

PROCEEDINGS
of the
INTERNATIONAL CONFERENCE
on
CHANGING CITIES VI
Spatial, Design, Landscape, Heritage & Socio-economic Dimensions

**CHANGING
CITIES**



Changing Cities VI, Rhodes, 24 - 28 June 2024

Edited by
Prof. Aspa Gospodini
University of Thessaly, Volos, Greece

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CHANGING CITIES VI
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Rhodes Island, Greece, June 24-28, 2024

Organised by

Research Unit of Urban Morphology and Design,
Department of Planning and Regional Development, Faculty of Engineering,
University of Thessaly, Greece.

in collaboration with

Department of Mediterranean Studies, School of Humanities,
University of The Aegean, Greece

Under the aegis of

The Greek Ministry of Maritime Affairs & Insular Policy
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PREFACE

The series of international conferences on *CHANGING CITIES* aspires to bring together urban planners and designers, architects, landscape designers, urban geographers and historians, urban economists, urban sociologists, and urban policy makers, and investigate new challenges concerning cities and their future. The conference aims at becoming an international forum of transaction of ideas on cities' transitions. We have so far organised six conferences, with peer-reviewed Proceedings, taken place always in June, in venues with unique urban and natural landscape, built heritage and place identity.

- *CHANGING CITIES I: Spatial, Morphological, formal, and socioeconomic dimensions, 18-21 June 2013, Skiathos Island, Greece.*
- *CHANGING CITIES II: Spatial, Design, Landscape and socioeconomic dimensions, 22-26 June 2015, Porto Heli, Peloponnese, Greece.*
- *CHANGING CITIES III: Spatial, Design, Landscape and socioeconomic dimensions, 26-30 June 2017, Syros Island, Greece.*
- *CHANGING CITIES IV: Spatial, Design, Landscape and socioeconomic dimensions, 23-28 June 2019, Chania, Crete Island, Greece.*
- *CHANGING CITIES V: Spatial, Design, Landscape, Heritage and socioeconomic dimensions, 20-25 June 2022, Corfu Island, Greece.*
- *CHANGING CITIES VI: Spatial, Design, Landscape, Heritage and socioeconomic dimensions, 24-28 June 2024, Rhodes Island, Greece.*

All Changing Cities conferences have been welcomed by the academic community worldwide, usually attracting about 300 presenters from many countries - Greece and Europe, USA and Canada, Latin America, Middle East and North Africa, Asia, Far East, and Oceania. On this basis, we believe the 6th Changing Cities conference will also be a successful academic event.

The 6th Changing Cities conference puts an emphasis on the transformations of cities related to climate crisis; the main theme is '*Climate Crisis. Cities' transitions towards smart & green development*'. Cities are on the front line of climate change. First, cities are the main contributors to climate change due to concentration of population and various human activities such as industrial activities, people's everyday mobility and transportation of goods, etc. – all of which increase the flow of heat-trapping greenhouse gases into the atmosphere. Second, the impacts of climate crisis on cities are dramatic; Cities need to cope with the unprecedented challenges of climate crisis such as wild wood fires, floods, extreme weather conditions such as heat waves, heavy rainstorms, land drought, etc. Thus, cities as 'guilty' constituents to climate change, must also become vital protagonists in mitigating climate crisis. In this framework, the 6th Changing Cities conference welcomes the academic discussions on specific measures and policies of green and smart development of cities.

This year, about **350 abstracts have been submitted** from universities, research institutes, governmental organisations, and Ministries of environment from all over the world. In the conference, **will finally be presented 265 papers**. Among them, **54% of the papers have been authored by foreign academics** while **46% by Greek academics**- indicating the international character of the conference. For the first time the 6th Changing Cities Conference includes about 60 remote presentations organised in last day of the Conference mainly involving young researchers, PhD candidates, postgraduate students who faced difficulties to cover traveling expenses. The Conference Program includes **20 special sessions** that have been pre-organised by distinguished researchers enriching the academic discussion on portraying the impacts of climate crisis on cities and

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highlighting green and smart urban actions and policies to mitigate the negative effects of climate crisis.

I would like first to thank the Organising Committee, the keynote speakers, and the members of the international scientific board who supported enthusiastically the academic organization of this conference – and especially those colleagues who have also pre-organized special sessions in this conference.

I would like to show our gratitude to all the academic supporters – **University of Thessaly, University of The Aegean**, and **IsoCarp** (International Society of City and Regional Planners).

I would also like to express our gratitude to the sponsors of this conference - namely **The Green Fund** politically supervised by **the Greek Ministry of Environment and Energy; The Secretary General of the Aegean and Island Policy in The Greek Ministry of Maritime Affairs and Insular Policy**; and **the elected Regional Authority of Thessaly**.

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of the series of Changing Cities Conferences

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KEYNOTES SPEECHES

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CITIES**



Changing Cities VI, Rhodes, 24 - 28 June 2024



Justice, Design and the City

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Abstract

Cities are sites of inclusion and exclusion. But few of the scholars who write about justice in the city consider the practices and processes of urban design. At the same time, discourses on urban design often neglect concerns about justice or the possibility of spatial interventions to change or create more just urban processes and outcomes. And yet, urban design interventions can have direct and important implications about justice in the city. This keynote talk will delineate the concepts of urban design for justice, the public city, inclusive urbanism, and design for difference, which compose the cornerstones of the recently published book *Just Urban Design* (MIT Press: 2022). The primary premise of the talk is that urban design can and must play an important and constructive role in the development of cities as a public good.

The talk will ground the theoretical discussion in empirical work by the author that shows how the unjust urban design of Los Angeles inner-city neighborhoods denies older inner-city residents some basic rights to the city. Walking in the company of older adults – mostly low-income immigrants – shows that their right to the city is severely compromised by dangerous and age-unfriendly sidewalks and public spaces. Still, certain urban design interventions can offer comfort and reduce the fears that many older adults feel when travelling the streets and sidewalks of their underprivileged neighborhoods.

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Innovations and challenges in contemporary global urban geographies: Defining sustainable pathways amid climate change, local economic stability and political cultural crises.

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Abstract

Cities face many new challenges in an era of rapid urban growth, climate change and rapidly shifting social and economic conditions. This keynote will be an exploration of the key role of innovative urban planning in addressing these issues. It will be a discussion on how cities can create sustainable strategies that balance environmental needs, economic stability and cultural vibrancy.

The talk will present the latest methods and tools in urban planning that enhance resilience, adaptability and viable development. These include the use of green infrastructure, promoting the circular economy, encouraging community participation and the use of digital technologies. These practical solutions are being used by cities around the world to address current urban challenges.

The keynote will also look at the importance of stabilising local economies in uncertain times and the role of urban planning in the management of political and cultural crises. We will highlight how cultural heritage can boost the local economy, especially in small and medium sized cities. This can help to counteract urban decline. By combining theory and real-world examples, this lecture aims to provide urban planners and policy makers with the knowledge and tools they need to create sustainable, inclusive and dynamic cities.

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The landscape project: analysis and critical reading

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Abstract

Always remembering Lucien Kroll's synthesis: "everything is landscape", consolidated by the European Landscape Convention, we must realize that the landscape project has a decisive role in the management of the territory and therefore within the theme of the climate crisis.

The projects, involving all the different disciplines interested and specifically useful, must be developed with a careful, analytical and future-oriented strategy. It is necessary to overcome the extemporaneousness of everyday life with long-term objectives, but visible in the various stages that follow one another.

The landscape project, even in its unity, must be able to support emergencies, natural events and catastrophes, fragility and climate change.

In the urban landscape, the value of public space is always a priority.

The landscape project therefore needs multiple disciplinary approaches, which, overcoming their respective boundaries, collaborate as a whole.

Since the beginning of this century, many things have already matured as the conditions and methods of creating landscapes have changed, expanding with new opportunities, known and debated, including issues relating to the climate, placing in first place the relationship between architecture and nature, with its implications in the urban landscape, placing the relationship between man and nature at the basis of the purposes of the landscape project.

In the critical rereading it is necessary to analyze carefully and methodically, in a contemporary scenario where cities are in crisis with an evident transformation.

The landscape project must not be included exclusively in planning, but its positive work can be included in individual specific themes, even small ones. We remember the interventions in urban public spaces and all the issues connected to parks.

The first discussion to open, in a scientific debate, critically rereading the projects and achievements, concerns abandoned areas, with urban redevelopment projects, also for the relationships between architecture and nature.

The most significant and emblematic cases may be: the construction on the piers of the port of Amsterdam with the new residential districts of the island of Java, Borneo and Sporenburg, with a waterfront that marks a new urban landscape; the Bo01 district, on a completely eco-sustainable basis, built in a disused port area, in Malmö, Sweden, with the motto "beautiful and sustainable", which arises from the European exhibition on living, held in 2001, entitled "The city of tomorrow for an ecologically sustainable information society in an era of well-being"; Le Albere, created in Trento, in 2013.

Keywords: *Landscape Project, Climate Change*, examples, critical reading

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Urban Flexibility and Dynamicity to achieve multiadaptive and multiresilient public spaces

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Abstract

In current territories, it is increasingly happening that crises of different types occur simultaneously. The coexistence of more than one risk determines further difficulties in resolving because commonly, since the risks are sudden and unexpected, we tend to treat the last risk more carefully, leaving out the previous one even if it is equally important, and very often without taking into account the positive or negative example of the event that previously occurred in another place, also for reasons due to different or non-integrated regional legislation (Sepe, 2023; Bohland et al., 2019)

Traditional approaches to spatial planning often do not take adaptive behaviour as a starting point, believing that urban interventions can be decided on the basis of facts and estimates that are available at the time of decision-making. This form of planning is based on a static perspective, which assumes a transformation according to predictable patterns, whose starting points are "actual, desired and potential" (De Roo, Porter, 2007).

While it is true that unforeseen events occur suddenly, it is also true that adaptive and dynamic planning can better support the creation of a new equilibrium through the identification of flexible spaces (Davoudi et al., 2013; Zolli, Healey, 2012)

Accordingly, flexible planning makes possible to use local peculiarities as a starting point for the redevelopment project, resulting in lower investment costs, shorter construction times and greater support from stakeholders. The various design possibilities that can be realized with respect to the existing situation are identified through quantitative and qualitative analyses, of which the latter determine the implementation of flexible planning (De Roo, Porter, 2007).

However, most of the methodologies used to analyse areas affected by different risks are aimed at focusing in particular on seismic risks without considering those relating to intangible aspects linked to the identity of the places or aspects related to urban health and liveability. And, more in general, in relation to design aspects, urban methodologies do not consider all the results of the analyses, maybe for the difficulty deriving from translate the complexity of collected data in project interventions.

Starting from these premises, this study – carried out in the framework of the research project PRIN 2020 SUMMA within the ISMed-CNR Unit (with the author's responsibility) and the relative agreement between Sapienza Università di Roma and ISMed-CNR - is devoted to define multiresilience and multiadaptation concepts, illustrate an analysis and design methodology of the urban space to be applied to areas characterized by multiple risks which require integrated and flexible interventions and define guide-lines for post-event reconstruction/regeneration/enhancement strategies.

Keywords: *multiresilience, multiadaptation, multirisk, sustainable urban design*

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Greenery in the Historic Environment. A Critical Future

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Abstract

One of the main goals of historic cities policy is for a greener urban environment that will help improve urban quality, health, and well-being, reduce urban heat impacts, and protect for urban risks bringing nature into the city. Consequently, the green living must focus on providing easy people's access to quality green spaces to address climate and health challenges. It is essential, therefore, to develop strategies and policies in urban greening to meet commitments such as: Green urban strategy; Green streetscaping strategy and so on. There is a growing research and community recognition that providing healthy green environment such as an essential infrastructure can play a key role in creating environmentally-friendly and culturally inclusive urban spaces. The raised questions are: How can historic city transform its 'Heritage Open Urban Space', (HOST) including streets, small streets, squares, small squares, historic gardens to create more accessibility for people to walk, cycle and shop and reactivate to welcome people safely back to urban quality? Are HOSTs set to be transformed into 'urban oases', showcasing as part of a drive to provide urban quality and mitigate climate change? However, to create a sense of place, and street for all users, historic cities must introduce innovative strategies to represent where different types of greenery can introduce the 'Green Infrastructure Approach' for climate change adaptation and social benefits.

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Combining creativity and circular economy towards the regeneration of the urban ecosystem and the natural environment

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Abstract

The impacts of climate change, observed in recent decades, as well as the pandemic crisis are now resulting in degradation of the natural environment. The consequences of both the climate crisis and the pandemic are multiple, and addressing them requires a complex and multi-disciplinary approach. Priority must certainly be given to introducing alternatives for energy saving, reducing carbon emissions, ecological savings, including waste reduction and sustainable mobility. Changing production patterns with the support of recycling and the introduction of the circular economy would seem to be particularly effective means of promoting these trends. However, these actions can only bring comprehensive results if they are combined with additional measures to ensure quality life, adequate social housing, heritage preservation and the necessary social services. Therefore, a review of urban and broader spatial planning in a long-term framework is needed, following the recommendations of the global scientific debate on cities

There is a well-known relationship between culture, Creative Cultural Industries (CCIs) and urban development. A particular role has recently been taken by the recycling process in this context, so that many institutions are now recognizing and promoting this relationship with a view to Sustainable Development Goals (SDGs). Culture and CCIs cross many aspects of cities (economic, social, cultural), create social and cultural networks, and contribute to the local economy. CCIs are organized in a variety of ways: clusters, networks, hubs, and co-working spaces compose the so-called creative ecosystem that can thrive when cities provide a strong milieu.

Researched case studies and related theory argue that the majority of CCIs small medium enterprises are generally based in urban centers, flexibly exploiting the advantages of location, such as partnerships and cooperation with other relative enterprises, low costs of transporting raw materials and products, the ability to meet skilled labor, low rents, etc. Therefore, a privileged network is formed for their operation, defined by the favorable traffic conditions in particular raw materials, products and the presence of business and labor, which simultaneously constitute vectors of traditional knowledge. The resulting social and economic interactions reinforce this favorable environment and create a distinctive urban landscape. The CCIs sector is increasingly developing, highlighting opportunities for new jobs, collaborative economy, social innovation, start-ups and urban regeneration. It is often presented as a supporting factor for sustainable urban development, as it relies more on human inputs than material inputs.

Modern cities have a long tradition of creative and cultural activities, but the majority of has not resolved the issue of waste management. This is a multifaceted social, economic and urban-environmental issue whose resolution is of considerable research interest. The researches included in this paper will attempt, through innovative practices and tools, to link these two characteristics with the main objective of developing a strategy for a circular economy involving small and medium-sized CCIs, creating circular networks of cooperation and exchange within the urban fabric. Cities and industries may learn about the different solutions that can be adopted, considering their specific urban

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and economic features, such as the socio-economic fabric, the availability of raw materials and technologies, or the position along the global supply chain.

Finally, local authority should play an important role in managing the overall cooperation and coordination among CCIs, traditional businesses, and final consumers. Local authorities must promote the adoption of recycling and upcycling practice among industries, and so the conversion of their production systems.

Keywords: *Sustainable Development Goals, Sustainable Urbanization, Cultural Creatives Industries, Circular Economy, Recycling, Upcycling.*



Legends of possible flood destruction, contemporary waterscape resilience and political sustainability

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Abstract

It seems completely reasonable, nowadays, to expand the concept of urbanism through the addition of the suffix “landscape”, “landscape urbanism.” Moreover, it is also completely justified to specify the term “landscape” as an attribute of the noun “urbanism” and refer to “waterscape urbanism” in particular; or to discuss, on a more extended scale, the waterscape planning in urban or peri-urban scale. We have just described an important thematic approach, associated with a number of the present conference subjects: to the agonizing interest for climate change, for urban resilience and why not, for cultural and historical references indicating that water management constitutes a matter of consideration immersed in the ancestral depths of memory. Thus, the notion “sustainability” in the title of our paper intensely refers to the awareness of our communities, recognizing that ecological care in general, waterscape control and prevention of natural deluge could not be fruitful without a frankly expressed political concern. “Political sustainability” may thus be interpreted as political volition for environmental sustainability and, as the need for political integrity, as the need for sincere political volition for social well-being.

In our presentation, we could insist on the didactic value of our planning and design paradigms. We shall thus present didactic paradigms, concerning a research contribution, and academic instruction approaches or didactic examples, addressed to the totality of the urban communities. We shall focus on the waterscape identity of the Hellenic territory of Thessaly in particular; a territory largely influenced during the last delusive floods by a neglected or, at least, by a non-foreseen negative environmental condition.

Keywords: *waterscape control; waterscape urbanism, environmental and political sustainability, Athenian Green and Blue Porosity, academic and cultural didactics; plain of Thessaly, Historic Botanic Garden of Thessaly.*

• INTRODUCTION: LEGENDARY IMAGINARY AND LANDSCAPE INTERVENTION PRACTICES CORRELATED TO WATER MANAGEMENT

It is significant to mention that the term “landscape” as it appears in neoteric Western European languages was first coined in 17th-century Holland, under the Dutch word “landschap”, initially signifying landscape painting and intensively connoting the interest of the Dutch society for the total control of place formation [1:62-64, 2:104]. We could furthermore mention that this environmental, economic, and political interest was strongly associated with the water-scape management of the country through ingenious infrastructural interventions that succeeded in transforming extended wetlands into agricultural productive land. It was in the same country that strong dikes protected coastal zones from the sea-water fury and that friendly canals offered to the urban territories a picturesque environment combined with a water-circulation system.

We should mention in addition that 17th-century Holland was the first European country to possess an electoral system of governance, and an extended socio-political corpus of middle-class land proprietors, owning private farmland or a small well-formed house at the borders of a well-organized system of canals. It is in the same context that we may present the agrarian, urban, and even the

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economic or political formation of the Dutch “Golden Era” 17th-century society, as immediately associated with its waterscape management and ingenious design [3].

The previous may be probably considered as the best possible example for a “fertile” introduction to the nucleus of our presentation: the economic and political prosperity of the Dutch 17th-century society and its economic and political progress were correlated to its waterscape resilience. Reversing the previous statement, we may convincingly state that the political conscience of the strongest middle classes of the Dutch 17th-century, was the prerequisite for the continuous environmental control and flood prevention exerted on their natural environment. This could be an important paradigmatic reference, that could be used as a comment for our contemporary anxiety, towards low waterscape central political management, or this is even more crucial, towards low environmental ecosophic conscience.

(1) Waterscape seduction buried under tons of oblivion and its regeneration through the concept of the “Green and Blue Porosity.”

Recent destructive floods in Thessaly, Greece are intensively correlated to a mediocre controlling approach, through an extended period of governance. The previous comment seems to be extremely important: it refers to a lack of decisive environmental interventions or even worse a continuous negligence of environmental interventions, under the governance of different, successive political parties. Looking backward, we may remark that the delusive result of September 2023 in Thessaly, did not need a clairvoyance vision to be foreseen and prevented, but rather a concise scientific and governmental management that seems to be largely neglected.

We shall not continue by offering a concise critical approach to the political and finally to the cultural loss of our environmental responsibility in the previous case of Thessaly; a concise critical approach, having to do with detailed scientific research. We may, nevertheless, present an undeniable realization, having to do with the waterscape system of the metropolitan area of the Hellenic capital city of Athens. In 2015, as part of a research approach to the previous urban territory, we decided to investigate a possible green landscape system that could be organized in the Athenian basin [4]; a systematic organization that could promote a network of existing or future possible parks, correlated through green planted corridors.

We refer to an “emerald necklace”, as a landscape network analogous to what Frederick Law Olmsted, had proposed in his 19th-century project for the Boston Park System (emeralds are precious stones of green color) [5:96-108, 6:83-93], or analogous to Baron Haussman’s Park Network for the urban reform of the 19th century Paris. We shall remark that our proposal for Athens was presented one hundred fifty years after the two previous urban examples and that it bears the title “Green Athenian Porosity”, in association with the well-known use, by Walter Benjamin, of the term “Porosität – porosity”; a term describing the way that urban void corrodes the urban buildings solidity. Nevertheless, a third comment seems to be more important; a comment presenting the political validity of the park systems and the landscape urbanism. According to Olmsted’s insight, analogous urban interventions are not solely a matter of aesthetic amelioration of the cities or a matter of a neutral environmental concern. They rather refer to the political rights of the citizens, to their democratic political rights. The 17th century Holland had to provide positive water management to its population, and neoteric democratic Western societies had to provide positive urban landscape conditions to their habitants, otherwise we could describe them as authoritative or at least as politically blind and irresponsible.

In our research proposal for the porous green system of the Athenian metropolitan territory, the “Green Athenian Porosity”, our proposal of eco-political intervention, soon reached a more intelligent design approach. Not only we could create a green network system, moreover, we could think of a waterscape network of streams and rivers that could be associated with the previous green network, creating a more complicated and surely richer system of green and water urban conjunct formations; a system of “Green and Water Athenian Porosity” (Figure 1) [7:345-349].

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Our research soon realized that most of the elements of this desired water network, being apparent till the 19th and the first decades of the 20th century, were covered, foolishly, under the false belief that they could thus be used as building substratum or for other solid earth functions. Furthermore, the existing non-covered streams or riverbeds were extensively mummified through their transformation to concrete canals, presenting no real interaction with the surrounding still-existing natural influences of the urban environment. Could Athenian municipalities or Hellenic ministries actively participate in the revitalization of the underestimated Athenian waterscape?

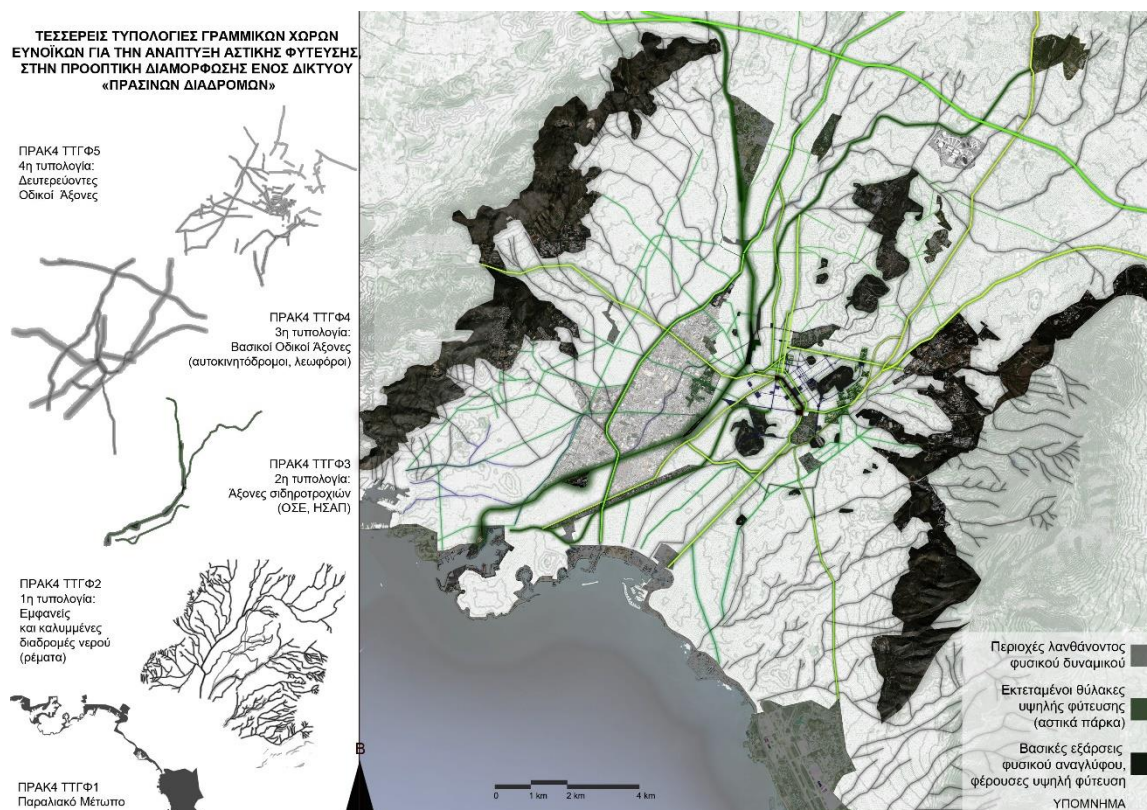


Figure 1. Map depicting the complex system of the green network (stronger green lines of proposed planted corridors) and green enclaves of existing or possible future parks (black spots), in correlation to the waterscape network of rivers and urban streams that had to be uncovered (thinner black lines). The total combined system has been described as “Green and Water Athenian Porosity.”

(2) Waterscape seduction buried under extended lack of environmental conscience and managerial negligence.

As a reply to the previous rhetoric questions, we may use Félix Quattari’s description, in his book on *Les Trois Écologies, The Three Ecologies* [8]. The French intellectual insisted on the three-fold necessary orientation of the ecological approach: on the “natural” ecological condition having to do with the control of the natural environmental factors, of the “cognitive” ecological condition having to do with the social conscience concerning environmental protection and, finally, on “social” ecology, correlating natural environmental conditions with social and political ethics, with the social and as we could add, with the political integrity of our societies. Thus, the notion “sustainability” in the title of our paper intensely refers to the awareness of our communities, recognizing that ecological care in general, waterscape control and prevention of natural deluge could not be fruitful without a frankly expressed political concern. “Political sustainability” may thus be interpreted as political volition for environmental sustainability and, as the need for political integrity, as the need for sincere political volition for social well-being.

We could now continue our presentation and explain that we shall not describe solely planning and design paradigms, we shall rather insist on their didactic value. We shall refer to didactic paradigms presenting, in addition to the previous research proposal of the “Green and Water Athenian Porosity”, academic instruction approaches or, furthermore, a tendency for extended didactic examples addressed to the totality of the urban communities. This last approach will be presented in our text through two urban landscape design projects that offer, in addition to their positive environmental contribution, exemplary narratives focused on the waterscape identity of a given Hellenic territory. They both refer to the territory of Thessaly, largely influenced during the last delusive floods by a neglected or, at least, by a non-foreseen negative environmental condition. In those two paradigms the need for political bottom-up apprehension is suggested, supporting the top-down scientific planning or design approaches. In this frame of reference, cultural guidance is offered to the citizens, indicating the importance and the threads of the waterscape as presented by legendary and historical references, in our case associated with the critical resilience of the plain of Thessaly.

2. WATERSCAPE DESIGN AND MANAGEMENT: ACADEMIC DIDACTIC PARADIGMS

We shall now present three paradigms of waterscape and management interventions, proposed in the context of diploma theses in the School of Architecture N.T.U.A.



Figure 2. Exemplary intervention at the stream of Pikrodaphni: conceptual plan (upper part), and correlation of the zone of the stream with a green urban plantation zone (lower part).

The first among them refers to a rehabilitation intervention, applied at an exemplary element of the “Green and Water Athenian Porosity” system, at the stream of Pikrodafni, a waterline running through a densely built part of the city. The project [9] noticed that the streambed has been distorted, partly covered, or narrowed and thus in a dangerous condition for a possible future flood. As an answer, the diploma thesis project proposed the re-naturalization of the streambed, uncovering it, increasing the curved parts of it, and suggesting, furthermore, its enlargements in such a way that a possible flood could be harmlessly decompressed (Figure 2). The streambanks were stabilized in a natural way through vegetal implants, without the use of concrete, and additional higher tree plantations at the length of the banks realized the association of the waterscape design with a green urban landscape.



Figure 3. Exemplary intervention at the urban zone and the neighbouring lagoon of the historic Hellenic city of Missolonghi: a central urban park zone combining a canal passing through the city and ending at the lagoon area (upper part), and a wooden structure offered to the strollers of the proposed water and green landscape formation (lower part).

The second paradigm refers to another waterscape network, not that of the Athenian territory but in the waterscape context of the lagoon, next to the “sacred” Hellenic historical city of Missolonghi. The project [10] (Figure 3) intended to restore the covered parts of a previously existing canal network, and even augment it, to create an extended visiting and touring system, in the interior of the city or next to it. Wooden constructions were provided for the important focal places of the previous canal network, as landmarks of reference, inspection towers, or structures for possible public group activities. The waterscape network was again, in this second paradigm, correlated to organized, designed plantation proposals; nevertheless, the project was not limited to a natural landscape intervention. Missolonghi is well known for its historic importance being correlated to the struggle for independence during the Hellenic Revolution of 1821. It is in this context that the term “political sustainability” acquired, in this case, a concise, aphoristic meaning. The Missolonghi lagoon and the city of Missolonghi in itself constitute a compound “cultural and historic landscape”, a compound “cultural and historic waterscape”; we ought to preserve both its natural and historical-political integrity.

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Figure 4. Landscape intervention proposal, at the zone of Arachthos River, partly surrounding the city of Arta, in Epirus Greece.

The third paradigm refers to a proposed management of the Arachthos River, a waterscape at the periphery of the Hellenic city of Arta in Epirus, Greece. In this project [11] (Figure 4), the river zone was not limited to the quantity of water flowing in the bed but, again, as in the previous case of Pikrodaphni stream, it was extended to the wider green zone surrounding it; at a zone where the influence of the water could easily be seen. After defining the borders of this water-vulnerable area, interventions were proposed only at the exterior of it, while in its interior the area remains free of constructions, to be influenced only by the passage of visitors and water. Moreover, the project proposed a controlled, human-made flood every few years. Thus, the river could regain its old flow range, reform the riparian zone, and partly counterbalance the drawbacks of the existing dam. We could consider this controlled intervention as a means of natural environmental invigoration and, at the same time as a cyclic repeated “festivity” for the city aiming, according to the description of the project, “in the re-activation of the collective memory.” We could insist in this case on the term “cultural sustainability.” Nevertheless, is it cultural sustainability, a necessary compound of what we have already many times characterized, in our text, as “political sustainability”? That was a rhetorical question.

3. LEGENDS AND REAL LANDSCAPE INTERVENTION PRACTICES, CORRELATED TO WATER MANAGEMENT: THE CASE OF THESSALY

We have so far introduced our readers to important thematic approaches, associated with a number of the present conference subjects: to the agonizing interest in climate change that demands our environmental commitment, to the need for urban resilience and why not, for “cultural and historic resilience.” In this cultural and historical context, water management appears to constitute a matter of consideration immersed in the ancestral depths of memory; it surpasses the beginnings of history and goes back to Noah’s cataclysm or the Deucalion’s and Pyrrha’s flood in the Greek mainland. In the narration of the Book of Genesis of the Hebrew Bible, Noah had to build as a respond to God’s command an Ark. He succeeded thus in saving not his own family solely, but mankind itself and all land animals, from extinction during a disastrous Flood, a cataclysm, which God created after

regretting that the world was full of sin. An analogous legend refers to the Deucalion's and Pyrrha's flood [12:32-37], associated with the geographic territory of Thessaly in Greece, which has already been used as an introductory example of reference in our paper. We have just indicated that water management appears to be a matter of central concern in our known history and that its importance seems to have a deep mythical or even religious value, infiltrated in the cultural unconscious or the historical conscience of human societies worldwide.



Figure 5. After the delusive flood the two only survivors, Deucalion and Pyrrha, were throwing rocks behind them and, out of those rocks, a new tribe was born at the Thessalian plain, the tribe of the Hellenes, the Greeks. A 17th-century depiction of the legend, by Giovanni Maria Bottalla, (1635).

In the next two paradigms of professional projects, awarded in Panhellenic Architectural Competitions (both concern urban landscape and urban gardens interventions in cities of Thessaly), the architects directly refer to the legend of Deucalion's and Pyrrha's flood. The projects were completed, as a design proposal, some years before the last year's cataclysmic incidents in Thessaly. Nevertheless, they felt obliged to offer to the citizens or the visitors of the proposed landscape interventions, a didactic reminiscence insisting on the importance of the waterscape for the survival and fertility of the plain of Thessaly.

The first example corresponds to the redesign of a complex of two central urban squares in the city of Trikala, next to the river Lytheus [13] (Figure 6a). In correlation to the real place formation of the project and to the landscape intervention at the bank of the river, a guided route was added. It intends to combine a real promenade with digital narrations concerning the legendary and historic depth of the city: the references to the deified initiator of ancient medicine Asclepius, to the ancient, byzantine, ottoman and neoteric period, to the correlation of Trikala with the folk culture "Rebetiko" song, to the local resistance movement against the Nazi's occupation during second World War. To those multivalent narrations, one more was added; that of the Deucalion's and Pyrrha's legend, being constitutive of the geomorphology, the hydrological identity and the prehistoric depth of the territory in question.



Figure 6. An architectural competition awarded project, for the redesign of a complex of two central urban squares in the city of Trikala, next to the river Lytheus (upper part, Fig. 6a). The correlation of the waterscape formation to the green urban landscape is obvious. Analogous binary correlation of the waterscape and the green landscape design proposals we may observe in the second awarded project, that of the “Deucalion’s Cycle”, of the circular “Historic Botanic Garden of Thessaly” in the city of Larissa (lower part, Fig. 6b).

An analogous reference was proposed in the case of a second awarded project, that concerning the design of the “Historic Botanic Garden of Thessaly”, in the interior of a larger park zone in the city of Larissa; a historic botanic garden entitled “Deucalion’s Cycle” [14] (Figure 6b). According to the project, a circular garden was proposed, formed in such a way that its plan corresponded to the map of ancient Thessaly patterned in relief. At every part of it, a plantation of botanic species analogous to the supposed ancient flora would be provided, and metallic stands would be installed at the places of the map corresponding to the important ancient cities of Thessaly. On the stands, inscribed QR codes would offer the visitor digital narratives, concerning natural landscape information and mythological or historical references. What had to be added to this description, is the comment that the central element of this garden design would be a line of water, depicting the river Pineios, flowing from the Pindus Mountains through the Thessalian plain and emptying into the Aegean Sea. There, the river creates a large delta, well known for its beauty and many animal species, protected by international environmental treaties.

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4. CONCLUSIVE REMARKS: DELUSIVE FLOODS OR CULTURAL AND “ECOSOPHIC”, ECOLOGICAL CONSCIENCE?

In his second volume of *Faust*, Johann Wolfgang von Goethe described the phantom of Helen of Troy, revealing the essence of beauty to the central hero of the narration, Dr. Faust [15]. According to Helen such an aesthetic apperception could be realized through a journey in the Hellenic landscape, from Thessaly and the plain around Pineios River to the landscape beatitude of Arcadia. Goethe surely referred to the supposed natural beauty of the landscape of Greece, a country, nevertheless, that he had never really visited. What seems more justified could be the assumption that Goethe’s praise of the natural aesthetic superiority of the landscape of Greece is rather associated with its cultural and political importance, metaphorically correlated to its perceptive value. It is this compound identity, natural – material and cultural or political and immaterial that we ought to preserve against the natural delusive floods, the negative climate change, or against the loss of social and ecological conscience. It is following those demands that we have used, in our present paper, the terms cultural and political sustainability.

It is in the previous context that we feel obliged to finish our presentation, insisting on the comment that five years ago, the representatives of the School of Architecture of N.T.U.A. participating in the advisory committee of the Hellenic Ministry of Environment and Energy, for the “Landscape Award of the Council of Europe”, insisted on the importance of the Greek proposal for the restoration of the lake Karla in Thessaly, for its recreation as a natural waterscape. According to them, this project could be considered as one of the most important European landscape intervention projects.



Figure 7. Swan on the lake Karla.

Karla, a 180km² lake was completely drained in 1962 to be transformed into agricultural cultivation land, though it previously offered, before its drainage, a unique fishing culture with extended fisheries of significant economic importance. Nevertheless, agriculture seemed to be unsuccessful at the saline soils of the former lake bed, and as the ecosystem of the territory was radically upset, the ambitious project of the lake renaissance was realized under the support of the European Commission. The lake was finally “inaugurated” in October 2018, and it now exists as an important reference to the need for the preservation and support of the precious and capricious Thessalian waterscape, of its natural and cultural significance going back to the reminiscences of ancient Greek mythology.

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Figure 7: CC BY-SA 4.0, Ioannis Ch. Lampropoulos -

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Regional and local dimensions of Maritime Spatial Planning.

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Abstract

The keynote address will highlight the regional and local dimensions of maritime spatial planning, both at the European level and in the context of the Eastern Mediterranean sea-basin with a focus on Greece. The paper draws conclusions and policy recommendations from the REGINA-MSP EMFAF project with case study the Region of Crete where relevant participatory processes have been implemented by Panteion University. Consequently, will be discussed the analysis of the positions of all interested parties (incl. the MSP authority that is the Ministry of the Environment and Energy), the presentation of good practices for the harmonious coexistence of uses (offshore wind farms, fishing, tourism, NATURA areas, marine protected areas, underwater antiquities, diving parks), the development of participatory planning at the regional/local level and the cooperation between levels of governance and finally the creation of a Community of Practice (CoP) as promoted by the REGINA-MSP project and the possible establishment of a Regional Community of Practice and Innovation for optimal energy transition solutions, with a focus on offshore RES.

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Goals and Sub-Goals of the United Nations for the Sustainable Development of Cities

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Abstract

The 11th goal of sustainable development refers to sustainable cities and communities, and based on it, the solution of many key problems of cities is promoted at the global level. Today, many countries, having integrated the main directives of Global Goal 11 for the Sustainable Development of Cities and Communities in their domestic law and policies, are drawing up programs and taking initiatives and actions to achieve it. The ultimate goal is individual and collective well-being and sustainability in all areas of life in the urban environment. The comprehensive implementation of the 11th SDG is a collective undertaking, which requires the cultivation of a spirit of cooperation among all, having as the main stake the fundamental principle that "no one is left behind".

From the analysis of the policies promoted in recent years in the EU, it is observed that it has included almost all the areas covered by Goal 11, that is, Europe has oriented the goals of the United Nations Organization to European data, with the aim of achieving them by the European community.

However, the awareness in society and the active participation of citizens are necessary conditions to deal with the problems that cities are facing today. The first concern should be the change in mentality, mainly of the citizens who hold a position of responsibility, but also of each individual citizen, in matters concerning the city and its environment.

The European Union, as the most important coordinator of the processes of sustainable development, is constantly trying to give directives so that all cities and communities can work together to achieve goal 11. Many relevant programs are implemented by the EU states, but also directly by cities and communities. As far as the Greek state, is concerned that it implements a comprehensive policy to achieve goal 11, as sustainable planning is supported and environmental measures are taken to clean up waste management processes and public service processes and to encourage Greek citizens to environmentally upgrade their homes and be able to deal with climate change.

As far as Local Government Organizations are concerned, they are perhaps the most important bodies for implementing new measures and improving the existing situation in relation to the sustainability of cities and communities. Many Local Government Organizations today are very successfully orienting their actions with the aim of achieving sustainability and are an example for others to follow. But everyone's participation is necessary and the individual effort of every citizen is also very important! The sum of individual actions will lead to collective action and this to the solution of global problems and therefore to the final success of the 11th Goal concerning the sustainable development of cities and communities. Because, as Mother Teresa said, "I alone cannot change the world, but I can throw a stone into the waters to create many ripples."

Keywords: *cities sustainable development; 11th SDG; individual actions for sustainable development*

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Designs that able disableism

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Abstract

From the white, non-disabled muscular male figure such as seen in da Vinci's Vitruvius Man and likewise Le Corbusier's Modular Man to the standardised user illustrated in architectural professional handbooks, norms of able-bodiedness were used to produce good design by dominating the mens et manus of designers.

In recent decades, 'Universal' and 'All-inclusive' design theories and practices have been monopolising access for everyone regardless of particular needs. Yet, emerging access studies are highlighting challenges due to evolving disability and inclusion concepts, intersectional perspectives, and varied bodily experiences.

Responding to this call for accessibility, designers meet the minimum requirements of accessibility codes through obligation by merely ramping the built environment, without considering the emotional impact of their designs, or the need for all users to be able to retain a sense of dignity as they enter and move through buildings and open spaces.

This presentation aims to demonstrate critical spatial aspects of disability and inclusion that can inform designers who pursue creative, rather than constraining, accessibility-focused spatial solutions. Beyond accessibility codes and regulations, it seeks to establish new architectural forms and introduce physical transformations based on site and culturally specific evidence that maximise possibilities for disabled people in both private and public spaces.

To this end, the presentation reviews disability from a historical perspective, outlines current accessibility thinking, and examines the role of experts and their impact on users. Aimed at upcycling everyday environments so as to enable movements, our research has analysed and evaluated the built environment of Athens, where the experience of dignity is ubiquitously threatened due to planning pathogenesis. At the scales of apartment, building, city block, and neighbourhood, it has examined factors in urban space that promote dignity and access for all people: adaptability, aesthetics, autonomy, efficiency, equitability, flexibility, perception, privacy, safety, and social interaction.

Its findings enrich access knowledge through innovative urban design paradigms with the potential to transform spatial environments into dignified spaces for all.

Keywords: *disability, accessibility, inclusive environment, built environment of Athens*

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Photography as a critical thinking and living archive of changing cities and landscape.

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Abstract

In an era marked by rapid urbanization and dynamic landscape transformations, the art of photography emerges as a powerful tool not only for documenting change but also for fostering critical thinking about our evolving cities and landscapes. This paper explores the role of photography as a medium for capturing the different narratives of urban development, offering a deep understanding of the complexities of social, environmental and cultural change. On the other hand everywhere today, countless “would-be” photographers holding a mobile phone, having a strong desire to share personal experiences with others and preserve memories by highlighting their visual presence, with such intensity, that Susan Sontag may have been quite right in saying that "Today, everything exists to end in a photograph". Bridging visual analysis with multiple narratives of the city, the paper addresses how photography interprets and represents the ever-changing urban landscape, revealing layers of meaning and critique. In addition, the concept of photography as a living record is examined, wherein images serve not merely as static records, but as dynamic reflections of ongoing processes. Through an interdisciplinary approach encompassing visual analysis, cultural theory, and urban studies, today more than ever before, we can understand how photographers capture and interpret the dynamic interplay between human activity, architecture, and the natural environment. By considering photography as a critical lens, we uncover alternative perspectives on urban growth, decay and regeneration, prompting viewers to question assumptions and envision alternative futures. The paper focuses on a visual journey through changing cities, exploring the deep connections between photography, critical thinking and the evolving landscapes.

Keywords: *photography; changing cities; urban landscapes; landscape;*

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The New European Bauhaus: Heritage, Landform and Climate Change

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Abstract

The European initiative of the New European Bauhaus calls on Europeans to bring forth and protect the values and qualities of our shared continent at a time of climate change, cultural expansion and revision. Especially Southern Europe and the countries of the Mediterranean face dire predictions in regard to rising temperatures and projected draughts, a fact that impacts not only the moderate Mediterranean climate, but also affects the landscape and the traditional forms of inhabitation. Beauty, Sustainability and Togetherness, as professed by the New European Bauhaus, bring new challenges and unlock new possibilities within the framework of preserving the Mediterranean culture- an old culture which has long nurtured freedom, wellbeing and simple living as an expression of a harmonious co-existence between landscape and man.

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Exploring character and physiognomy of vernacular settlements as a means of preserving cultural heritage through sensory identity

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Abstract

The character and physiognomy of vernacular settlements and more specifically of the Aegean Island settlements, is a matter of investigation within the frame of city identity, city branding and placemaking. The overall question investigates the qualities which compose all the characteristics that act as magnets and attract thousands of people.

This paper addresses issues of city character, personality, physiognomy, image, branding, genius loci, sense of place and identity in order to obtain a clearer view on the parameters/criteria/factors that form them in the quest of preservation the identity of the vernacular Aegean settlements. The study proposes a simple tool that includes all the related parameters of value, which should be considered in order to preserve urban identity in great value historic settlements. The tool is in the form of a simple diagram and is addressed to all related stakeholders.

Keywords: *city character, city physiognomy, sensorial urbanism, cultural heritage, vernacular settlements*

1. INTRODUCTION

Several questions can be raised about character and physiognomy such as how is it possible to quantify them, whether they constitute planning parameters and act as parameter for the preservation of existing heritage. Can these two measures be related to the so-called spirit of the place? The local wisdom called genius loci by Norberg-Schulz, is associated with the spiritual sense of place in order to contextually sustain and preserve the quality of life and the local characteristics.

Character can be defined as the particular combination of qualities in someone or something that makes them or it different from others and also the way someone thinks, feels, and behaves. On the other hand physiognomy is defined as the appearance of a person's face. One can therefore say that character and physiognomy together consist a number of inner and outer qualities of a person. Moving to urban space analysis very often we come across the meaning of character and physiognomy of the city. Could it be that these two qualities if quantified could measure and define urban space identity?

Since ancient times, as early as the 15th century, travelers from central Europe travelled to the south in order to get to know the particular characteristics of the landscapes, the settlements and the people of the south. The environmental impact on health and long life was noted by the traveller Tournefort. In his description of the Greek island of Siphnos, he notes “*There are Men in Siphanto 120 years old: the Air, Water, Fruit, Wild-Fowl, Poultry, everything there is excellent*” [1].

Another aspect related is city identity and city branding. To understand the importance of city branding, it is important to clarify the concepts of city identity and city image. City identity is related to the fundamental essence and reality of a city. It encompasses the unique combination of qualities often derive from distinctive natural, cultural and historical characteristics. Branding, mainly developed from marketing strategies, is more and more used for city marketing and promotion, similar to products.

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A sense of place creates a personal identity, allowing the city to become more important to users and society. This last point is also suggested by Adams, who notes that “to walk through a place is to become involved in that place with sight, hearing, touch, smell and even taste”. Sensory landscape, also called urban sensescape, is the total experience of the city through all the senses, which also creates a sense of place for people, awakening memories, cultural connections and associations.

The concept of “sense of place” thus becomes an important criterion for understanding the built environment to which we belong. Sense of place represents the connection to the place where we live. The general feeling that is created in an individual after a crisis and the perception of specific environments is called “sense of place” and refers to the emotional connections that people feel or develop in a place [2]. Sense of place also derives from the effects of the design of the environment, the activity that takes place in it and what these forms and activities mean to people.

Cities, public spaces and the urban landscape in general can create this sense of place when people visit that space often and return because they have developed a sense of attachment and belonging in some way. This deeper connection to a public space makes it a place where people return and interact in a positive way. It is, therefore, important to move from public “space” to public “place”. A sense of place creates a personal identity, allowing the city to become more important to users and society. Despite the increased sensory bombardment, we have lost the art of appreciating the varied sounds, smells, textures, and qualities of materials, as well as the look and feel of the city and its component parts [3]. Every city has its own sensescape, yet our perceptive capacities are cramped because we do not sufficiently recognize or practice most of our senses. We have forgotten our ‘natural’ aesthetic knowledge, which is the science of sensory perception derived from the Greek word meaning to be ‘sensitive,’ ‘sentient,’ and to ‘perceive,’ ‘feel,’ and ‘sense’ [3]. Trespassing on our senses will be one of the critical battles in defining how our cities evolve in the future.

At the country brand personality level, studies differ from other investigations in terms of research methodology, using both qualitative and quantitative methods. According to Aaker [4], to study brand personality, products were categorized into three groups. Therefore, in this study, cities were categorized into three groups: functional cities, valuable cities, and functional and valuable cities. A functional city refers to a city with distinctions in economy, education, and industry. A valuable city signifies a city with cultural and traditional treasures, while a functional and valuable city possesses both characteristics.

The application of city identity principles to vernacular settlements involves adapting concepts traditionally applied to cities to smaller, often rural or less urbanized communities that possess distinct cultural, historical, and environmental characteristics. To set the general theoretical framework, a brief analysis of key-concepts follows, including City Identity, Personality, and Image as well as City branding, Brand Personality and Placemaking.

2. CITY IDENTITY, PERSONALITY, AND IMAGE

City Identity

City identity relates to the fundamental essence and reality of a city. It includes the unique combination of qualities and values that define and characterize a city, distinguishing it from other places. These qualities often derive from distinctive natural, cultural, and historical characteristics. Moreover, city identity is closely linked to the values that are of paramount importance in differentiating cities. While the term ‘place identity’ is commonly used in discussions about place branding and marketing, limited attempts have been made to fully understand it. Weichhart sheds light on this confusion by stating that we regularly befuddle put personality with the idea of a clearly identifiable put with it possess character and aesthetics, as well as the recognizable proof of inhabitants with a put or community, a city or locale, a neighborhood or a locale [5].

In the urban field, many architects and planners have thought a lot about the identity of cities and places, proposing many different definitions from different perspectives. Each definition emphasizes that each city is different due to a specific combination of subjective and objective factors. These

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factors include climate, natural elements, memories, emotional aspects, social life, culture and physical structures. Urban identity is largely shaped by factors such as location, spatial form and how they relate to human-made features. The characteristics of a place include its location, how it interacts with the urban form, its various aspects, the space has its own characteristics, colors, structures, sounds, smells, temperature, wind movements and the presence of different social groups engaged in different activities. Buildings and urban areas reflect social contexts, lifestyles and cultural meanings, emphasizing the importance of material form and the relationship between the physical environment and its context. Therefore, one of the most important cultural expressions of a community is its physical layout [6].

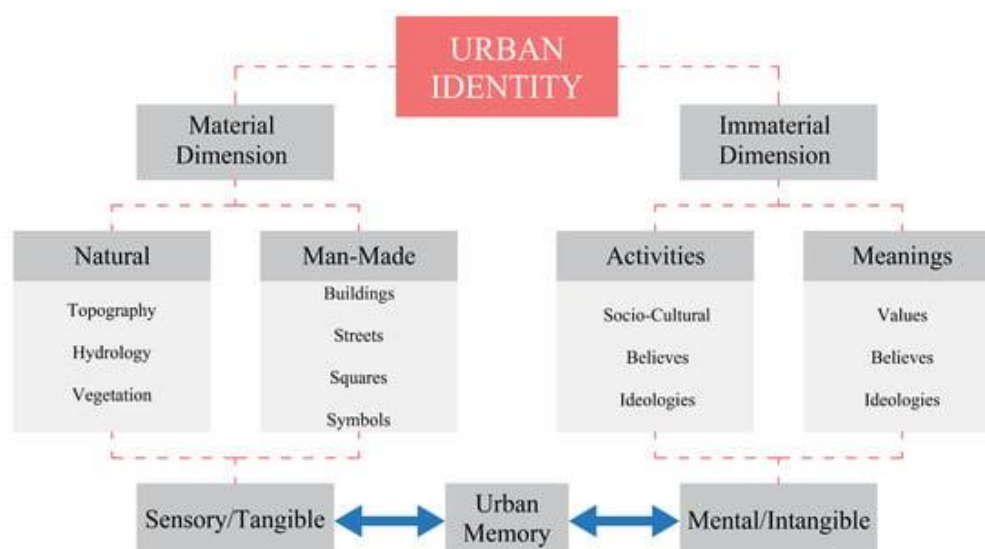


Figure 1. The components of urban identity [6].

Innovative design schemes may also play a role in forming the identity of a city since by becoming landmarks and promoting tourism/economic development they may generate new social solidarities among inhabitants grounded on ‘civic pride’ and economic prospects [7].

City Personality and City Image

The concept of city personality pertains to the distinct array of traits, characteristics, and values that define a city and set it apart from others. Much like individuals and brands, which are frequently associated with specific personality traits such as sincerity, excitement, or competence, cities can also be perceived and described based on their unique attributes. Despite the fact that some studies focus on city personality using the brand personality framework, Aaker’s framework fails to adequately explain city personality. In recent years, there has been an increasing amount of literature on city personality; however, several studies argue that these measurement scales suffer from limitations in generalizability. Several studies employed qualitative methodology to discover city personality by collecting data in one area and performing data analysis for quantitative information [3].

Hong-Bumm Kim and Sanggun Lee examined the causal relationships between city personality and city image, along with the possible effect of city image on visitors' revisit intention through empirical validation [8]. Their research model investigates the relevant relationships among the underlying dimensions of city personality and city image using a structural equation modeling (SEM) approach. The Brand Personality Scale (BPS), which consists of the five personality dimensions of sincerity, excitement, competence, sophistication, and ruggedness [4], is used in this context.

The image of a place can be defined as the sum of beliefs, ideals, and impressions people have toward a certain place [9]. Understanding the complex synergies of city personality and city image is crucial for urban development and planning, influencing how cities communicate their unique identities and attract visitors.

Understanding the interplay between city personality, identity, and image is crucial for urban development and planning. A cohesive city personality can enhance a city's identity and improve its image, thereby increasing its appeal to residents, visitors, and investors. Achieving this necessitates a comprehensive approach that considers the sensory experiences of the city, its historical and cultural context, and its strategic branding efforts. Urban planners and policymakers can leverage these concepts to create more vibrant, attractive, and sustainable cities. By recognizing and effectively managing a city's unique personality and identity, cities can distinguish themselves in a competitive global landscape, fostering economic growth and enhancing the quality of life for their inhabitants.

City Physiognomy

Physiognomy (from the Greek φύσις, 'physis', meaning "nature", and "gnomon", meaning "judge" or "interpreter") is the practice of assessing a person's character or personality from their outer appearance—especially the face. The term can also refer to the general appearance of a person, object, or terrain without reference to its implied characteristics. Notions of the relationship between an individual's outward appearance and inner character. The general appearance or external features of a material object; esp. the contour or configuration of a location, landscape, etc. Physiognomy is understood as the outside structure of the city, i.e. its general appearance, building forms, as well as the types of the building materials [10] (Figure 2).



Figure 2: Physiognomy of a person and built environment

In an attempt to make relations between human morphological characteristics and Cycladic building morphological characteristics three examples are presented in order to show that such elements can be confused sometimes as not significant but if inspected more carefully it is clear that they have a great value.

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Figure 3: Morphological relations between people and building characteristics

In the first column Audrey Hepburn's eyebrows protect her eyes similarly to the thin asymmetrical horizontal stone called '*frydi*', the Greek word for eyebrow, protects the window. In the second column Elvis Presley's renowned hairstyle could be related to the plasticity formed at the top of the Cycladic roofs by the chimneys that not only are a functional element but also become an aesthetic component. Lastly, Marilyn Monroe, the beauty idol of the past century is well known by her asymmetrical hair style but more by her beauty spot. It could be argued that the subtle asymmetry in Marilyn's face may be one of the most important beauty parameters which can be also found so often in Cycladic Architecture.

3. CITY BRANDING, BRAND PERSONALITY AND SENSORY PLACEMAKING

Cities effectively endeavor for maintainable advancement and endeavor to offer their citizens a tall quality of life, which incorporates financial openings and a solid environment. To attain these objectives, cities embrace branding methodologies to attract investment and allure individuals to require advantage of the administrations and comforts they offer. City branding, moreover known as geographic branding or put branding, alludes to the method of creating and promoting a particular picture for a city or a particular location (Figure 4). A bit like items, cities around the world lock in in branding endeavors to set up themselves as the most excellent among their competitors. Strolling through city neighborhoods, it isn't unprecedented to discover expansive announcements featuring cities rather than well-known brands of clothing, shoes or gadgets. This wonder is especially predominant within the tourism industry.

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Figure 4: Examples of city branding (<https://planningtank.com/city-insight/city-place-branding>)

Brand personality, on the other hand, is a concept that uses a metaphor to characterize a brand as human, referring to the set of human characteristics associated with a brand [4]. This concept can be measured following Aaker's findings that brand personality comprises five dimensions: sincerity, excitement, competence, sophistication, and ruggedness. The approach has been used in various contexts, including universities, countries, tourist places, and cities. In recent years there has been an increasing amount of research on city personality; however, several studies argue that those measurement scales suffer from the limitation of generalizability [11].

Several researchers have studied the components of City Branding in an attempt to classify the different aspects of value that can consist its identity and therefore form a branding strategy. Five broad categories can be identified in this stage of the research: **History** - Cities that have stood the test of time and have a rich history and culture have significant value. Over the years, these cities have been the setting for many events and have gained immense significance. Drawing inspiration from the principles that underpin these assets, a range of marketing opportunities can arise using traditional design thinking, ideas and processes. **Culture** - A city's culture also plays a vital role in shaping its identity. Customs, attitudes and local cuisine reflect the unique culture of the city. However, it is the interaction between the spatial characteristics of the city and its inhabitants that truly defines these cultural elements. A city, as a mere physical design, is incomplete without its users. It is through their presence and the experiences they create, both for themselves and others, that the city acquires its identity. Thus, the essence of a culture-based city brand image is based on these dynamic factors. **Architecture** - The buildings and structures within a city reflect its architectural style. This includes not only the physical design of buildings but also their layout and plans. In a literal sense, architecture shapes the "visual image" of the city. As such, the built environment serves as a manifestation of what the city intends its inhabitants to experience on a daily basis or as an enticing spectacle on special occasions. **Climate** - The weather conditions of a city have a significant impact on the lifestyle of its inhabitants. For example, tropical climates in some regions have a profound impact on the daily lives of the people who live there. This aspect becomes particularly important when creating a tourism brand for the city. It attracts people from colder regions seeking respite from the heat and vice versa. Incorporating this element into the branding process can effectively target and cater to these specific tastes and desires. **Economy** - The economic activities that drive a city's income have a significant impact on the lifestyle of its residents. For example, in some parts of the world, agriculture serves as the main economic activity. This reality shapes the lifestyle of the people living there. Once the different elements of urban branding have been

identified, it is crucial to understand how to integrate them harmoniously in order to create a targeted branding image for the specific urban facility (Figure 5).



Figure 5: The elements of Urban branding (graph by author)

By enumerating these elements and understanding how to use them in combination, a cohesive and compelling brand identity can be created. The cultural sector plays a central role in city branding strategies, as heritage images, events and the contemporary artistic expression feature prominently in the communication material of cities. Culture offers the advantages of recognition, historical continuity, collective representation and identification. It is considered a vital comparative advantage in contemporary cities, aligning with concepts such as C. Landry's creative city and R. Florida's creative class theory. Many cities are highlighting their cultural heritage, contemporary architecture and cultural activities as part of their efforts to revitalise urban areas. Often, specific 'cultural neighbourhoods' serve as a representation of the entire city, showcasing images of 'regeneration', architectural innovation and cultural production. In recent years, urban policymakers have used three basic techniques for naming cities, as identified by Kavaratzis and Ashworth [12]:

1. **Association of Branding with a Personality ("Personality Association" or "Personality Branding"):** This technique involves associating a city with a well-known personality, often from fields such as architecture, science, arts, or literature. By transferring human characteristics to the city, this approach aims to imbue it with a creative character. While this technique has been applied in various cities worldwide, it is usually led by formal organizations and mainly aimed at the tourism sector, often excluding contributions from the local community and informal actors.
2. **Signature/Flagship Building and Design:** This technique focuses on the design and construction of important public buildings, usually with cultural content, by well-known architects. Such buildings highlight a city's status as an 'international landmark' and enhance its global position, while also showcasing the governmental institutions responsible for their creation. Examples include the Pompidou Centre in Paris, the Guggenheim Museum in Bilbao, and the MACBA in Barcelona. However, it is important to note that iconic buildings on their own are not enough; they must form part of a wider set of effective policies that bring long-term benefits to the place and its inhabitants.
3. **Branding through Signature Events ("Event Branding" or "Event Hallmarking"):** This technique involves organizing large-scale sporting and cultural events, often referred to as 'mega-events' such as the Olympic Games or designated as European Capital of Culture. By

associating the city with these events, its position in the global networks of similar events is strengthened, demonstrating its capacity to host such occasions. The various events can be classified as mega-events, characterized as one-off, transient events, while hallmark events are those that occur sporadically in a particular location. Regardless of the size and short-term gains from a single event, it is critical to integrate it into a broader urban policy and create lasting links with the local community and its needs.

Sensory Placemaking

In the purest sense, the definition of **placemaking** is a process through which places that people want to live, work, or explore are created. Considering the definition of placemaking as this has been developed through the years, we need to first acknowledge Jane Jacobs [9] when she early discovered, that cities make sense only when they are designed by everybody for everybody, giving us an early hint about the importance of inclusion, community participation and ownership in the development of the built environment. Successful placemaking as a process, involves multiple steps and relates not only to the physical and built environment, but also to the people. To create a place out of a space means considering design, location, infrastructure, logistics, service, and the needs of the people you're creating the place for. Placemaking is catching on as another way to improve the quality of various places in a neighborhood, and by extension, the community and region in which those places are located as well and most importantly in helping neighborhoods and communities imagine and create a better and more resilient future. Project for Public Spaces, has developed a tool to help in evaluating the public spaces and has found that in order to be successful, they should generally share the following four qualities: be accessible; encourage people to be engaged; the space is comfortable and has a good image; and finally, it promotes social interactions where people meet each other [13].

4. FOCUSING ON THE CYCLADIC IDENTITY AND SENSESCAPE

A city's sensescape could be perceived as a dynamic interplay of sensory stimuli that profoundly influences urban living. Thoughtful design and management of these elements can lead to more livable, enjoyable, and sustainable urban environments, enriching the lives of residents and visitors alike. The concept of a "city sensescape" encompasses the diverse sensory experiences within urban environments, including sights, sounds, smells, tastes, and tactile sensations, all of which collectively shape how a city is perceived and experienced. Every city has its own sensescape [3]. Designing for the sensescape of a city is crucial for enhancing urban life quality, fostering vibrancy, engagement, and overall well-being.

Sometimes, people are sidelined and the focus is on the built or natural environment without considering the needs and aspirations of people. Sensory maps, combined with comfort parameters, can be a very promising tool in the scientific field of comfort and mapping, enabling the creation of a sustainable urban "sensory landscape". At this point, it should be noted that, by combining participatory design, an even more sophisticated collaborative sensory mapping methodology can be created.



Figure 6: Sustainable Coastal Design Indicator Toolkit [14]

An approach of analyzing the city considering the senses is presented in a research on sustainable urban design where the analysis focuses on five main areas: urban and environmental analysis, cultural and natural heritage analysis and sensory mapping. This classification allowed the identification of a series of indicators to be used in the urban analysis. The synthesis of the above-mentioned indicators has constituted a methodological tool with replication value, useful for the study of similar places. The specific indicators and parameters evaluated in the proposed method are presented in detail in Figure 6. These parameters can help stakeholders and designers to make decisions in similar projects [14].

Cycladic architecture, prevalent throughout the Aegean islands, epitomizes a distinctive identity forged by historical development and the Mediterranean environment. Characterized by cubic forms and whitewashed buildings, Cycladic vernacular settlements exercise simplicity, functionality, and harmony with the island landscapes. Emerging from ancient Greek civilization, Cycladic architecture embodies a minimalist aesthetic with clean lines and geometric shapes, utilizing local materials such as stone and marble. Contemporary interpretations blend tradition with modern design, prioritizing sustainability and cultural preservation. Heritage conservation efforts strive to maintain the architecture's appeal to tourists seeking an authentic Greek island experience. Cycladic culture is further expressed through vibrant local festivals, music, dance, and culinary traditions. In modern times, preserving Cycladic cultural heritage involves archaeological conservation, restoration of historical sites, and the promotion of traditional arts and crafts. Museums across the islands exhibit artifacts and artworks spanning millennia, providing insight into the region's rich cultural tapestry.

Regarding the Cycladic identity and considering all the above presented, one can wonder what are the qualities which compose all the characteristics that act as magnets and attract thousands of people in the Aegean Archipelago? Several questions can be raised about character and physiognomy such as how is it possible to quantify them, whether they constitute planning parameters and act as parameter for the preservation of existing heritage. Character can be defined as the particular combination of qualities in someone or something that makes them or it different from others and also the way someone thinks, feels, and behaves. On the other hand physiognomy is defined as the appearance of a person's face. One can therefore say that character and physiognomy together consist a number of inner and outer qualities of a person. Moving to urban space analysis very often we

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come across the meaning of character and physiognomy of the city. Could it be that these two qualities if quantified could measure and define urban space identity (Figure 7)?



Figure 7: Cycladic views – characteristics comprise identity

5. CONCLUSION

This paper attempts to unite different theories of city identity in order to address a method of preserving heritage elements considering issues of contemporary living. Parameters of sustainability, sensory perception of space, culture and spirit of place were considered as well as the notions of city branding and city identity. The overall idea is that physiognomy, that is external parameters of the city when joint to character that is internal – embodied parameters are being perceived together than a more holistic approach is created. This more unified, holistic environment can be referred to as ‘topos’ meaning a deeper understanding of a location, of a site.

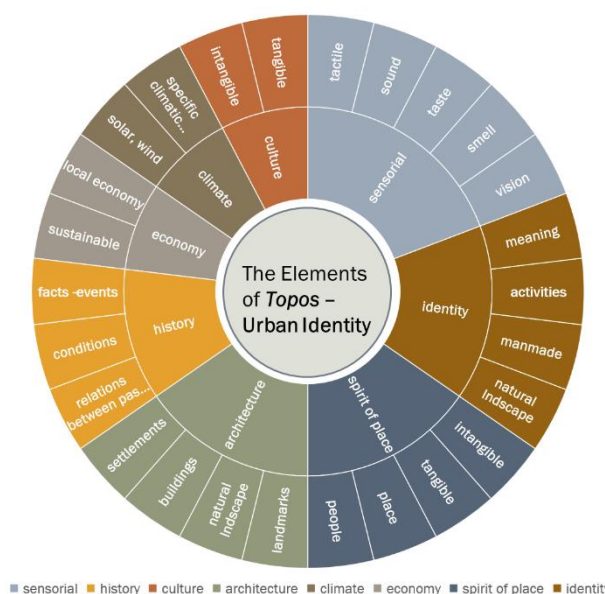


Figure 8: The elements of *topos* – urban identity

Hence, the elements of ‘topos’ as defined here can derive by composing the previous examined parameters of urban identity (Figure 8). The main categories are history, culture, architecture, climate, economy, sensory experience, spirit of place and identity. These categories can in their turn be classified into subcategories creating an easy to use indicator toolkit. This toolkit is an attempt to

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bring together all the parameters of value that were identified by this research in order to create a simple tool for stakeholders to identify and preserve the significant parameters of historic settlements. The toll can be used as a checklist when evaluating a location or an intervention or as a pre-design tool for considering the concept of preservation and heritage in a design phase.

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The post-2027 EU Cohesion Policy: Thoughts and suggestions

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Abstract

The European Union (EU) is a unique case of a supranational organization that undertakes an explicit commitment to the exercise of Cohesion Policy (already since the founding Treaty of Rome, in 1957) and to the promotion of economic, social and territorial cohesion. The exercise of Cohesion Policy is, on the one hand, the compensation for (or the supplement of) the creation and operation of the Single Market, and, on the other hand, a tangible manifestation of (community) solidarity. In principle, the problem that Cohesion Policy is called upon to remedy is the (cumulative) spatial asymmetry of the development process.

The period from 2020 onwards is marked by the establishment of the Next Generation European Union (NGEU) financial instrument, which was created in response to the need to deal with the effects of the COVID-19 pandemic crisis. The budget of the NGEU amounts to €750 billion that are going to be channeled until 2026 (and possibly until 2028). This amount comes from loans contracted by the European Commission, with the repayment expected to be made with the EU's own resources. The receipt of the loan resources constitutes the *de facto* issuance of a Eurobond (although such a thing, for political reasons, is not acknowledged) as it constitutes the issuance of mutual debt.

The central pillar of the NGEU is the Recovery and Resilience Facility (the so-called Recovery Fund). The budget of the Recovery Fund amounts to €672.5 billion (€312.5 billion are going to be channeled as grants and €360 billion are going to be channeled as loans). The Recovery Fund can be considered as experimentation on behalf of the EU as it can develop into an established practice to the extent that the absorption of its resources on the one hand occurs in a smooth manner and on the other hand brings multiplier benefits to their recipients. Being an indirect, though clear, confession of the inadequacies of the free market – which had already been demonstrated during the period of the economic crisis, 2008-2015 – as well as of the weaknesses of the Cohesion Policy, the establishment of the Recovery Fund may signal the evolution of the Cohesion Policy, constituting a leap in the direction of the EU's fiscal integration.

The keynote lecture expresses thoughts and makes suggestions against the backdrop of the formation of the post-2027 EU Cohesion Policy, and after the establishment of the Recovery Fund. The aim of the lecture is to ferment ideas on an issue of salient importance which, nevertheless, is not fully understood yet.

Keywords: *EU, Cohesion Policy, Recovery Fund*

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Changing Cities VI, Rhodes, 24 - 28 June 2024

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Prof. Sepe Marichela, Sapienza Università di Roma

Flexible and adaptable places: a case of redevelopment plan based on long-term sustainability

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Abstract

An urban project is carried out in the medium-long term, and it is necessary for its sustainability and the reduction of risks to foresee that use, times and design are flexible. Accordingly, also adaptation has to be considered fundamental in urban planning, as the uncertain and the sudden should become components of the design process with the same weight as the others, and consequently urban planning tools should be renewed or modified in order to contribute to the management of any crisis in an appropriate way.

Starting from these premises, aims of this study - carried out in the framework of the research project "PRIN2020 SUMMA #20209F3A37" within the ISMed-CNR Unit with the author's responsibility and the Sapienza University of Rome and ISMed-CNR related agreement - are to identify emblematic case studies of urban regeneration with respect to the concepts of flexibility, liveability and adaptation.

The emblematic case study that will be illustrated in the paper concerns the Quayside new area of regeneration in Newcastle-Gateshead, which will be completed in 2025. It will be showed with attention to the general plan, the Quayside details, and the public space aspects related to liveability, adaptability, flexibility, accessibility and sustainability.

Keywords: *adaptability; flexibility; public spaces; sustainability; place*

1. INTRODUCTION

Places influence the opportunities available to people such as cultural and social activities and are important for their sense of belonging [1].

Accordingly, in England six different types of place values [2] are identified which include: the exchange value of parts of the built environment; the value in use relating to the activities that take place there; the image value, which concerns the identity of the built environment projects; the social value and how much the built environment supports or is a threat to social relations; the environmental value and its resources; and the cultural value of the built environment.

In continuity with these aspects, other important factors for places - above all in sustainable urban regeneration plans - are the flexibility, liveability and adaptation [3-14].

The flexibility should be related to the entire lifespan of an urban project, starting from the early stages. An urban project is carried out in the medium-long term, and it is necessary for its sustainability and the reduction of risks to foresee that use, times and design are flexible [15-16].

In line with these concepts, also adaptation has to be considered fundamental in urban planning, as the uncertain and the sudden should become components of the design process with the same weight as the others, and consequently urban planning tools should be renewed or modified in order to contribute to the management of any crisis in an appropriate way.

In this way, the value of the place expands and refers to a complex and interconnected system of factors to be connected to both material and immaterial interventions in the built environment and to all those who have different interests in the place and in its quality.

Starting from these premises, aims of this study - carried out within the research project "PRIN2020 SUMMA #20209F3A37" within the ISMed-CNR Unit with the author's responsibility and the Sapienza University of Rome and ISMed-CNR related agreement - are to identify emblematic case studies of urban regeneration with respect to the concepts of flexibility, liveability and adaptation.

The case study concerns the Quayside new area of regeneration in Newcastle-Gateshead, which will be completed in 2025. It will be showed with attention to the general plan, the Quayside details, and the public space aspects related to liveability, adaptability, flexibility, accessibility and sustainability. Public spaces are an important part of this project as these are places conceived both with biodiversity and for leisure time, and include elevated areas with views on the River Tyne, break sites, sport spaces, bicycle supply areas, charging points for electric vehicles within the new multi-storey car park.

Positive aspects and possible criticalities resulted by the case study - also related to general topic of the study - will complete the paper.

2. FLEXIBILITY

The flexible city is based on tools for and urban planning and design which are not rigid and able to allow changes in the course of implementation of projects, in case of unforeseen events or new requirements and needs.

The principles of the flexible city should be related to the entire lifespan of an urban project, starting from the early stages. An urban project is carried out in the medium-long term, and it is necessary for its sustainability and the reduction of risks to foresee that use, times and design are flexible. Over thirty years of time, it may happen that a commercial land becomes a residential building, or a design phase may be delayed, requiring adjustments to the masterplan that can only be made in the presence of a flexible tool designed for places where people can work and live well. Architects, urban planners, legal professionals and developers, as well as the various actors involved in different ways in the design and construction process of the site or building, are required to design in an innovative way, offering the greatest possible degree of flexibility [16]. Flexible planning makes possible to use local peculiarities as a starting point for the redevelopment project, resulting in lower investment costs, shorter construction times and greater support from stakeholders. The various design possibilities that can be realized with respect to the existing situation are identified through quantitative and qualitative analyses, of which the latter determine the implementation of flexible planning [15].

To achieve this, it is necessary to obtain permits for flexible planning in agreement with all interested parties, even if not all of them will have the same weight in the decision-making process. Their influence will depend on the project and in general the owner and the initiator have greater importance in determining the decisions to be made, on the subjects to be involved and on times and methods. It can be expected that in large-scale projects, the public interest will be greater, while in small-scale ones the parties involved will have greater influence. Architects, planners and construction experts in the costs list the different stakeholder steps and the parties involved take note of all these information. Then all the subjects take a joint decision with respect to tasks and responsibilities with respect to the Plan, a decision which remains non-revocable for a limited period of time.

In the next steps initial scenarios are defined and determine the choices in the short term with respect to organizational, legal, financial and spatial aspects (Bergevoet, van Tuijl, 2016).

The planning of the initial scenarios only allows to work on further development during the execution of the project, in order to be ready for changes in the event of market changes or new ideas that can be implemented during the project's implementation. Investments are made in several stages, taking into account any unforeseen circumstances and distributing the risks over time. The unforeseen events can be of different types, from the increasing in energy costs to the worsening of the general economic situation; if there are many unforeseen events, many additional steps will be necessary for flexible planning, if there are few unforeseen events, the design process will require fewer adjustments.

Adaptation to the initial idea are made through assessments that can be made during construction by creating new initial scenarios. Reflective sessions are used to re-consider the development process together with the owner, initiator and stakeholders and propose a recalibration. The time factor in this process of changing the initial scenario has an important weight.

3. METHODOLOGY

The methodology which was used to identify emblematic case studies of urban regeneration with respect to the concepts of flexibility, liveability and adaptation First, keywords to search in urban design and planning and placemaking literature were selected; these include: urban regeneration, public space, placemaking, healthy, liveability, sustainability, climate change and inclusion. The case studies which were identified were then circumscribed to those belonging to European areas and to medium-size cities to better comprehend the impact of the regenerated public space in relation to the whole city. The identified areas were: Hafencity public spaces in Hamburg, Promenade du Paillon in Nice, the new Liffey Riverfront in Dublin, Superkilen park in Copenhagen, the Quayside in Newcastle-Gateshead.

As regards, the Newcastle-Gateshead quayside case study was interested by a regeneration process aimed at an urban change strongly linked to the local identity, paying attention to the participation and involvement of the population, to liveability of places, the long-term sustainability interventions and the creative economy. The general strategy and urban core plan which were adopted in March 2015 form a strategic planning framework for development in Newcastle and Gateshead up to 2030 [6].

The second data which were identified include: the presence of indicators and current strategies/policies related to healthy, liveability, sustainability, climate change and inclusion aspects. The third data was the new public spaces generated in the framework of the urban strategies and policies.

The fourth data concern the selected public space projects in themselves, namely: the kind of competition and the urban designer who won it; the data of completion; the cost; the goals of the project in relation of the selected keywords; the description of the project.

4. CASE STUDY

The case study concerns the quayside in Newcastle and the nearby Gateshead city in England. Newcastle upon Tyne is a city in the county of Tyne and Wear, founded in Roman period. Newcastle is located on the north bank of the River Tyne, the port of which developed in the 1500s and for a long time was one of the leading shipbuilding and repair centres in the world. Gateshead is situated on the southern bank of the River Tyne opposite Newcastle upon Tyne and is connected to it by many bridges.

In the seventies the industries suffered a major crisis and a subsequent closure of many of them, with a consequent economic decline [17]. The strategic actions for the redevelopment of abandoned areas in Newcastle concern the establishment of industries in innovative sectors, the construction of new homes and the lowering of rents of existing ones, the creation of digital services, the creation of a sustainable transport service, the increase in cultural and entertainment activities and events [18].

Since the early nineties, culture has taken on an increasingly important role in urban policies until it becomes one of the main elements around which to transform the territory through public investments aimed at involving the population in activities related to art and culture.

The regeneration process of Newcastle, which also took place through collaboration with the nearby municipality of Gateshead, aimed at an urban change strongly linked to the local identity, paying attention to the participation and involvement of the population, to the liveability of places, to long-term sustainability interventions and to the creative economy [17-20].

The general strategy and urban core plan which were adopted in March 2015 form a strategic planning framework for development in Newcastle and Gateshead up to 2030.

The Vision for Gateshead and Newcastle upon Tyne 2010-2030 is based on a shared framework of general strategic policies and more site-specific policies. The realization of a common plan was due to the recognition of the advantage that both Local Authorities can have in terms of economic growth and trade, employment development, housing growth, and infrastructure enhancement. The overall goal is to create two sustainable and attractive cities where people decide to live, work or visit them for their high quality and lifestyle.

3.1 The vision

The strategic objectives identified are 12 and will be included in the policies defined by the Plan for Gateshead and Newcastle upon Tyne 2010-2030. These include: SO3 To increase competitiveness by improving and expanding the role of the Urban Core as the regional destination for business, shopping, education, tourism and as a place to live; SO5 Expand leisure, culture and tourism providing for all age groups and diversifying the evening economy; SO8 Improve sustainable access to, within and around the Urban Core by promoting fast and direct public transport links to the heart of the Urban Core, increasing walking and cycling and minimizing through traffic; SO9, Ensure the development and use of land protects, sustains and enhances the quality of the natural, built and historic environment, making the Urban Core a high quality exemplar for Gateshead and Newcastle, and ensuring communities are attractive, safe and sustainable; SO10 Provide the opportunity for a high quality of life for everyone and enhance the wellbeing of people to reduce all inequalities; and SO12 To create a network of green public spaces connected and accessible by all.

The Plan identifies various themes for strategic policies, of which People and Place are the most transversal [21].

With respect to Placemaking, it aims to improve the quality of life through an attractive design and a sustainable and quality built environment, where the historical and natural heritage and the urban landscape are enhanced. The plan considers that the distinctiveness of places has an influence on people's well-being as well as on health and social cohesion.

Likewise, high-quality design is also seen as a key element in enhancing the positive characteristics of Gateshead and Newcastle. For the creation of a successful place, it is important to fully understand the context from different points of view, namely socio-economic, cultural, natural and built. The distinctive character of the areas within Gateshead and Newcastle is given by its natural topography and landscape and the rural and urban ones around it. The views of these places and their enhancement can therefore be distinctive features for the quality of the place. Public art can also be of support in this direction and if used in a sensitive and imaginative way it can help to improve the sense of place and/or improve the search for the road.

Specifically, the CS14 Policy deals with Wellness and Health to be maintained with initiatives that include: creating a living environment favourable to the elderly, creating an inclusive environment both natural and built, promoting healthy lifestyles, preventing impacts on residential services deriving from contamination of soil and water and air quality, providing adequate access to all health and social facilities, promoting accessibility for all the green spaces, and spaces for sport and leisure. The CS15 Place-Making Policy is aimed at creating environments that are attentive to the local character, safe, accessible, connected and inclusive; that respect the significant views and respond positively to the character of the River Tyne and its environment, the opportunities introduced by public art and local guidelines for design.

The CS18 Policy, which concerns the quality and interconnection of green infrastructures and the natural environment, focuses on protecting and improving the connection and multifunctionality of green infrastructures, the protection and enhancement of natural corridors, green networks with particular landscape value and trees, woods and hedges, the extension and connections of the Green

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Infrastructure Network, the enhancement of open spaces and sports and leisure facilities and the improvement of the axis to the River Tyne and tributaries.

The CS16 Policy on Climate Change aims at sustainable development to be achieved with passive design, a good standard of the building fabric, flexibility from the outset to allow adaptability to alternative uses, and resilience to the impacts expected from climate change and the risk of floods. The policy also envisages reducing CO2 emissions and activating low-carbon energy solutions that comply with government guidelines. These guidelines will be followed by both the Gateshead and Newcastle Councils and both adaptation and mitigation will have to be achieved by also paying attention to the context, design and landscape, thus also improving their attractiveness.

Regarding the policies for the Urban Core, these focus on the quality of public spaces and paths and the protection and enhancement of the natural and built environment.

In particular, the UC12 Urban Design Policy underlines the importance of providing distinctive places in terms of quality of architecture and public spaces, to be obtained through: projects that enhance the positive characteristics of the context and the surrounding places, improving primary and secondary paths, using durable and sustainable materials appropriate to the character of the area. The readability of the Urban Core must be clear and instinctive also thanks to suitable visual connections where there are high pedestrian flows. All following a coordinated and holistic approach to the site that respects its character and enhances or creates an appropriate urban form.

The UC13 Respecting and Managing Views Within, From and Into the Urban Core Policy calls for attention to prominent views such as those from, through and into the River Tyne Gorge, major roads and major buildings and monuments of cultural interest.

The UC16 Public Realm Policy deals with the network of public spaces both regarding the improvement of existing ones and the creation of new ones in a logic of flexibility and adaptability to different uses, attractive design and use of high quality, durable and sustainable materials. This will improve the user experience, liveability and healthiness of the places and, thanks to the possibility of different and possibly temporary uses, it will increase the opportunities for social engagement.

The current presence of public art has created a strong sense of place, creating distinctiveness, strengthen the identity and attract internal investments. The UC17 Public Art Policy intends to enhance local distinctiveness and the Key Sites where public art can be included. It can also be integrated into the architectural fabric, into the floor, into street furniture, into lighting or into temporary installations and performances. Art can also help the legibility of the street increase the experience of the place and can be an opportunity for collaboration and creative work between people and maximization of the use of resources [21].

3.2 The regeneration project

The regeneration of the waterfront of Gateshead and Newcastle that began in the mid-1990s is transforming its former industrial destination into a contemporary place for leisure and culture, attractive and creative, characterized by liveability and healthiness [22-27].

The redevelopment actions, focuses on two neighbourhoods, namely Stephenson Quarter and Quayside. The Stephenson district is located between Quayside and Central Station and is characterized by abandoned areas linked to the area's railway past, by commercial and industrial buildings and with vast free spaces in disuse. The regeneration began with the completion of the Life Science Centre biomedical research centre connected to a large science museum, the Metro Radio Arena for concerts and performances, and the Central Square office building.

The other neighbourhood is the Quayside, which is the focal point of the city and where the first bridge over the River Tyne was built [17].

In 1996, on the occasion of the year of visual arts, attention had already begun to use public investments - together with those of private organizations - in the creation of new infrastructures such

as The Sage Gateshead (dedicated to music), "Dance City" (dedicated to dance), and "The Baltic" (contemporary art centre).

A further infrastructure that also became a symbol of the territorial dimension of the project is the Millennium Bridge over the River Tyne, a connection for pedestrians and cyclists to the Gateshead side.

Quayside has become one of the most vital and liveable parts of Newcastle thanks to the presence of spaces for the arts and socialization. Indeed, several public spaces have been created to connect residences and services, as well as a transport network with the use of eco-sustainable vehicles. Art, health, liveability and creativity are here understood as necessary ingredients for urban, economic and social regeneration. On the one side with the creation of galleries and exhibition canter in the industrial buildings of the nearby cultural village Ouseburn, on the other side with the creation of a music school within the Sage, open to children and people of all ages.

The Quayside is crossed on both banks by the River Tyne along which there is a cycle-pedestrian path of great interest for the views of both the bridges, the architectures, and the landscapes, offering a notable perception of liveability and healthiness. Another element of liveability is given by Quayside Seaside, the urban beach that is set up in the summer near the Tyne Bridge, with sand, deck chairs and cabins. The equipment of this area for the summer includes a climbing wall, games for children, and spaces for activities such as yoga and pilates.

The views of the bridges include the Tyne Bridge and the Gateshead Millennium Bridge which was designed by Wilkinson Eyre Architects and constitutes an element of attraction both for its architecture, for the particularity that it is a bridge that tilts, as well as for the possibility to walk along it. on foot and by bicycle.

The architectures that can be observed along the Quayside include the Sage Gateshead, regional music centre of international standing created by the Foster + Partners studio and the Baltic Centre for Contemporary Art, created from the recovery and transformation of a former grain warehouse from the 1940s.

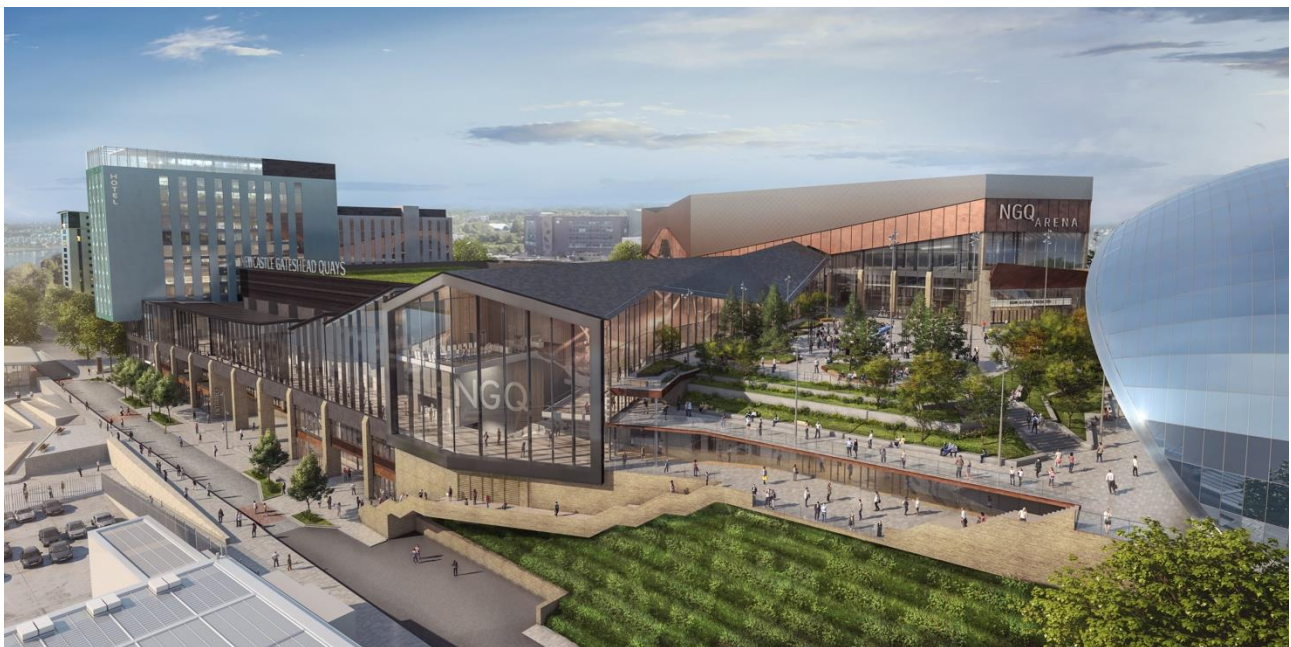


Fig. 1. Newcastle-Gateshead, detail of the project (Source: HOK's archive)



Fig. 2. Newcastle-Gateshead, detail of the project (Source: HOK's archive)

A new plan will further improve the liveability and attractiveness of this place. The Newcastle Gateshead Quays Development Plan was presented by Ask PATRIZIA - Ask Real Estate and Patrizia - and was approved by the Gateshead Council's planning committee in November 2020.

Pandemic and consequent delays did not allow to complete the new area in 2023, but thanks to a flexible planning, the project will be completed in 2025. The plan's projects include arena, exhibition and conference centre, hotel and new public spaces. The general plan was entrusted to the HOK studio, AHR Architects is designing the hotel while the design of the public spaces has been entrusted to the Planit-IE landscape studio.

In particular, after a consultation process, the hotel that was originally adjoined The Sage International Conference Centre has moved to a new location characterized by a landscaped linear park, accessible to the public, with wide green spaces into the area and enhancement of biodiversity. The construction of the 58,500 m² complex was entrusted to Sir Robert McAlpine, while the ASM Global company will manage the campus for 12,500 people, with an area of 29,000 m² and 7,000 m² of flexible spaces for different types of events such as sports, conferences, exhibitions and festivals. Public spaces are an important part of this project as these are places conceived with biodiversity and designed for leisure time. These spaces include elevated areas with views of the River Tyne, seating areas, bicycle supply throughout the area, charging points for electric vehicles within the new multi-storey car park.

The total cost of the project is about 260 million pounds, and the ultimate goal is to create infrastructure projects to improve economic growth and quality of life and increase jobs. 4000 new jobs are expected and an income of around 60 million pounds per year. The Getting Building Fund, managed by the North East Local Enterprise Partnership, awarded 7 million pounds to create the link between north and south in the Baltic district and improve accessibility to the areas of the regeneration project. 2 million pounds were allocated for the construction of the exhibition and conference centre, public spaces, the arena, two hotels and the multi-storey car park. The conference centre will be 2,800 square meters and will be able to accommodate a flexible number of people, the exhibition space will be 6,300 square meters and the arena for outdoor events will seat 12,500 people. The designed public

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spaces will cover an area of 2 km which includes roads, cycle paths, pedestrian crossings, green infrastructures. In this regard, the project includes seating areas and elevated areas with lookout points over the River Tyne, bicycle rentals and charging points for electric vehicles [22-29].

4. CONCLUSION

The paper illustrated the concept of flexibility in urban regeneration and the case study of Newcastle-Gateshead. In flexible planning, it is necessary to obtain permits for flexible planning in agreement with all interested parties, even if not all of them will have the same weight in the decision-making process. Their influence will depend on the project and in general the owner and the initiator have greater importance in determining the decisions to be made, on the subjects to be involved and on times and methods. It can be expected that in large-scale projects, the public interest will be greater, while in small-scale ones the parties involved will have greater influence.

The new spaces in Newcastle-Gateshead, which will be completed in 2025, are designed in accordance with the principles of biodiversity, inclusion and sustainability related to the strategic objectives and policies envisaged by the Plan and designed to accommodate outdoor activities to address the growing need for quality outdoor spaces, also due to the Covid-19 emergency.

An important aspect of this project is the flexibility both in terms of what can be done and how many people can be accommodated. In addition, accessibility is guaranteed 24 hours a day for all with walkways, lifts and escalators. The approach to the landscape was designed paying attention to the history, geology, microclimate and urban structure of the site. In this regard, the project includes seating and elevated areas with viewpoints over the River Tyne, bicycle rental and charging points for electric vehicles which will connect all the area increasing the value of place in its multiple meaning. Finally, the process of listening involved people living, working, studying, and visiting the surrounding areas in order to better focus on the needs, desires and expectations of those who will use these spaces and encourage all people to enjoy this part of the city.

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Attractive and Liveable Public Spaces for Communities.

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Abstract

The needs of students in relation to university open spaces are diverse and concern not only the learning activities that take place inside the buildings but also those of moving from one space of a lesson to another, breaks for relaxation or lunch places for socializing.

Indeed, the well-being of a community is given by the livability, healthiness, accessibility, inclusiveness of the places it frequents and therefore, public spaces, especially open ones, if properly designed these can increase the quality of life of students, teachers, and the community of a university as a whole and, as many studies show, they can create the conditions for more profitable student learning.

Likewise, each place is different from the other and the public space, in addition to representing its society, must also be attentive to urban identity.

Starting from these premises, this study, carried out in the framework of the research project “LOVE Sapienza: Livable, enjOyable and attractiVE spaces for the community” - funded by Sapienza University of Rome with the author responsibility - aims to identify the main factors and elements that characterize best practices of public spaces in university campuses and propose a new methodology to analyze and design these spaces, adapting the original Healthy Place Method.

Keywords: adaptability, flexibility, public spaces, sustainability, place

1. INTRODUCTION

The relationship between health and urban design are complex because of the multiple elements which play different roles in the city system [1].

As several international studies on places [2] report, places influence the opportunities available to people, happiness [3] the sense of belonging and are important for cultural and social activities [4].

The definitions of the quality of the place indicated in the scientific literature are often related to terms such as liveability, quality of the built environment, sustainability and urban design according to the different practical and political traditions. Several other terms can be connected to the concept of quality of the place. Carmona [5] for example define 12 of local environmental quality: clean and tidy, functional, distinctive, safe and secure, robust, green and unpolluted, accessible, attractive, comfortable, inclusive, vital and viable, and fulfilling, which in turn are connected to a broad set of other terms and issues.

In particular, the spaces of a university campus or, more generally, of a university site mimic the functions of a city in a smaller dimension and, like this one, needs large open public spaces.

University open public spaces are important places not only for student training but also as places of socialization between students, teachers, technical-administrative staff, and, more generally, within the community which in different ways is part of the university life: family members, maintenance workers, cleaning staff, janitors, etc.

The needs of students in relation to university open spaces are diverse and concern not only the learning activities that take place inside the buildings but also those of moving from one space of a lesson to another, breaks for relaxation or lunch places for socializing.

Indeed, the well-being of a community is given by the livability, healthiness, accessibility, inclusiveness of the places it frequents and therefore, public spaces, especially open ones, if properly designed can increase the quality of life of students, teachers, and the community of a university as a whole and, as many studies show, they can create the conditions for more profitable student learning [6-20].

Likewise, each place is different from the other and the public space, in addition to representing its society, must also be attentive to urban identity.

Starting from these premises, this study, carried out in the framework of the research project “LOVE Sapienza: Livable, enjOyable and attractiVE spaces for the community”, funded by Sapienza University of Rome with the author responsibility aims to identify the main factors and elements that characterize best practices of public spaces in university campuses and propose a new methodology to analyze and design these spaces, adapting the original Healthy Place Method [1].

2. THE HOLISTIC APPROACH TO EDUCATION IN THE EUROPEAN AGENDAS

The UN SGs [21] and the New Urban Agenda [22] clearly refer to the importance of education in their principles as reported in the following.

Among the 17 sustainable goals to be reached in 2030, the fourth is Quality Education, whose objectives include: “4.3 By 2030, ensure equal access for all women and men to affordable and quality technical, vocational and tertiary education, including university”; “4.5 By 2030, eliminate gender disparities in education and ensure equal access to all levels of education and vocational training for the vulnerable, including persons with disabilities, indigenous peoples and children in vulnerable situations”; “4.7 By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture’s contribution to sustainable development”.

The New Urban Agenda adopted during the UN-Habitat III Conference which was held in Quito in October 2016, is a document which contains many topics of interest related to the education topic. The interest in this document stands in the fact that each principle is treated in a holistic way and not in separate manner. Some of these are reported below.

“2. By 2050, the world’s urban population is expected to nearly double, making urbanization one of the twenty-first century’s most transformative trends. Populations, economic activities, social and cultural interactions, as well as environmental and humanitarian impacts, are increasingly concentrated in cities, and this poses massive sustainability challenges in terms of housing, infrastructure, basic services, food security, health, education, decent jobs, safety and natural resources, among others”.

“13. We envisage cities and human settlements that:

(a) Fulfil their social function, including the social and ecological function of land, with a view to progressively achieving the full realization of the right to adequate housing as a component of the right to an adequate standard of living, without discrimination, universal access to safe and affordable drinking water and sanitation, as well as equal access for all to public goods and quality services in areas such as food security and nutrition, health, education, infrastructure, mobility and transportation, energy, air quality and livelihoods”.

“32. We commit ourselves to promoting the development of integrated and age- and gender responsive housing policies and approaches across all sectors, in particular the employment, education, health-care and social integration sectors, and at all levels of government — policies and approaches that incorporate the provision of adequate, affordable, accessible, resourceefficient, safe, resilient, well-connected and well-located housing, with special attention to the proximity factor and

the strengthening of the spatial relationship with the rest of the urban fabric and the surrounding functional areas”.

“34. We commit ourselves to promoting equitable and affordable access to sustainable basic physical and social infrastructure for all, without discrimination, including affordable serviced land, housing, modern and renewable energy, safe drinking water and sanitation, safe, nutritious and adequate food, waste disposal, sustainable mobility, health care and family planning, education, culture, and information and communications technologies. We further commit ourselves to ensuring that these services are responsive to the rights and needs of women, children and youth, older persons and persons with disabilities, migrants, indigenous peoples and local communities, as appropriate, and to those of others in vulnerable situations. In this regard, we encourage the elimination of legal, institutional, socioeconomic and physical barriers.

“36. We commit ourselves to promoting appropriate measures in cities and human settlements that facilitate access for persons with disabilities, on an equal basis with others, to the physical environment of cities, in particular to public spaces, public transport, housing, education and health facilities, public information and communication (including information and communications technologies and systems) and other facilities and services open or provided to the public, in both urban and rural areas”.

“56. We commit ourselves to increasing economic productivity, as appropriate, by providing the labour force with access to income-earning opportunities, knowledge, skills and educational facilities that contribute to an innovative and competitive urban economy. We also commit ourselves to increasing economic productivity through the promotion of full and productive employment and decent work and livelihood opportunities in cities and human settlements”.

61. We commit ourselves to harnessing the urban demographic dividend, where applicable, and to promoting access for youth to education, skills development and employment to achieve increased productivity and shared prosperity in cities and human settlements. Girls and boys, young women and young men are key agents of change in creating a better future and when empowered they have great potential to advocate on behalf of themselves and their communities. Ensuring more and better opportunities for their meaningful participation will be essential for the implementation of the New Urban Agenda.

3. BEST PRACTICES: FACTORS AND ELEMENTS

The open public spaces of university campuses can be enhanced by inserting differentiated functions for physical activity, breaks, repairing from uncomfortable climatic conditions, socializations, organization of events and further ones improving the welfare of its community and become more attractive.

According with this holistic approach provided by the 17 SGs and principles of the New Urban Agenda, through a bibliographical research [23-26] an internet research on different campus websites (<https://you.ubc.ca/tours-events/campus-tours>; <https://www.ucd.ie>; <https://www.tudelft.nl/en/education/information-and-experience/preparing-for-a-bachelor/bsc-campus-tours/visitus-campus-tour>), visits by the author to universities campus (Figures 1-4), the factors and elements to identify best practices of public spaces university campus were decided. These include the presence of: green spaces; inclusive accessibility; shelters for shelter from the sun/rain; benches; tables; rubbish bins; poles for artificial lighting; urban furniture of quality design; artistic elements; play spaces; spaces for sports; study spaces; cycle-pedestrian paths; bicycle racks; charging points for electric bikes; proximity to subway and/or bus stops; dedicated means of transport to the campus; solar panels; water plazas; and wayfinding/signage.

The presence of green spaces was considered in relation to their size, the variety of typology, the possibility of seeing them only or of being able to use them in a different way.

Accessibility was considered from various points of view: both outside the campus, with dedicated parking, and inside the campus with paths without architectural barriers.

The presence of shelters was observed in relation to various aspects, both for repairing from the sun and from the rain, and in relation to the possible furniture for waiting for the harsh atmospheric event to end.

The benches were observed regarding not only to their presence, but also to their quantity, position, and proximity to tables and other furnishing elements and trees.

The presence of tables was also noted in relation to quantity and function and, as in the case of seats, proximity to other equipment.

The rubbish bins were observed regarding quantity and function for separate waste collection. With regard to lighting poles, these are identified with regard to their presence, quantity and location; it is also noted whether the lighting poles are solar powered or in any case energy saving.

The attractiveness of public spaces can be even greater if they have a quality project, designed with durable materials and a pleasant design. Artistic elements are another important element as art in its different modes of expression can make places more beautiful and therefore more livable and enjoyable.

The play spaces help to make the moments of breaks from lessons or periods in which they are not there more pleasant. Such games must be inclusive and also be designed for people with fragility. The spaces for sport together with those for games are fundamental places for aggregation and socialization in free moments as well as outside of lesson days. This were observed in relation to quantity and typology.

Spaces where people can study both outdoors and indoors cannot be missing to allow both off-site students and students who live not near the university or, simply, for those who want to study important places on a campus and these must be designed to be welcoming, equipped and suitable for shelter from difficult weather conditions.

The presence of mixed cycle-pedestrian paths or, if there is space, even separate ones, constitute an important element for connecting the often large spaces of a campus. In this regard, another element consists in the presence of racks for parking bicycles, as well as the presence of electric charging points for bicycles. Both elements must be analyzed in relation to their presence near the cycle paths and the quantity. The proximity of the campus to bus stops, underground trams near or inside the campus and/or the presence of small electric buses to connect the different public spaces are further elements of quality.

Orientation within the various areas of the campus and the presence of the various types of public spaces must also be adequately indicated with wayfinding, totems and signage on site and on an online map on the campus website. Finally, solar panels and water collection in water plazas are important in relation to sustainable aspects.



Figure 1 University Dublin College Public Space (Source: Author's Archive)



Figure 2 University Dublin College Public Space (Source: Author's Archive)

4. MAPPING BEST PUBLIC SPACE CAMPUS

According with the aforementioned European Agendas and the results of the research illustrated in the previous section, some first deductions include as follows. Campus spaces have several points in common with urban spaces, as buildings, open spaces and pedestrian paths can be observed in both. The quality of university outdoor spaces increases the quality of urban and university life and therefore public spaces should be designed in detail to meet the contemporary evolving needs of its community. Likewise, each place is different from the other and the public space, in addition to representing its society, must also be attentive to urban identity.

A well-organized space offers the possibility to establish connections between the physical and social environment, make the place meaningful for the students and can create the conditions for more profitable student learning.

To suitably analyze and design improvements of the campus public spaces, the methodology with which the university sites will be analyzed is the Healthy Place Design, conceived by the author and already tested in Europe, the United States and China. The method aims to detect factors which make places healthy and liveable from the user's point of view and identify appropriate project interventions to enhance or design these factors. For the purpose of this study, the method will be adapted to better fit the surveys of university campuses.

The part of analysis of the method – five phases - consists of different kinds of surveys, observations, and questionnaires. The part of design is composed by three phases and aims at identifying the project interventions.

Phase 1 of the method consists in the definition of the study area; it needs to go on the site in question in different days and hours and decide, through one or more inspections, what are the public spaces to include in the analysis.

Phase 2 is characterized by the observation of the characteristics of the place through three surveys concerning the kinds of activities, the perceptions, and the elements which contribute to the feeling of healthy and liveability of the place.

In the survey 1, the types of people – students, professors, residents, workers etc.. - and their activities are observed. It needs to observe the activities – break, study, sport, lunch, etc.. -from the quantitative point of view, to collect data concerning in what percentage the activities are present in that place and how influence its liveability and urban health. Then, it needs both measure and observe the presence of different typologies of persons from the quantitative point of view, expressed in low, medium, or high presence of people.

Accordingly, the frequency with which the activities are repeated or implemented and with what pace is measured: it is observed if that activity is carried out with a rapid, moderate or slow pace.

The survey 2 consists in identification of singular and mixed perceptions. The singular perceptions include the visual, sound, tactile, smell, taste perceptions, while the mixed one include those of chaos, serenity, disorder, joy, harmony, disorientation, uncomfotability and so on, and depend on the sum of one or more perceptions. Their quantity is expressed as light, medium and high amount percentage; the quality is expressed as pleasant and disturbing perceived perception.

The survey 3 of this phase consists in the observation of the elements which contribute to the health and liveability sensation such as constructed and natural elements, suitable pedestrian/bike paths, art product, sport areas, and good quality equipment and urban furniture - pavement, tables benches, lighting, wireless, solar panels; wayfinding/signage etc..-, and kind of accesses.



Figure 3 University of British Columbia Vancouver (Source: Author's Archive)



Figure 4 University of British Columbia Vancouver (Source: Author's Archive)

Finally, from the intersection of these data, a first outcome of the degree of healthy and liveability of the campus spaces is obtained, resulted from surveys on the place in object.

Phase 3 consists in a questionnaire administered to the campus communities who use the sites aimed at identifying factors and elements which give them the sensation of healthy and liveable place.

This questionnaire is mainly administered to common users of the place in object, including students, passer-by, locals, teachers, community in general, and visitors of different age and nationality. In case of specific objectives of the case study, privileged witnesses and stakeholders can be interviewed to allow a further interpretation of the site.

Questions may include the following and will be modified in accordance with the place characteristics. 1. This place gives you a feeling of liveability or discomfort/ health or unhealthy? 2. What are the elements that give you the above sensations? 3. What are the main facilities that give quality to this place? 4. What are the activities that you act in this place and how often?

5. According to the place healthy and liveability what could be done in order to improve these public spaces? 6. What is a healthy/ liveable university place that you remember in this city or elsewhere? 7. How the weather condition might influence the perception of healthy and liveability of this place?

The observation of the place carried out during the previous surveys allow the choice of the most suitable part of the area to administer the questions. Usually, the presence of fountains, benches, steps and other kinds of urban furniture around which people stop, constitute sites where students, teachers, and people who stay in a campus take a break and are more available to answer.

Phase 4 is that of the analysis of the traditional cartography of the campus in order to understand the elements that compose the place in terms of the type of built elements, natural environment (green areas, rivers, trees, hills, etc ..), and open spaces in the campus and in the surrounding area.

Phase 5 involves the construction of the map of urban health and liveability of the campus public spaces with the identification of sites and features that give to the people who use those places the perception of these factors.

The map will be the result of the different survey operations, analysis, questionnaires and observations, which were collected on the sites in object.

In phase 6, the check of the degree of healthy and liveability is carried out. This is obtained through the study of both intrinsic and extrinsic factors contained in the map and which are capable to determine urban healthy and. The intrinsic factors include the perceptions, orientation, and culture. Extrinsic factors include the architecture, facility, and urban furniture. The aim is that of identifying factors that can be improved according with the 25 principles of the Charter of Urban Health and Liveable Design concerning [1].

Phase 7 concerns the check of the emerged first design ideas with the users of the place through a questionnaire to obtain a “mosaic” of degree of pleasure of these.

Following the check of consistency with the Charter of phase 6 and the results of the phase 7, in phase 8 the identification of the project interventions in the areas in object with attention to healthy, liveability and flexibility is carried out through the overlapping of the results of the previous phases and a check of consistence with spaces and urban furniture and equipment already present.

5. CONCLUSION

The spaces of a university campus or, more generally, of a university site mimic the functions of a city in a smaller dimension and, like this one, needs large open public spaces.

University open public spaces are important places not only for student training but also as places of socialization between students, teachers, technical-administrative staff, and within the community which in different ways is part of the university life: family members, maintenance workers, cleaning staff, janitors, etc.

The needs of students in relation to university open spaces are diverse and concern not only the learning activities that take place inside the buildings but also the activities of moving from one space of a lesson to another, breaks for relaxation or lunch places for socializing.

According with these considerations, the study - carried out in the framework of the research project “LOVE Sapienza: Livable, enjOyable and attractiVE spaces for the community”, funded by Sapienza University of Rome – illustrated through the holistic approach provided by both the 17 SGs and principles of the New Urban Agenda, a bibliographical research, an internet research on different campus websites and visits to universities campus, the factors and elements to identify best practices of public spaces university campus. These include the presence of: green spaces; inclusive accessibility; shelters for shelter from the sun/rain; benches; tables; rubbish bins; poles for artificial lighting; designer urban furniture; artistic elements; play spaces; spaces for sports; study spaces; cycle-pedestrian paths; bicycle racks; charging points for electric bikes; proximity to subway and/or bus stops; dedicated means of transport to the campus; solar panels; water plazas; and wayfinding/signage.

To suitably analyze and identify improvements of the campus public spaces, the methodology with which the university sites will be analyzed is the Healthy Place Design, conceived by the author and already tested in Europe, the United States and China. The method aims to detect factors which make places healthy, liveable and happy from the user’s point of view and identify appropriate project interventions to enhance or design these factors. For the purpose of this study, the method was adapted - and illustrated - to better fit the surveys of university campuses.

Next steps – according with th research project objectives - will concern the test of the method in different campus with particular attention to the Sapienza University public spaces and the proposal of guidelines to improve or design livable, enjoyable and attractive spaces for university communities.

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The Absence of Public Space Project in the Massive Production of New Settlements of the Program My House My Life in Brazilian Cities

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Abstract

After the pandemic the design of public spaces become more relevant in the agenda of urban transformations, but only apparently as an established and widespread situation. The case concerns the design and implementation of public spaces in the new residential settlements of the Brazilian Program *My House My Life* (2009-2020). After an introduction on the Program, the paper presents an overview of the different conditions of public spaces in the PMCMV settlements on the island of Maranhão, a metropolitan capital area in the North-East of Brazil, as result of a field research, carried out by the author and some scholars of the State University of Maranhão in July 2022. First, the research reflects on the monofunctional islands, characterized by two types of settlements and very few connections to the urban grid of public spaces. Secondly, it examines the role of private property in defining proximity conditions through formal and informal services and activities. Finally, the discussion highlights the relevance of private actors (building companies during the design and construction processes and homeowners who live there) and the absence of a collective idea and perspective of urban space “out of private properties”.

Keywords: *social housing; facilities; public open spaces; informal public spaces.*

1. INTRODUCTION

Is the design of public spaces on the agenda of urban transformations worldwide? In the aftermath of the pandemic, academics, politicians and civil servants are confident that the answer to this question is affirmative. The lockdown that forced everyone to stay indoors in 2020 made us aware of the importance of the network of neighbourhood services and the continuity of open spaces, especially in cities and metropolitan areas [1]. A debate on the city of x minutes has opened up in the international debate, following the political slogan promoted by the French capital [2]. Everywhere, continuous pedestrian and cycle paths, squares and playgrounds near homes and workplaces, well-connected parks and pocket gardens have become important; public administrations have decided to invest in the design and implementation of such interventions [3, 4, 5, 6, 7, 8]. Only apparently this is an established and widespread situation. It is necessary to continue to monitor the development of this aspect of urban design, because situations of advanced progress in the definition of public space are juxtaposed with shortcomings and gaps in the design and implementation of a widespread network of public spaces and services. Different attitudes are noted from city to city and between consolidated contexts undergoing change and parts of expanding territories.

The case discussed in this contribution concerns the design and implementation of public spaces in relation to the construction of new residential settlements in Brazil, promoted by the Federal Program *My House My Life* (*Programa Minha Casa Minha Vida, PMCMV*). In particular, it reports on how the programme was implemented in São Luís, a metropolitan city, capital of the North-East State of Maranhão in Brazil.

After an introduction on the Program *My House My Life*, the paper presents an overview of the different conditions of the public spaces in the PMCMV settlements on the island of Maranhão, as result of a field research conducted in July 2022. First, the research reflects on the monofunctional

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2. THE PROGRAM *MY HOUSE MY LIFE*

In 2009, the Federal Government of Brazil promoted public policies for social housing to create affordable houses for low-middle-income families and to support the construction sector.

To react to the 2008 financial crisis [9], and to mitigate political instability and support electoral interests [10], the Lula government, in its second mandate, took this opportunity in 2009 to launch the *Minha Casa Minha Vida* Program (federal law no. 11,977/2009) with the initial objective of building 1 million houses.

The objectives of the PMCMV concerned, on the one hand, the reduction of the housing deficit, which according to the João Pinheiro Foundation and the Ministry of the City in 2006 was 7,934,719 houses, corresponding to 14.5% of the country’s housing stock, which for 94% it concerned the population with an income up to 10 minimum wages [11]. On the other hand, the program aimed at increasing investments in the construction sector and the creation of new jobs in the related sectors, ranging from the extractive industry and the production of building materials, to building construction up to that of furniture and household appliances which allowed the use of homes. Thus, the production of homes of social interest and for the low-cost market guaranteed the social and redistributive purpose but it was first and foremost an economic program [12] and an anti-cyclical policy that hinged on building production. In fact, the construction companies could obtain special lines of credit to build homes in the first two income brackets (0-3 and 3-6 minimum wages) or in general tax relief and facilitations in the project approval process, with priority analysis for approval in the Municipalities [11]. In addition to businesses, these opportunities were also made available to *entidade popular*, legal entities resulting from popular mobilization, with a specific line of intervention and dedicated funds. These subjects, in addition to being responsible for the contracts and works, have the task of discussing the projects with social support and selecting the families who benefit from the interventions, a task which in the case of private companies was instead carried out by local authorities.

In eleven years (2009-2020), the Program *My House My Life* (*Programa Minha Casa Minha Vida*, PMCMV) has constructed 7.525.000 housing units all over the States of the Federal Union, and 5.399.700 were successfully delivered. The program concerns the development of a system to build housing units for low-income families, offering subsidies for families who did not exceed an average monthly income equal to 3 minimum wages (income band 1) and favorable financing conditions for the home purchase for families with incomes from 4 to 10 minimum wages (income bands 2 and 3, in 2009). The beneficiary selection criteria sought to give priority to families living in risk areas, families where the head of the family is a woman and families with disabled members. In relation to family income band 1 (corresponding until 3 minimum wages), the program offered the possibility of subsidies up to 90% of the value of the house; in turn, the other bands followed a popular market financing structure, with repayment quotas and subsidized interest rates. The guaranteed contributions to band 1 allowed 1,901,984 families to access housing at controlled prices [13].

According to Rufino, these residential settlements were mainly located in two contexts: the consolidated suburbs, occupying residual urban voids, in many cases adjacent to previous social housing interventions promoted by the *Banco Nacional da Habitação* (BNH), or in not urbanized areas, as «frontier outposts», in peri-urban fringe areas «discontinuous, often outside the pre-existing urban perimeter» [14: 67] and seen as starting points for further urbanization of natural land.

In 2020, after a brief interruption of the Program due to a political change in the Federal Government, the *Minha Casa Minha Vida* 2023-2026 Program was re-proposed to the Federal Congress on 14 February 2023, with some modifications (Provisional Measure No. 1,162) [15].

3. METHODOLOGY

The implementation of the program was investigated in a specific context, the island of São Luís, a metropolitan area around the capital of the North-East State of Maranhão in Brazil. These different interventions of Program MCMV have been developed and completed. A field research was carried out by an international team, composed by the author, and some scholars of the State University of Maranhão (UEMA), Brazil. Together they carried out field research in the settlements of São Luís, São José de Ribamar and Paço do Lumiar. These urban areas constitute the metropolitan conurbation without continuity solutions. The joint inspection was carried out in July 2022 and involved 11 residential complexes built as part of the program on Ilha do Maranhão.

In São José de Ribamar, the Nova Aurora, São Jose II and Nova Terra residential complexes were visited; instead in the city of Paço do Lumiar Primavera, the complexes of Morada dos Bosques and Cidade Verde; while in São Luís the residential settlements of Amendoeiras, Morada do Sol, Santo Antônio, Vila Maranhão and Luiz Bacelar. All the “non-neighborhoods” visited are aimed at families with very low incomes between 1 and 3 minimum wages (income band 1); only Cidade verde is an intervention aimed at families with a slightly higher income, between 3 and 6 minimum wages (income band 2). The latter is also the only residential settlement, among those studied that targets families with higher incomes.

A photographic campaign, interviews with local actors and residents and visits to some houses and artisan activities allowed to make direct contact and measure through direct experience the urban condition implemented by the Program *Minha Casa Minha Vida*.

The field research was complemented by a study of the urban planning and architectural literature, mainly bachelor's, master's and doctoral theses in Portuguese, and a redesign and schematisation of the urban layout at three different scales, representing the main morphological characteristics of the neighbourhoods and the architectural peculiarities of the building units, and highlighting the changes in the relevant areas of the dwellings [16].

4. MONOFUNCTIONAL ISLANDS OF TWO TYPES OF SETTLEMENTS

The interventions carried out on the island of Maranhão are all significant in relation to the number of housing units created, which range from 700 to over 2,100 for each complex. Nova Terra in São José de Ribamar, among the first interventions started in 2009 and built in ten phases, even exceeds 4,000 real estate units, all on one floor [17].



Figure 1. Nova Terra, São José de Ribamar, Brasil. The residential settlements; Scheme of built and open spaces and mutations (drawing: G. Eportentosi), Sport facilities (photo: M. Mareggi 2022)

The field research carried out on the island of Maranhão and the comparison with the literature allowed to highlight that this building production has used two types of standardised settlements in terms of the form of the residential complexes: on the one hand, isolated houses on plot (single, double or, in a few cases, four-family houses), organised by an orthogonal grid of streets, and on the other hand, closed fences of multi-family buildings controlled by a guardhouse, the so-called *condomínios feschados* or gated communities. [18].

4.1 Settlements of detached houses

A *first type of neighborhood* is made up of a repetition of single-, double- or in more sparse cases four-family houses, organized by an *orthogonal grid* of streets, potentially open, but often well delimited. They are mainly secondary neighborhood streets with sidewalks, often anonymous even in names, sometimes simply numbered. The private open spaces in front of the residences face them without barriers. In addition to the minor roads, there are a few main streets, two-way, in some cases with traffic islands (Morada do Sol). In the majority of the cases studied, the street grid comprises elongated rectangular open blocks. Sometimes the orthogonal system results in a simple double-comb system. The connection with the territorial road network is often unresolved and occurs through a single access to the settlement, which has no specific connotation. Even the road layout is extraneous to the upcoming road network. These residential settlements are therefore *islands*, sometimes limited by infrastructures or, more often, located in rural contexts without a pre-existing territorial layout. Around them, there are natural areas or partly cultivated land, where the gap between urban and rural is marked by the border road, or informal settlements made with waste materials (Morada dos Bosques), almost a sort of small *favelisation* around the interventions of the new PMCMV complexes. In this type of neighborhood, the maintenance of asphalt roads is poor and the presence of parking is rare, except in front of some rare public activities.

In this first situation, the settlements between 700 and 4,000 residential units are mainly composed of single-storey semi-detached houses, in one case also of single-family houses (Cidade Verde) and in two cases of 2-storey buildings with 2 apartments per floor (Nova Aurora and Primavera), where a relevant open space is assigned to each family. All the houses repeat the same internal distribution model, with a few variations.

Concerning the provision of services, the main street of the residential complex often becomes – over time and according to informal practices of functional and building transformation – a commercial and small craft facade. Thus, the buildings extend up to the street level (Amendoeiras), also occupying the narrow sidewalks with temporary coverings (Nova Terra), or by building a veranda as an extension of the house, open towards the street (Morada do Sol) and higher than the level of the driveway (Morada dos Bosques). Few commercial activities are scattered throughout the settlements, located in re-functionalized residential properties; often these are building additions that occupy the private space on the front of the house. The buildings with a different function and form than homes are very limited. Among these, in several neighbourhoods there are religious buildings, while there are a few nursery schools. In some there are health facilities, for example in Nova Terra, one of the first interventions in 2009 and among the largest in size, where there is a general health unit (*Unidades Básicas de Saúde*, UBS). The state of the provision of equipped open spaces and sports facilities is more complex. The inspections showed a discontinuous presence. Usually along the main road or at a central crossroads of the settlement, the plan has left some lots for gardens or leisure facilities. Where present and significant, there are lawns and equipment in a state of decay (Cidade Verde) or in use as a result of the requests of citizens and local associations, in the face of attempted occupations and privatizations for further residential expansions (Nova Terra). However, the absence of paved squares can be noticed, both in the street layout and in front of places of civil or religious representation, which are also absent or have no connotation.

4.2 Condominium colonies

If the neighbourhood of isolated houses on plots distributed in an orthogonal grid in a rural area is prevalent in these newly planned settlements, a second aggregation form is also present on the island, widely spread in the major Brazilian metropolises, for example in Rio de Janeiro [19]. This second type of neighbourhood concerns the *closed fences* of multi-family buildings, the so-called *condominios fechados* – a housing complex fenced and controlled by one or more guardhouses –, which here find a modest version compared to the homologous controlled citadels of the wealthy classes [20]. In the cases under investigation, these are 4-storey apartment buildings, repeated and located to form a linear sequence of low towers or symmetrically ordered around an asphalted courtyard used as a car park. The “condominium colonies”, such as groups of multi-storey buildings delimited by an enclosure, are closed within a curtain wall, with controlled access with security. The relationship with the road system is defined by a single entrance for each colony of condominiums, and the separation from the urban context they generate appears clear: the public sidewalks (rarely used) and driveway paths circumnavigate the fenced complex. Inside there are service spaces for collective use (loisir area, waste area, sports equipment), which are modest, small in size and show traces of poor use and neglect. Inside the enclosures, the ground is completely paved and there are only small green open spaces between the buildings. This type of settlement is found in both urban (São José) and rural (Vila Maranhão) contexts. The latter constitutes a sort of “Apache fort” in the natural landscape, where the distance from the city (a few kms) and the absence of services is counterbalanced by the spontaneous establishment of commercial and restaurant activities in precarious wooden or metal shacks along the only public access road to the fenced condominium colonies.



Figure 2. Vila Maranhão, São Luís, Brasil. The residential settlements; Scheme of built and open spaces (drawing: G. Eportentosi), Informal street trading (photo: M. Mareggi 2022)

It is worth noting that the two types of complexes studied, and the minimalist residential architecture that constitutes them, do not depend on the territorial context investigated. The repetitiveness with which the PMCMV proposes the same types of urban fabric and building typologies from North to South of the country is surprising [21]. It is a reiteration of a single functional program for houses and an *obsessive repetition* of architectural typologies in the settlements. In fact, the interventions paid more attention to significant production rather than to the urban quality of the complexes and the architectural quality of the buildings [22]. Furthermore, the same architectural typologies proposed by the Federal Economic Fund are taken up everywhere in the same form, without considering adaptations to different geographical, climatic and cultural contexts [23], with a standardized building production carried out on-site and not industrialized [14].

In contrast to the great homogeneity of the works carried out, there are some cases of different projects and interventions, adapted to the contexts and qualified in the architectural solutions, albeit in episodic cases, for example where inhabitants and associations have contributed to the definition of the interventions [24].

It is important to note that construction companies have generally preferred to create collages of closed urban interventions or on cheap land outside the city, often contributing to the creation of a periphery of the periphery or even new small, scattered and isolated settlements.

Both of these spatial configurations do not allow for a process of community building, with the service provision and social relations that this entails; rather, they only remain an opportunity for the production of houses.

5. PRIVATE PROPERTIES DEFINE PUBLIC SPACES

The description of the two types of settlements highlights the lack of public space design. In the first type, the neighbourhoods of detached houses, the role of backbone of the public space is entrusted exclusively to the grey infrastructure, with a function mainly related to urban road mobility, on which public services or commercial activities are usually located, without a specific urban and architectural character. In the second type, the fenced condominium colonies, the spaces of sociality are located within the private enclosure, whose access is designed for vehicles. The vitality of the public space is only determined by informal street-side activities, where present.

The lack of planning, design and/or implementation of public space in these settlements is largely compensated by the modification of private property. The focus is on the material actions that redefine physical space rather than temporary social actions (festivals, occupations, demonstrations), which this contribution is not focusing on. On the one hand, the mutations of private property are gradual and primarily concern the transformation of individual houses, which indirectly transform the street section and thus the public space. On the other hand, new informal and precarious spaces are being created at the edge of the road, on vacant land; these new activities seem to play a substitute role for the lack of design of spaces and services of public collective life.

About the first aspect, the inhabitants find themselves living in environments where privacy and security are guaranteed only in the closed domestic space. In the detached house, the open space is significant only on the main front of the house (4-5 meters deep); while it is very limited between the houses, on the sides and at the back. These privately owned open spaces, in a short time and in a self-managed way, change. Walls arise that delimit the property boundaries between the houses and create new open-air rooms at the back. Or verandas are installed on the main front, in masonry or light materials, sometimes precarious. Properties are frequently delimited by high walls on the borders, with an opening for car access. This causes a radical change in the road landscape which becomes closed. And the open settlement of isolated houses on plots becomes a grid of streets designed by the building curtains of the newly shaped patio houses. In extreme cases, the open space in front of the house is transformed into a new volume, to the point of becoming a building extension of up to two floors, both for residential and productive/commercial uses. Recurring is also a sort of private characterization of the sidewalks which become discontinuous in levels, shapes and materials, because each owner tends to characterize it and adapt it to his/her own home. This is a recurring use in low-density settlements in Brazilian cities [25] and is not specific to these places of social housing. The public space of the street is thus completely reduced to a mere area of vehicular circulation and its shape does not allow to feel and experience it as a public space dedicated to sociality.

Similarly, the creation of new informal spaces at the roadside determines an unplanned vitality of the street space, transforming it from a monofunctional to a multi-activity place. This happens in both types of settlements. The formal and informal opening up of activities determines new commercial and service streets that become meeting and resting places. They can be extensions of the dwelling or the occupation of empty spaces with light and precarious materials, located at the crossroads of mobility flows. These are economic activities, both sales and services, that seem to respond more to needs induced by the social context and seem to play a role of compensation for the lack of design of public and collective space, both functional and spatial.

Even with respect to the design of the roads themselves, it is worth noting how the field survey in the settlements of isolated houses on plot in São Luís has shown that the main street is only larger than the secondary ones, bike paths and parking plots are not present, and sidewalks are narrow; their materials and levels change according to the different houses. Very few public (schools, health centres, churches), commercial and workshop facilities are planned. Usually, the last ones have grown informally in enlarged parts of the houses or occupying sidewalks. Some little playgrounds and leisure areas are underused or, differently, some sports facilities are preserved by local communities against the new residential developments. Differently, the gated communities have few poor facilities in the

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private fenced spaces. Moreover, a continuous and high wall defines the relationship of the settlements with the surrounding city, creating a strong physical barrier.

In general, the provision of public services, be they buildings or open spaces, is limited, when present, to a few equipment: «a sports field, not always positioned correctly, even in defiance of its solar orientation, a playground with unattractive games and a little or badly used social center» [26: 211]. The absence of a continuous qualified open public space adds to the lack of integration with the surrounding urban fabric, often not even where such integration would be possible.

6. CONCLUSION

The large-scale construction of new residential settlements for the low-income population has often led to the creation of monofunctional urban areas. The lack or absence of services highlighted does not allow to consider them “self-sufficient neighborhoods”, if by this we mean a complex set of residences and public and private facilities where the daily life of families can take place. Not even the partial transformations of houses into shops and services manage to bring about a change in the monofunctional trait of the settlements. These informal and self-built operations carried out by the inhabitants, necessary for the survival of the family, transform homes into a socio-economic asset [27], and create the dynamics of public space, but without conforming it to a continuous chain of places, able to become a backbone of social and public life, recognized and used by citizens [28, 29]. It does not have the ability to create consolidated urbanity, although it enlivens daily life in the proximity of activities and becomes a place for some occasional form of spontaneous sociality.

In these interventions, the weakness of defining only a street grid, with a few plots available for hypothetical public squares or gardens, emerges as a problem. The orthogonal grid does not seek relationships with the existing street grid and does not adapt to the characteristics of the ground and the environment. This highlights the lack of designing the city in its public dimension and contextualisation. *The My Home My Life* program thus manifests its nature: to produce houses and not to build livable cities. Similarly, the program does not express a shared idea of the space of collective life, except in the private dimension. This is also evident in the lack of design of public space in the face of the few existing public services, such as a health centre or a school. Even these do not become an opportunity to design a square, a meeting place, a playground. Also, the sequence of commercial activities and services does not foster the redesign of the pavement, so that it becomes a place for walking and meeting.

Perhaps this characteristic of the MCMV program is due to the political decision to entrust the design and management of the interventions to the real estate sector. The recurring criticism that the real estate sector is primarily motivated by economic considerations is only partly justified. The voices of public actors, such as local and public administrations and research and training institutions, seem to be scarcely present in the debate and do not play a leading role in urban transformation processes, nor a collaborative role with the productive sectors in order to convey an idea of a qualified public city. The lack of a public perspective and of adequate urban planning is undoubtedly the reason why the network of streets and public spaces of the new settlements is not connected to the existing city, and why the interventions are often located far from the city and the workplaces, in ultra-peripheral areas such as consolidated suburbs or non-urbanised areas [30].

The building companies that led the process of developing the PMCMV have thus conditioned the choice of construction sites; in fact, even in this publicly funded programme, building and real estate companies have continued to pursue a logic of construction intervention through the obsessive repetition of isolated houses or closed condominiums. In Brazil, market-oriented housing production has long adopted the same settlement logic [31], perpetuating an urban model of monofunctional residential, commercial or tertiary enclosures, juxtaposed but without relations.

Thus, the relevance of private actors – construction companies in the design and implementation processes of the programme and the homeowners who live there – and the absence of a collective

idea and perspective of urban space “out the private property” have produced a new disconnected and car-oriented city, with the absence of traditional or innovative public open spaces.

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Safety and Adaptation for Urban Public Spaces

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Abstract

There is a growing need to design and/or redesign usable, comfortable, but also safe urban spaces, roads and equipment, in which everyone can feel included. The pursuit of safe conditions, including the various forms of threat and crime, requires the integration of the different existing approaches to achieve effective and lasting results.

Urban planning can ensure that spaces dedicated to the community and shared use are transformed into as many common goods, thus satisfying citizens' legitimate aspirations to improve the quality of life, for which safety is important. The objective of this EU-funded project (Next Generation EU) entitled "SeTUP - Security Town through Urban Planning" is that the results of this research will lead to the definition of models that can be implemented in policies, plans and regulations.

This work is, in fact, an opportunity for a more careful reflection on the topic in order to identify the key aspects that allow Urban Planning to be oriented towards the environmental prevention of crime risk and the definition of specific actions, possibly to be contemplated in the municipal urban plan, for the adaptation, over time, of urban spaces to security criteria.

Keywords: *safety, adaptation, public spaces, urban planning, next generation EU - Prin 2022 PNRR.*

1. THE THEORIES OF CRIME

Urban safety refers to the measures and strategies put in place to ensure the well-being and security of residents within urban areas. It encompasses various aspects such as crime prevention, emergency response, infrastructure resilience, public health, and environmental sustainability. Creating safe cities is crucial for fostering community cohesion, attracting investment, and enhancing the overall quality of life for residents.

It is a concept that includes within a single definition a broad spectrum of phenomena ranging from predatory offences (robberies, thefts, muggings) to assaults and behaviours such as simple infractions or acts of incivility such as writing on walls, breaking bottles in the street, disturbing the peace.

As for theories and techniques, related to urban safety, there is a vast literature, extensively referred to by researchers over time, which has employed increasingly sophisticated and scientific approaches to understanding and solving the problems of crime.

Several studies have contributed to the formation of the modern understanding of the environmental approach, some of the main streams are briefly described below.

1.1 Eyes on the Street Theory

This theory is based on the concept of *natural surveillance* [1], which represents the controlling action exercised by citizens during their daily activities. The presence of people in the street performs a twofold task: firstly, it hinders criminal behaviour, as offenders generally tend to prefer places of action where they cannot be seen. Secondly, the presence of people increases the perception of security, as it multiplies the opportunities for control and help in case of need [2].

The reasons for urban unsafety are thus to be found in the lack of vitality generated by the insufficient functional mix. The latter stimulates the presence of people in the street, on the pavements and in urban spaces by ensuring eyes on the street, i.e. the informal control of urban space [2].

This is only possible in a living city, in high-quality urban environments that inspire trust and safety, and in spaces that citizens love and are ready to defend.

1.2 Crime Prevention Through Environmental Design (CPTED)

The CPTED method [3] suggests that the physical environment can provide opportunities for crime to occur, thus having a deterrent rather than a preventative effect.

Hence indicating that crime can be reduced by varying environmental factors. The aim of CPTED is to alter the physical environment to ensure that the ‘normal’ users feel safe, but make the ‘abnormal’ users feel uneasy and apprehensive about engaging in any inappropriate antisocial behaviour [4].

It is based on the “behaviourist theory” of operant learning [5]. Every behaviour takes shape based on environmental stimuli and can result in reinforcement or punishment upon the performance of a criminal action. By manipulating the environment appropriately, it is possible to induce specific reactions in individuals [2].

1.3 Defensible Space Theory

Design standards are at the centre of this theory, which aims to enhance architecture, land use, security, and lighting. The concept of territoriality is highly emphasised in this theory, as it is believed that it is crucial that residents feel a sense of belonging for the design to be effective.

Therefore, suggestions are made to encourage the territorial behaviour of residents whose presence could provide surveillance around their residences and advocate the construction of boundaries that reinforce natural territoriality to help residents intervene and prevent crime in their spaces [4].

The first architect to concretely translate theories into projects applied to cities was Oscar Newman, author 1972 of *Defensible Space: Crime Prevention Through Urban Design* [6], an approach applied in many American cities, particularly in working-class neighbourhoods.

Through the construction of closed streets, the control of access, the clear division of spaces and the restriction of crossings, some neighbourhoods showed an improvement in living conditions, a significant reduction in crime rates and the re-appropriation and care by the inhabitants of their living spaces.

1.4 Broken Windows Theory

According to the theory of broken windows [7], phenomena that do not constitute crime but break standards of care and maintenance of the territory and coexistence in public space are potential inducing factors for criminal acts.

The basic thesis is that along with episodes of petty crime, urban decay and social degradation also significantly influence citizens' perception of insecurity.

In a city, minor problems, such as graffiti, public disorder, neglect, filth, are the equivalent of broken windows, i.e. risks inviting more serious crimes: robbers and thieves know that the chances of being caught, or even identified, are reduced if they act in streets where potential victims are already intimidated by the prevailing conditions: therefore, any damage, any act of vandalism not promptly dealt with is considered to be highly indicative of a lack of interest on the part of the authorities and an invitation to continue the damage.

2. OBJECTIVE

Urban settings have often been the study object in the vast research field of perceived personal safety and fear of crime. The latter is an experienced feeling, distinct from actual safety, security or risk, and therefore needs to be approached differently [8].

Unsafety in cities is produced by a complex set of factors, including economic conditions and social problems, but also the way they are planned, designed and built, the way urban spaces are maintained and managed, and the way people identify with their environment [2].

In the wide range of urban spaces, this contribution aims to investigate a specific type of urban public space: the urban green areas. Greenspaces refer to a range of different public spaces including parks, gardens, greened thoroughfares and sporting fields.

Indeed, among the studies carried out on the urban safety concept, only a few have examined perceived personal safety in parks and other green areas [8].

They are an important element of urban design as they provide unique health benefits to residents. Although the health and social benefits of green spaces are well supported [9], emerging research indicates that green spaces can also generate crime.

This work aims at a more careful reflection on the complex dual role of urban green spaces, as valuable but also threatening, shows the need for knowledge on how it can be planned, designed and managed to improve perceived personal safety without reducing other benefits.

Studies of the relationship between crime and greenspace face several challenges, therefore, to understand trends in scientific research, a keyword search was carried out based on the following keywords: TITLE-ABS-KEY ("crime" AND "greenspaces"). This resulted in a cluster of 211 documents from the SCOPUS search covering a time horizon from 2002 to 2024. They were exported in .csv format and uploaded to the VOSviewer software. Once the file was uploaded to VOSviewer, a threshold was set for the minimum number of citations for keywords of 2, identifying 36 keywords shown within the co-occurrence map in Fig. 1.

Each keyword is depicted in correlation to a single bullet: the size is directly proportional to the number of citations found for that map. The arcs represent the correlations existing between the various keywords as a function of the documents in the cluster.

The overlap map (Fig.1) allows us to see how, in recent years, scientific research has proposed different themes and topics and which variables have been used to understand crime patterns.

There is a growing interest in the relationship between greenspace and crime, yet how particular greenspace types encourage or inhibit the timing and types of greenspace crime remains largely unexplored. Most articles link green spaces/areas, crime and security, urban areas, perception and neighbourhood issues. Few studies have considered multiple types of crime simultaneously, and consider crime is linked to socioeconomic factors.

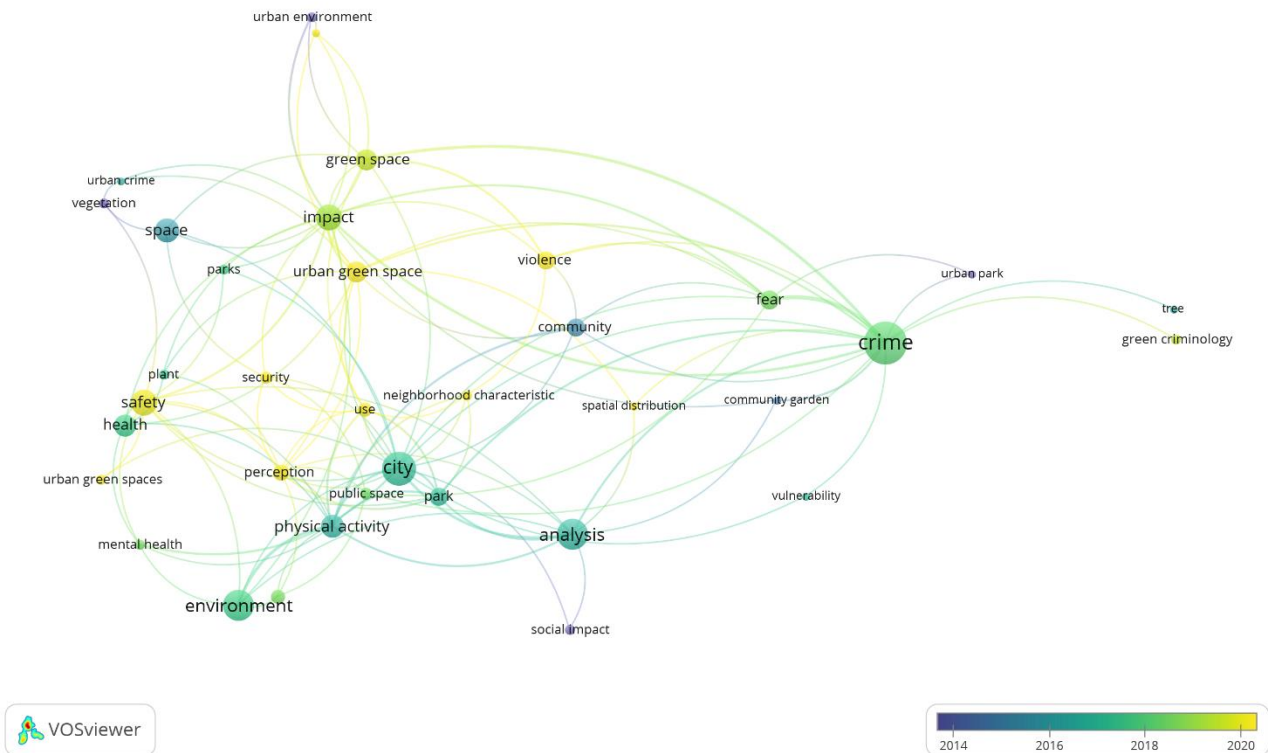


Figure 1. Overlay visualization of author keywords, 2002–2024, in Scopus, based on total occurrences.

3. URBAN GREEN SPACES

Green spaces are important reservoirs of urban biodiversity, improving functional and structural connectivity at the urban level. They contribute to mitigating the urban heat island effect, improving air quality and enhancing the health and well-being of residents while providing a habitat for urban wildlife.

Despite their many environmental and social benefits, they can be both a generator and a deterrent to crime. The crime-facilitating aspect of trees is justifiable by their view-obstructing effect. Following the “broken window theory” [7], poorly maintained urban greenspaces, such as overgrown vegetation and litter, can communicate a lack of oversight and attract criminal activities. So, the character of vegetation can be an important factor affecting perceived personal safety.

In densely forested areas, trees, particularly in low-lying or dense forms, are typically associated with lower perceived security and higher fear of crime due to trees’ view-obstructing effect [10]. In some cases, criminals may take advantage of the dense vegetation or other special environments in the park to conduct illegal activities (e.g. target selection, examining stolen property, disposing of unwanted goods and fleeing the scene), resulting in increased vulnerability to crime and reduced perceived safety for residents [11].

However, it should be considered that not all vegetation has this visually obstructing effect. Indeed, a well-tended area certainly does not block the view; widely spaced, high-canopy trees have a minimal effect on visibility; and low-growing flowers and shrubs do not appear to provide cover for criminal activities. Therefore, although the rule that vegetation helps crime may apply to forms of vegetation that reduce visibility, there are systematic exceptions to this rule. Careful design that favours widely

spaced, high-canopy trees and other forms of vegetation can help preserve visibility, not encourage criminal phenomena [11].

It should also be noted that the intensity and cause of fear varied according to social characteristics of gender, ethnicity and age and spatial behaviour with respect to park use. Park users, particularly women, avoided areas with poor lighting, dense understory vegetation or a high density of trees [12].

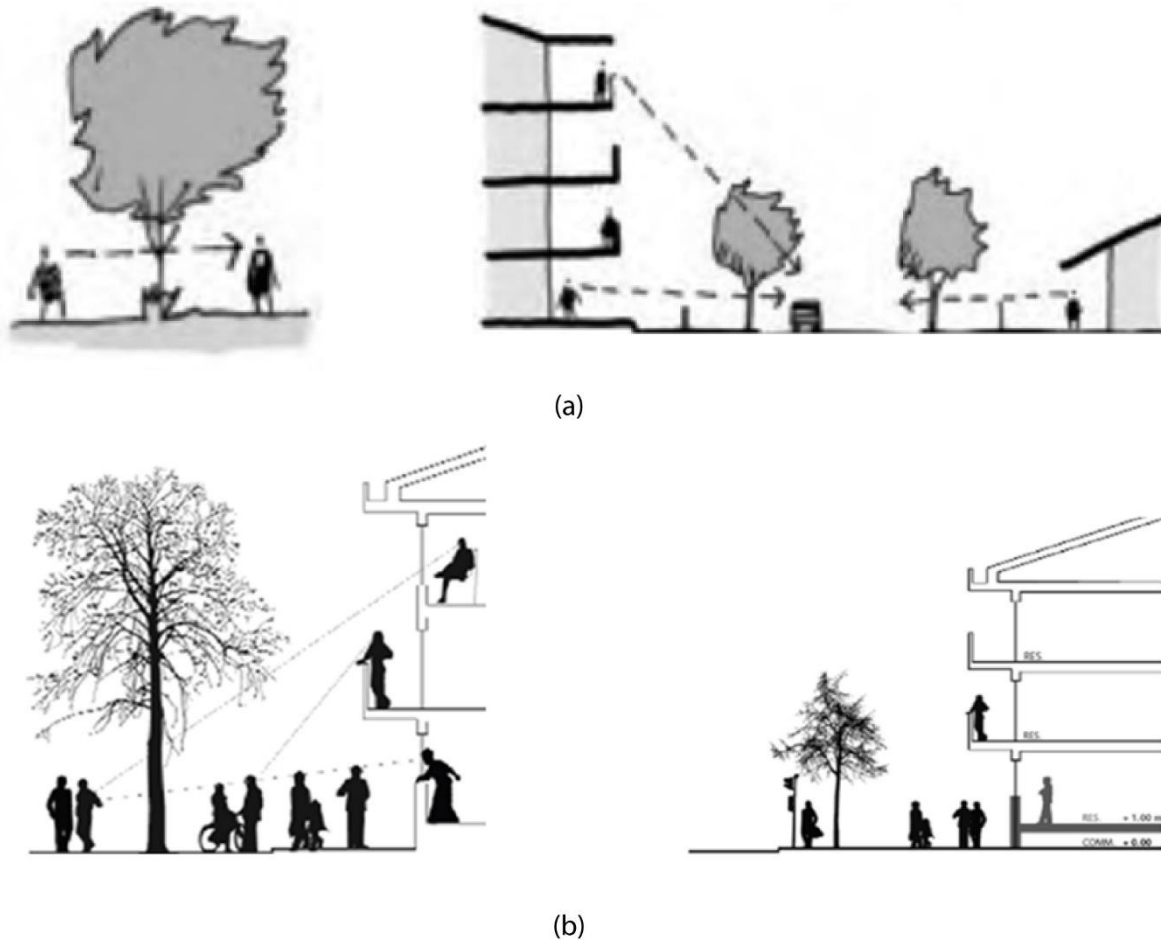


Figure 2. Sightlines through vegetation.

On the other hand, urban green spaces can be associated with reductions in crime, by attracting diverse people, providing a space for positive social interactions via outdoor activity [13] and promoting “eyes on the streets” or informal surveillance [1].

Attractive green landscapes and paths tend to encourage socialisation on the road and increase outdoor activities (e.g. exercising and cycling), which translates into more surveillance with more witnesses and a greater likelihood of intervention [1,10,14].

This increased vigilance on the part of community members can build collective efficacy, strengthening concern and vigilance in a neighbourhood.

Thus, echoing the concept of broken windows, a high-quality landscape around a house can discourage criminal activity [10], as well as redevelopment projects in which vacant lots and decaying urban spaces are transformed, making the environment more attractive and useful for residents, cause violence and crime to decrease [15].

Some researchers also believe that urban green spaces improve the psychological health of urban residents by reducing typical precursors to crime, such as stress and aggression [16,17] and enhancing happiness and social behaviour.

Moreover, through the simultaneous use of public green space, shared by residents of all ages, greater levels of community connection and cohesion can be generated [18]. This can further strengthen the commitment of residents to protect neighbourhood space and deter criminal activities.

The benefits provided by green elements are summarised in Figure 3.

Benefit	Explanation
Natural Surveillance	Greenery, such as trees and shrubs, can improve natural surveillance by providing clear sightlines. This makes it easier for people to see and be seen, discouraging criminal activities like vandalism or assault. Well-lit green areas contribute to a sense of safety by reducing hiding spots for potential wrongdoers.
Psychological Benefits	The colour green is often associated with nature, tranquillity, and vitality. When incorporated into urban spaces through parks, gardens, or even green walls and rooftops, it can evoke feelings of calmness and well-being among residents and visitors. This positive psychological impact can lead to an increased sense of safety and security.
Community Cohesion	Green spaces play a vital role in bringing communities together, promoting social interactions, and fostering a sense of belonging. When individuals feel connected to their neighbours and environment, they are more inclined to watch out for each other, forming an informal surveillance network that contributes to safety. Community events and activities held in green spaces also help reinforce relationships and encourage a sense of ownership, which can deter crime.
Physical Barrier	Greenery can act as a physical barrier, separating public spaces from streets or private property. This not only improves aesthetics, but also creates a feeling of enclosure and protection. By defining boundaries, green elements help users feel safer within the designated area.
Environmental Benefits	Incorporating green infrastructure not only improves aesthetics but also helps manage stormwater runoff and mitigate urban heat island effects. Creating a more sustainable and resilient urban environment enhances the overall quality of life and contributes to a sense of safety by addressing environmental concerns.
Wayfinding and Navigation	Green landmarks, such as prominent trees or lush plantings, can aid wayfinding and navigation within urban areas. Clear and intuitive pathways reduce the likelihood of users getting lost or feeling disoriented, thereby increasing their confidence and sense of security.
Programming and Activation	Activating green spaces with diverse recreational and cultural programming ensures continuous use throughout the day and evening. Well-utilized spaces are less susceptible to criminal activities due to the presence of people and increased guardianship.

Events such as farmers' markets, concerts, or fitness classes attract visitors and promote a vibrant, safe atmosphere.

Social Cohesion and Well-being

Access to green spaces and natural environments has been linked to improved mental health, reduced stress, and increased social interaction among urban residents.

Figure 3. Urban green benefits.

4. FINAL REMARKS

Nowadays, in the European Union (EU), ensuring urban safety is a priority, and several guidelines and initiatives have been developed to achieve this goal. EU encourages cities to develop comprehensive, integrated urban safety strategies that address various safety challenges holistically. This involves cooperation among various stakeholders including local governments, law enforcement agencies, community organizations, and residents.

The EU also promotes the implementation of CPTED principles, such as designing urban spaces in a way that reduces crime opportunities and improves residents' sense of security, in urban planning and development projects.

The growing demand for safer urban spaces is linked to a wide range of conditions that influence and alter the perception of urban spaces, making them appear unsafe.

The contribution emphasises that crime is influenced by many factors, but the environmental context - including green spaces - is considered a key component [9,13].

By prioritising green spaces, cities can improve the physical and psychological well-being of their residents while fostering a greater sense of safety and security. It is therefore believed that the proper design of urban green spaces can significantly improve the perception of safety in public spaces.

As parks are becoming important reference points for new environmental strategies in cities, and since fear of crime is often cited as a major barrier to the development and subsequent use of green spaces [19], it is essential for urban planning to investigate the causes and spatial configurations of fear if all community members are to be encouraged to increase their participation in public parks [12].

Police forces often allocate resources to respond to the perceived potential for crime and disorder in specific types of green spaces, such as urban parks [13], but the goal of making the city safer is not pursued, exclusively, by control (police, video surveillance) or repressive actions. The recourse to such actions, the excessive confidence placed in them, and the instrumentalization of the issue for political ends, only further fuels the perception of unsafety and obscures the great potential that urban planning has in this regard. Decisive in this sense are the physical elements of the urban environment, related to the way cities and spaces are planned, designed, built and managed. Careful design, taking into account security aspects, can reduce the probability of the occurrence of criminal events but above all increase the sense of trust and security felt by citizens towards urban space [2]. It is therefore considered necessary to address the problem by following an integrated approach that sees socio-economic actions flanked by physical, functional and managerial interventions on the built environment, aimed at influencing the vitality of the city, the perception of the environment, the sense of belonging to the territory and the informal control of the same.

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Valletta – The fine line between urban vitality and liveability

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Abstract

Numerous authors have debated the fine line between urban vitality and liveability, particularly when prioritising vitality strategies at the expense of liveability objectives. These debates are even more heightened in tourism-dependent contexts. This is epitomised by Malta's capital city, Valletta – a UNESCO World Heritage site undergoing rapid transformation that has in turn brought about numerous placemaking challenges. The city's urban structure, defined by its strict geometry, underwent numerous cycles of adaptation and restructuring along the centuries. Its main challenges, however, have come about more recently, because of several phenomena that are worth exploring, not least those related to its designation as European Capital of Culture in 2018.

Building on an ongoing ten-year research project, the paper first discusses the city's changing land use profile in recent years, through a detailed understanding of development planning permits and tourism clearances for catering and hospitality proposals issued between 2014 and 2022 – therefore in the run-up to, and post-, 2018. It then proceeds to translate the spatial implication of such permits on the ground, more specifically by understanding the proliferation, and subsequent public land take-up, of outdoor catering areas within prime streets of the capital city. The nightlife transformation of the city, as it becomes a new entertainment destination for revellers, has further tested the urban fabric's resilience and has led to numerous calls for its control and reduction from its residents, the Valletta Local Council and, notably, the Malta Hotels and Restaurants Association.

Using textual analyses as an analytical technique, the paper analyses the text from a selection of widely diffused newspaper articles and key opinion pieces written throughout 2022 and 2023 and that have generated debate regarding space appropriation, land use compatibility and heritage concerns in Valletta. The paper then discusses how specific planning policies have been created to suit, foster, and indeed accelerate Valletta's commercialisation, with significant consequences to liveability, under the guise of the strategy's objective to promote urban regeneration within the city. In particular, the discussion centres on the Valletta Strategy, a key policy document that has arguably helped shape most of the recent urban phenomena within the city.

The paper highlights the lack of safeguards for the commodification of space as a significant policy deficiency, suggesting policy pointers for a more resilient and liveable urban fabric, as Valletta witnesses slow, but persistent, calls for change from its frustrated residents.

Keywords: *vitality; liveable cities; placemaking; Valletta.*

1. INTRODUCTION

The debate surrounding urban vitality and liveability has been a recurring theme in urban studies, reflecting the complexity of balancing economic vibrancy with the quality of life for residents. Urban vitality refers to the dynamic quality of a city, characterised by economic activity, cultural vibrancy, and social engagement. On the other hand, urban liveability prioritises residents' quality of life, emphasising factors such as housing, green spaces, sanitation, safety, and overall environmental quality. These concepts often clash when strategies to enhance urban vitality come at the expense of liveability, especially in cities heavily reliant on tourism.

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Valletta, Malta's capital city and a UNESCO World Heritage site, serves as a prime case study in this discourse. The city has undergone rapid and significant transformations in the past twenty years, with investments in rehabilitating historic properties for tourism purposes and infrastructural projects that have transformed the urban spaces within the city as part of a pedestrian environment. These changes have been driven by various factors, including its designation as European Capital of Culture in 2018. Valletta's revitalisation, however, has come at the cost of reduced liveability and concerns about the decline of the social fabric in Valletta.

This paper outlines the balance between urban vitality and liveability in Valletta, providing an examination of changing land use patterns, policy impacts, public opinion, and the resultant urban fabric implications. The study employs textual analysis to examine the public discourse captured through key opinion pieces and newspaper articles. Additionally, it integrates on-the-ground observations to document spatial realities. This mixed-methods approach enables a comprehensive understanding of Valletta's evolving urban dynamics and the tensions between commercialisation and liveability.

2. UNDERSTANDING URBAN VITALITY AND LIVEABILITY IN THE CONTEXT OF TOURISM-CENTRED REALITIES

Urban vitality refers to the vibrancy of city life, often measured by the presence of economic activities, cultural events, and social interactions that occur within an urban space. Jane Jacobs' [1] theories emphasise the importance of diverse, mixed-use urban neighbourhoods with a strong sense of community to foster urban vitality. She advocates for pedestrian-friendly streets, local businesses, and a mix of residential and commercial spaces to promote social interaction and economic growth. Ebejer et al. [2] similarly discuss the importance of activity in urban spaces, contending that successful public spaces are characterised by the presence of people, as it creates a social contact and enhances the overall experience. The authors also emphasise the vitality of urban spaces, dependent on the diversity of uses and the exchange of transactions among people.

Liveability, on the other hand, pertains to the quality of life experienced by residents, encompassing factors such as housing quality, accessibility, environmental health, and social well-being. Related to this discussion is the 'right to the city' — a concept introduced by Lefebvre [3] that forms the foundation for examining the inequalities arising from social and spatial interactions and the changes in societal landscapes.

These concepts may be seen as two sides of the same coin – in that they are not mutually exclusive; however, prioritising urban vitality, particularly through tourism and commercial activities, can sometimes undermine the liveability of a city, creating tensions between economic development and resident satisfaction. The reality of urban tourism is that it now occurs in committed residential neighbourhoods, driven by factors such as low-cost airlines and online platforms like Airbnb, and resulting in a heavy reliance on the tourism sector in many urban economies [4]. In the early 2000s, urban and cultural policies in southern Europe shifted towards using tourism to revitalise historic districts, attract more tourists, increase property values, attract investments, create jobs and generate economic benefits [5]. As a result, cities, particularly their historic centres, have been transformed into tourist destinations and leisure-oriented spaces.

This phenomenon has led various authors [6, 7] to use the term 'touristification' to describe the transformation of urban spaces into tourist-dominated areas, which disrupts social relations, dismantles communities, and poses challenges to long-term residential life. Leccis [5] further highlights the lack of research on the relationship between urban planning and tourism development. Touristification processes have negative impacts on the physical, social, and economic environment of destinations, notable of which is the alienation of residents. It also affects residents' quality of life by exacerbating existing issues such as waste disposal and repercussions of outdoor commercial activity, notably noise. Chamizo-Nieto et al. [8] similarly examine the impact of urban tourism on

cities, noting how city modifications to accommodate tourists have displaced residents and sparked protest movements. The concept of tourism gentrification has highlighted tensions between residents and tourists. In this respect, Valletta is no exception.

3. VALLETTA'S URBAN TRANSFORMATION AND CHANGING LAND USE PROFILE

Valletta's urban form is characterised by its grid layout, fortifications, and grand public spaces, which were designed for both defence and civic pride. Over centuries, the city has seen various uses and adaptations — from a fortress city to a bustling trading port, and more recently, a vibrant cultural and tourist hub. Each transformation has brought changes to land use, infrastructure, and urban dynamics, thus influencing both its functionality and identity [9].

Following independence, efforts were made to repurpose historic buildings into government offices, incorporate cultural amenities to support tourism, and establish various businesses within the city, although the city kept on experiencing a population decline and a deteriorating urban fabric. While the increase in commercial activity and tourism in Valletta led to a rise in daytime population, the lack of evening activities and untidy streets in the city centre caused the capital to become deserted at night, resulting in environmental decay and a decrease in overall liveliness [10]. The inclusion of Valletta in the UNESCO World Heritage list in 1980 signified a commitment to heritage conservation, but also added a layer of complexity to development endeavours.

After 2006, Valletta underwent a regeneration process, driven by a combination of top-down placemaking efforts, investments in property by both local and foreign investors, and the agency of consumers and other co-producers. Projects included the restoration of historic buildings and the development of pedestrian areas alongside a comprehensive traffic management system, in turn leading to increased investment in catering establishments and boutique hotels. This has not always been supported by a clear vision and regulatory framework, leading to numerous instances of speculation by developers [11]. In turn, the transformative wave over the past decade, driven by Valletta's designation as the European Capital of Culture (ECoC) in 2018, has brought about multifaceted challenges. While the event spurred substantial urban renewal projects and increased tourism, it also further intensified pressures on the city's infrastructure and social fabric [12].

In this respect, two key recent developments within the city of Valletta deserve discussion:

- (a) *Development Planning Permits* – A surge in permits for outdoor catering areas and hospitality establishments indicate a shift towards a service-oriented economy driven heavily by tourism. This influx of permits has translated into a significant increase in commercial activities within the city, often at the expense of residential uses. The proliferation of outdoor catering areas, with the insertion of tables and chairs, while contributing to the city's urban vitality, has created concerns about the excessive use and appropriation of public space by private businesses. Valletta's transformation into an entertainment destination has also had profound effects on its urban resilience and liveability.
- (b) *Tourism Clearances and Hospitality Proposals* – The prospect of an increase in tourist numbers, a result of the ECoC designation, has necessitated additional hospitality and entertainment facilities. Tourism-driven clearances have thus facilitated the rise of hotels, guesthouses and entertainment venues. While these developments have boosted Valletta's economy, they have also contributed to the commodification of public spaces and have sparked debates about the sustainability and liveability of such rapid transformations.

The above shifts have visibly altered the urban landscape of Valletta. What was once a public space open to all has now been transformed by private interests. This transformation has resulted in a form of displacement in the city, not necessarily in terms of direct residential evictions typically associated with gentrification, but indirectly in terms of land use changes. As a result, older local establishments that are deemed less attractive or profitable have faced displacement due to commercial gentrification influenced significantly by tourism. This evolution has reshaped the character and identity of Valletta.

Furthermore, the increase in catering establishments and nightlife is perceived by residents to be excessive and inconvenient [13].

Previous studies [14] have already shown how the rising land value in Valletta has created a commercial gentrification that displaces local businesses, including traditional retail and food markets, causing residents to lose access to essential stores and services, particularly with the advent of the *Suq Tal-Belt* (Covered Market) project. However, the commercialisation of the site has been criticised [14, 15, 16] for detracting from its urban heritage value and limiting space for pedestrians. In turn, Deguara et al. [17] have exposed residents' concerns with leisure and nightlife, providing first-hand accounts of how urban transformation has affected daily life in Valletta and highlighting issues such as noise pollution, reduced accessibility, and loss of community spaces.

3.1 Land use changes — development planning applications and tourism clearances

Data collected from development planning permits and tourism clearances was obtained from the Planning Authority and the Malta Tourism Authority respectively. Three important sets of data were obtained for the period 2014 - 2022:

- 1 Change of use permits issued in Valletta, visualised as a Sankey diagram and clearly illustrating the significant land use change occurring vis-à-vis catering outlets – Class 4C and Class 4D food and drink establishments, without on-site cooking (snack bar) and with a kitchen (as a restaurant) respectively (Figure 1).
- 2 Amount of Class 3 tourism accommodation, comprising Class 3A hostels, small guesthouses and boutique tourism accommodation and Class 3B hotels, as well as Class 4C and 4D reclassifications in Valletta, with peaks pre-ECOC 2018, and with Class 4 uses remaining significant even thereafter (Figure 2).
- 3 MTA clearances issued for both Class 3 tourism accommodation and Class 4 catering outlets in Valletta, with notable peaks pre-ECOC 2018 and an understandable drop during, and in the aftermath of, the COVID-19 pandemic (Figure 3).

The data is further supported by a recent study carried out by Speake, Kennedy and Love [18], that discusses the scarcity of affordable property in Valletta, and the resulting increase in property prices and demand for luxury apartments and townhouses. The authors show how this has led to a significant development of tourism-related functions, such as upscale hotels, boutique accommodations, and the revitalisation of the city with a focus on tourism. Their research also concludes that around one-third of Valletta (particularly areas near Republic Street) has undergone gentrification and revitalisation, resulting in a visible contrast between affluent and impoverished sections of the city. The rejuvenated areas stand in stark contrast to the surrounding pockets of poverty in terms of development, visual appearance, functionality, and social characteristics. Further understanding the spatial distribution of these non-residential uses on the ground (Figure 4) illustrates the juxtaposition of incompatible land uses, particularly that of residential areas adjacent to nightlife zones, leading to conflicts and a diminished perception of liveability, as discussed further hereunder.

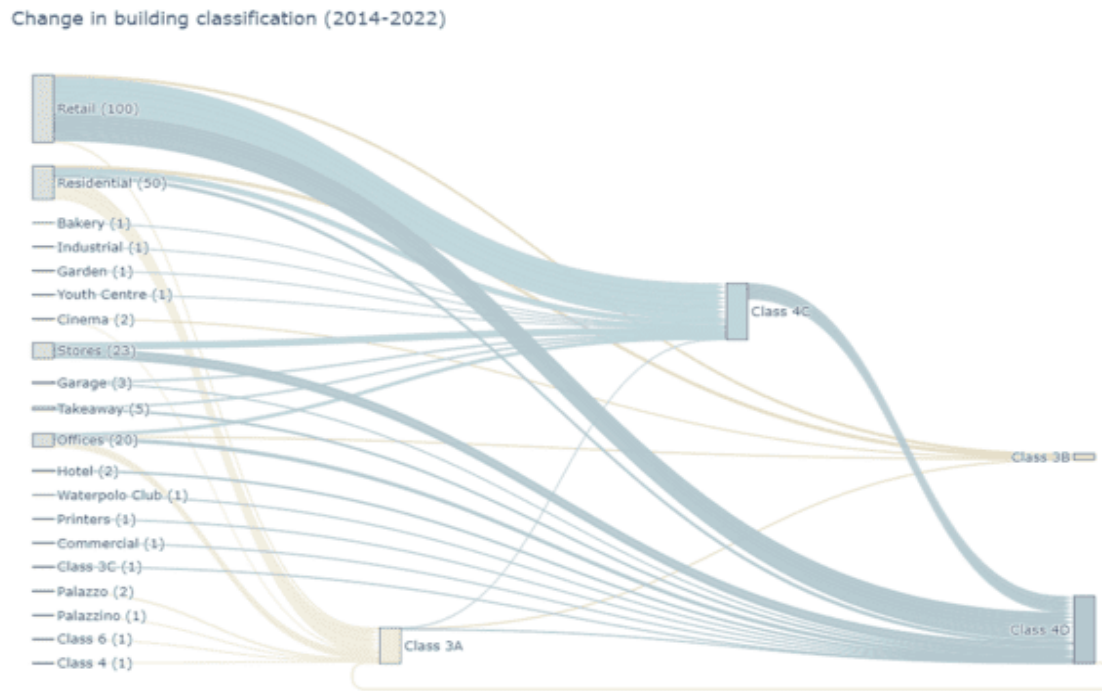


Figure 1. Sankey Diagram illustrating change of use permits issued between 2014 - 2022 (Data source: Planning Authority, Malta)

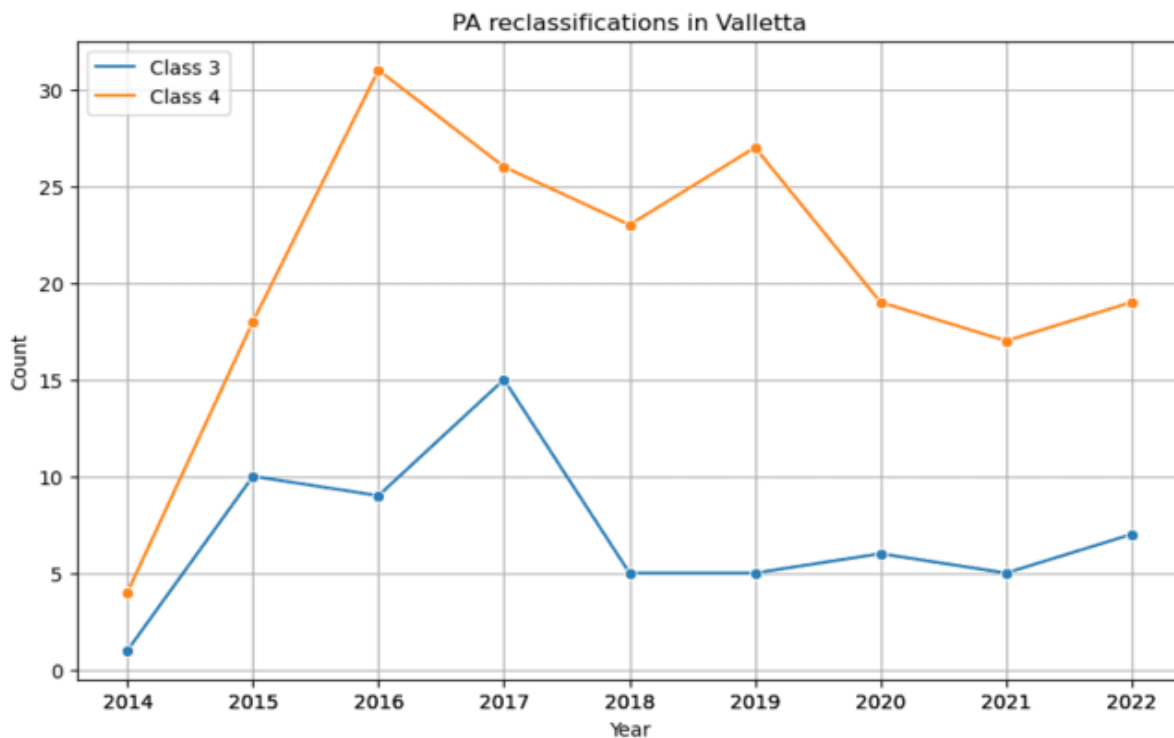


Figure 2. Change of use permits in connection with Classes 3A, 3B, 4C and 4D issued between 2014 - 2022 (Data source: Planning Authority, Malta)

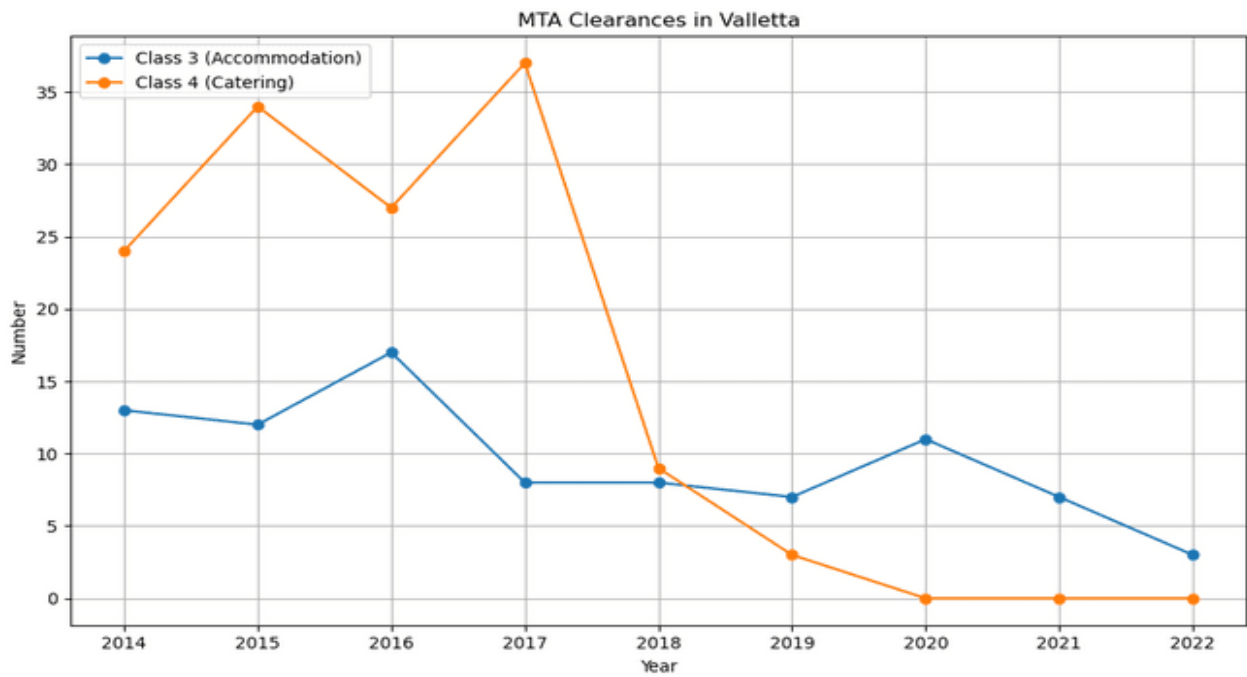


Figure 3. MTA clearances in connection with Classes 3A, 3B, 4C and 4D issued between 2014 - 2022 (Data source: Malta Tourism Authority)



- Different catering types**
- Restaurants with kitchen (class 4D)
 - Snacks and coffee shops without kitchen (class 4C)
 - Ancillary ground floor catering use with hotels (class 3B)
 - Ancillary ground floor catering use with palazzo (class 3A)
 - Midstreet places
 - Formal places with tables and chairs

Figure 4. Plotting out of the various catering offers within Valletta's central core, as a stand-alone Class 4C/4D outlet or ancillary to Class 3A/3B at ground floor (Source: Author)

3.2 Proliferation of Outdoor Catering Areas (OCAs)

One of the most noticeable changes on the ground has been the mushrooming of Outdoor Catering Areas (OCAs). Restaurants and cafes have increasingly expanded their seating onto public spaces, taking up significant portions of prime streets. This trend has implications for spatial equity, pedestrian accessibility, and public space utilisation, as a significant amount of public land is taken up. Based on the previous analysis, and in tandem with several on-the-ground observations, four streets containing a concentration of OCAs may be singled out – along Merchants Street, along St. John’s Street, and within the intersection of Strait Street with Old Theatre Street (Figure 5).



Figure 5. Outdoor catering areas along Merchants Street, St John’s Street, Strait Street and Old Theatre Street (Source: Author)

On-the-ground measurements taken to establish the area of land occupied by the OCAs in each of these streets, reveals a land take-up that varies from 30-53% in Merchants Street (Figure 6), 24-61% along St John’s Street and 48% within the intersection of Strait Street / Old Theatre Street. This constitutes a significant amount of appropriated public urban space by catering equipment.

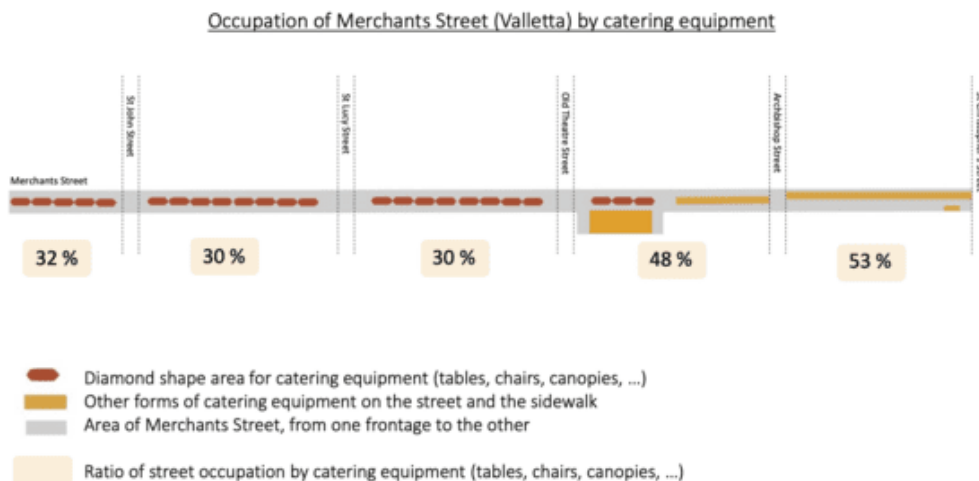


Figure 6. OCA land take-up along Merchants Street (Source: Author)

3.3 Valletta’s nightlife transformation – textual analysis of media and opinion pieces

Valletta’s nightlife transformation, characterised by the rise of bars and entertainment venues with live music, has led to noise pollution, increased waste, and conflicts between revellers and residents. Residents, the Valletta Local Council and the Malta Hotels and Restaurants Association (MHRA)

have all raised concerns about the night-time economy's impact on liveability, with matters coming to a head throughout 2022 and 2023 as Government identified several streets in Valletta wherein music could be played until 1am, receiving a backlash from residents and NGOs. The MHRA subsequently stated that such a decision “contradicts efforts in positioning Valletta as a high-end destination as agreed to by all tourism stakeholders through the national tourism policy” [19]. A textual analysis of twelve newspaper articles and opinion pieces with the highest engagement (most read and most article comments) over these two years was carried out to gauge public sentiment on these important issues. Python scripts were used to extract (scrape) both article content and its comments. For each article, common English ‘stop words’ were filtered out and engagement counts were calculated from the comments section. Key issues and common themes arising from this media are summarised in Figure 7.

Article / Opinion Piece Title (2022/2023)	Author	Key Issues, Common Themes
‘Pavements for citizens’: The sticker rebellion battling restaurant encroachment	Claudia Calleja	Space appropriation Public space commodification Land use (in)compatibility Regulation and control of nightlife activities, legal implications Quality of life for permanent residents Growing discontent among residents regarding noise levels / loud music Noise pollution Traffic congestion Waste management issues
Making money as Valletta dies	Josephine Burden	
Lord of tables and chairs	Alexiei Dingli	
Editorial: Valletta is no longer a city of gentlemen	Times of Malta	
‘Valletta is not Paceville’ - anger as music is extended through the night	Fiona Galea Debono	
Minister defends Valletta's 1am music rule as two more streets added	Fiona Galea Debono	
Valletta meeting on late-night music rules degenerates into shouting match	Jessica Arena	
Revellers in Valletta have bucket of water thrown at them	Jessica Arena	
Withdraw the law or face the music, Valletta residents warn government	Matthew Xuereb	
Valletta risks becoming 'nightclub destination' says MHRA amid talks	Times of Malta	
Valletta residents have had enough of al fresco encroachment on their walkways	Matthew Vella	
Valletta’s anger is about more than just ‘noise’	Maltatoday	

Figure 7. Key issues arising from the 12 newspaper articles and opinion pieces and their comments. (Source: Author)

3.4 Policy discussion: The Valletta Strategy

In 2009 a Valletta Action Plan was drafted to develop an Integrated Cultural Heritage Management Plan, aligned with the objectives of URBACT and in collaboration with several entities, NGOs and the private sector [10]. The document's six-point Rationale comprised restoration objectives, the creation of a competitive tourism market that hinged on a diverse tourism product and niche market, mobility objectives and an emphasis on the local communities within Valletta. Its vision for creating

commercial opportunities comprised both the promotion and maintenance of Valletta's commercial zone, as well as acknowledging the need to focus on developing alternative commercial areas that align with the upgrade of the residential area to ensure long-term sustainability. The Plan was never implemented and instead a new document was drafted – the Valletta Strategy [20].

The Valletta Strategy is one of the central documents that has been used by the Planning Directorate at the PA to justify the development planning applications discussed in the previous sections [14]. It has played a significant role in promoting Valletta's touristification by outlining objectives to promote urban regeneration through cultural and economic activities. The strategy categorises almost the entire city as a 'regeneration priority area' and facilitates the interpretation of planning regulations to allow for the development of boutique hotels, short-term rentals, and an increase in tourism-oriented retail and catering outlets, ultimately transforming Valletta into a tourist destination and helping the city's commercialisation.

4. DRAWING PARALLELS AMONG STUDIES

The above empirical work, together with previous local studies in relation to Valletta's liveability, relate to Cocola-Gant, Gago and Jover's [4] study regarding disruptions caused by tourism, further adding the contribution of Sánchez-Montañés, Romero-Ojeda and Castilla [21], who discuss the overtourism influences on architecture and urban spaces of historic centres (Figure 8).

5. URBAN VITALITY VS LIVEABILITY: THE BALANCING ACT

Valletta's journey highlights the complexities involved in balancing urban vitality with liveability. While recent transformations have boosted its commercial vibrancy, they have also strained its urban fabric. By examining land use changes, policy impacts, and public sentiment, this paper underscores the need for a more balanced approach to urban regeneration. While the Valletta Strategy's emphasis to leverage Valletta's heritage and strategic location, to attract investments and tourists, is positive in principle, the document lacks numerous safeguards. A rethought strategy is needed, which looks at the cumulative impact and/or land use concentration of specific land uses and that address liveability concerns in a tangible and effective manner by addressing key issues, notably the commodification of public spaces and the need to rebalance the land use offer within the city, especially regarding tourism accommodation, giving due regard to the incompatibility of some land uses. In tandem, a stronger role for enforcement in ensuring that encroachment limits for OCAs are not exceeded (in the short term) and to control night-time disturbances and, medium-term, to re-evaluate the city's urban spaces to rethink OCA limits.

In Michael Sorkin's words, "no urbanism can be spoken of outside its political dimension" [22: 58]. this is even more relevant and pertinent when dealing with Valletta's public urban space and its use, particularly for commercial purposes. in all this discussion, therefore, the role of the state remains a central one – first, to address and rectify the injustices of gentrification through the implementation of policies and institutions that consider local social and market conditions [23]; second, to address tourism requirements within an overarching strategy that protects local communities, not alienate, or exclude them. the concluding issues from this research (figure 8) have important policy implications in effectively addressing liveability objectives. this is a fine balancing act, requiring good governance structures that are defined by resilient community frameworks, but above all, a robust roadmap steered by the state as it sets its medium- and long-term urban regeneration objectives.

Phenomena / Issues — Literature				Empirical work in support of the literature		
Cocola-Gant et al. [4]		Sánchez-Montañés et al. [21]	Previous local studies -- Valletta's liveability	Analysis of permits	On the ground analysis	Media Analysis
Economic	Loss of consumption facilities used by residents	Lack of commercial establishments that cover the basic needs of the residents	[14]	X	X	/
	Commodification of consumption facilities that now cater to visitors	Specialisation of the city centre as an area mainly for hotels, restaurants, shops and tourist facilities; areas given to consumption and leisure activities	[13, 15, 17]	X	X	X
	General rise in the cost of living	/	/	/	/	/
Physical - spatial	Overcrowding and mobility disruptions	/	/	/	/	/
	Privatisation of public space	Massive physical occupation of the public space; homogenisation of public space	[13, 15]	/	X	X
	Noise	Hybrid impacts, notably liveability and environmental problems – pollution, waste, noise	[13]	/	/	X
	Loss of meeting places	Monofunctional zoning and tourist monoculture	[13, 14]	/	X	X
		Reduction of housing total area, causing a housing shortage. Disappearance of residential use.	[15]	X	/	/
Socio - cultural	Exclusion from places dominated by visitors	Displacement of local and traditional businesses; decline in liveability for community and destruction of the neighbourhood because of tourist gentrification	[13, 15, 17]	X	X	X
	Loss of community and social bonds	/	[17]	/	/	X

Figure 8. Parallels among literature sources and the empirical work (Source: Author).

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Activators. Complex Buildings as Public Space Generators

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Abstract

To be seen more as a collection of open questions rather than a description of possible solutions, this paper intends to focus its attention on the very old issue of architecture's capacity to shape our contemporary society. The paper opens by introducing some essential data reflecting the not-so-far future of our cities and questioning the role that architecture can play in pursuing sustainable transformations of public space.

In a scenario where the city is becoming the primary urban habitat, while the right to the city falls short, the paper addresses the case study of the so-called Complex Buildings as a possible theoretical and practical tool to face contemporary urban challenges.

Keywords: *Complex Buildings, Bento-Box Architecture, Architecture, Complex System Theory, Social Ecology*

1. INTRODUCTION

In April this year, an updated report on the World Bank and United Nations Department of Economic and Social Affairs (UN-DESA) website revealed that 56% of the world's population (about 4.4 billion people) live in cities, one billion of which reside in slums. This number is expected to reach 60% (or 5.2 billion people) by 2030 and 68% by 2050. Furthermore, it is estimated that continued global population growth could lead to an increase of 2.5 billion inhabitants in urban areas by 2050, most of them living in 43 megacities (cities with more than 10 million inhabitants) expected to emerge by 2030. These will contribute to the expansion of new urban areas, with an expected growth of an additional 1.2 million km² of built-up area by 2030 [1].

This unprecedented acceleration, which creates new urban dynamics, poses critical challenges for sustainable urban development. As of today, in fact, although cities are seen as the new engine for initiating a model of sustainable and inclusive growth, they are often analysed and planned from projections centred on the – now sustainable - connection of flows of means and goods, leaving out a fundamental datum of urban life: the citizens and their continuous research of a community. These strategies, where already applied, have highlighted how such a model of urbanisation mainly results in five phenomena: urban dispersion, low productivity, segregation, and exclusion. These phenomena can generate a counter tendency that is only apparently classifiable as *demographic decline*. It is instead an actual *exclusion process* fed by the stagnation or decline in the overall population of some countries but primarily by doped real estate projects that, in the name of a recognisable aesthetic, are helping to widen the gap between rich and poor, winners and losers, changing the anthropological profile of contemporary cities. In other words, paradoxically, in this contemporary context where *the city is becoming the primary human habitat*, "the right to the city" falls short. This fall is due to the marginalisation of fragile social groups pushed out from served urban areas and resettled in increasingly remote suburbs (if lucky, in dormitory districts; if less lucky, in slums) where access to equal opportunities - regardless of age, race, gender, sexuality, income or physical and mental health - becomes even more difficult. As a result, contemporary cities are increasingly subjected to bottom-up initiatives, such as *tactical urbanism* projects that, although masked as colourful short-term solutions and essential in reconnecting the citizens to the city, are, in fact, symptoms of a concerning problem: the incapacity of architectural and urban design to activate the public sphere. Nevertheless, these design projects and research demonstrate that even if we live in an era where social media seems

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to be *the public place* (and they are effectively becoming it through the metaverse), collective public space within cities is increasingly needed. They unequivocally demonstrate that, although housing/social housing policies and projects are vital for making cities accessible to all, it is only through the *public spaces* and the *public facilities* that it is possible to guarantee "the right to the city" and epitomise the city's essence: to be the *generator* of civic and public life.

2. FINDING ARCHITECTURE IN URBAN THEORIES

"We are now officially part of the group of people who have been forced to leave the city." With this statement, two young architects decided to move away from Milan. They struggled to find an affordable house in a convenient area and ultimately chose to move to a small provincial city. Their decision was due to the challenges of sustaining a life in Milan from economic and social perspectives. This example reflects a trend that has emerged since the COVID-19 pandemic, affecting vulnerable social groups who, despite relying on the city's work opportunities, welfare, and leisure facilities, are choosing to leave. This phenomenon has led to an increasing demand for public transport connecting the city with the surrounding suburbs. However, the public transport system is struggling to meet these needs, causing people to rely more and more on cars and other unsustainable forms of transportation. This leads to a drastic increase in pollution levels that no facade defined as 'beautiful' or "ecological" just because studded with trees sustainable like diamonds can counteract. Ironically, the summa of all the green policies adopted by the Milanese Municipality has led the city to become, in February, the third most polluted urban area in the world for a few days. The Milanese experience thus highlights how it is increasingly necessary to rethink the term *sustainability* semantically, integrating within its meaning technocratic and political issues but also social matters in which architecture and urban design become the main tools for fostering new sustainable life models for all social strata. In other words, integrating the world of Design with the world of Social Ecology.

Some research and projects have been developed in the last decades to contrast these phenomena and transform the cities into more sustainable devices. Among them, the so-called "15-minute city" has gained prominence by proposing a model based on a temporal distance between the location of an individual's housing, workplace, and public facility, therefore proposing a sustainable and livable "city of proximity". However, recent studies show how this model presents a social mix fallacy generated mainly by short-term or top-down urban planning ideals that cannot address long-term community needs and structural discriminations related to equal opportunity and access to public and private services. It seems, therefore, that even the "15-minute city" theory still needs to adequately satisfy the contemporary need for equal access to the city and its services.

The critical role of public spaces and facilities in generating civic places and creating inclusive cities has been thoroughly described in studies conducted by Klinenberg, Latham and Layton [2]. In their works, public *space* is meant as *social infrastructure* and refers to the networks of spaces, facilities, and institutions that create affordance for social connection. These *social infrastructures* (such as libraries, cafes, community centres, art centres, sports facilities, coworking facilities, etc.) have a greater significance than just being functional spaces since they offer the opportunity to experience cities as welcoming and inclusive environments by triggering social, economic, cultural and political phenomena. In other words, a sense of identity.

Interestingly, these studies' authors - mainly sociologists, economists, psychologists and geographers, but surprisingly not architects or urban designers- have shown how these *social infrastructures* are extremely *sensitive to how their space* is designed and planned. However, even though this topic is becoming increasingly central in the discourse of many disciplines – from sociology, ecology and

sustainability to architecture and urban design – a significant gap within the literature still does not allow us to answer perhaps the most crucial question: How?

How can *the space* of these social infrastructures *trigger* social relationships and a sense of identity? More specifically, is this sensibility generated exclusively by function or by a complex relationship between space's form, function, and integration/hybridisation? How does this *relationship* affect/generate a collective public place in terms of space? Which spatial features and qualities make these architectural and urban places – namely social infrastructures – *generators* of inclusive processes?

Architectural and urban discourse has long recognised the impact of buildings and the built environment on human behaviour. A contribution to this topic is given by the *Space Syntax Theory*, which aims to describe the space-society relationship, bringing the spatial configuration to the core of the problem. Since its introduction in the 1970s, Space Syntax Theory has been widely influencing the architectural and urban design discourse by working with mathematical models and theorising a designing method generated from human interactions. In his essay *Space is the Machine* [3], Bill Hillier – the father of the Space Syntax Theory – tries to describe the complex relationships between humans and the built environment and how they mutually transform each other. In his text, Hillier identifies the *generating* capability of space in the semantic meaning of the word that indicates, for example, a building typology – say, school, house or church. This word is constructed from two generative ideas. The first is the idea of *a family of possible building forms*, and the second is the idea of *a family of possible social organisation forms*. Social Organisations are defined as a set of subjects which interact with shared behaviours. Therefore, the *idea of school* is associable with those recognisable *roles and relations realised in a spatial form* more than the idea of function itself. According to the Space Syntax Theory, this intricate relationship between space, form and behaviour not only describes «how buildings so easily change their function» - and consequently how the function is not essential in defining space - but also how, through the definition of space, it is possible to anticipate behaviours and vice versa.

However, this theory has also shown some critical methodological issues over time. Unfortunately, while on the theoretical level, the Space Syntax theory offers a potential solution to answer the questions above—describing how space qualities trigger social behaviours—and to offer an efficient multiscalar design method, its application overlooks the crucial aspect of the interplay between architectural and urban design, considering architecture as a backdrop of public life, nothing more than a container of public services and therefore bringing the problem back to the realm of function rather than that of space. Once again, another design theory misses the opportunity to overcome the misconception that architecture and urban design are two separate entities, where the former is designed to be exclusively aesthetically recognisable and technologically efficient and sustainable (at least in appearance), while the latter is reduced either to a matter of furniture or stretched to the regional scale to shape economic values.

Space Syntax Theory is not the only science that has tried to approach the complexity of the relationship characterising the urban context. Another important branch arises from the so-called Complex System Theory. Also known as Complexity Science or Philosophy of Complexity, this matter became a recognised research field in the Seventies. The first scholar highlighting the relationship between Complexity Science and Planning was the physicist Prigogine using cities as an example to explain his dissipative structure theory. From then on, Complexity Science has proved helpful in conceptualising various phenomena relevant to planning. Gathering these results, Allen and Sanglier [4] introduced the so-called *Complexity Theories of Cities* (CTC) in 1981. These theories represent one of the most innovative methods for observing complex properties of towns and forecasting urban developments. Over time, they have led to significant technological advancements

that have positively affected not only the field of planning but also that of physics and economics. The significant impact of CTC is undeniable. However, most of the research work developed so far has been rooted in a controversial assumption. Cities became the metaphor of Complex Systems due to the interaction between *urban agents*, namely human components, while space is nothing more than an *artefact* that can be interpreted both as the results or the means of human interactions. In other words, *Space* has a *passive role* in defining urban life. Also, CTC theories often depict architecture as separate from the city, which doesn't directly affect its surroundings if not for its urban position. In other words, these studies often view architecture not as one of the urban phenomena's generators but as a beautiful and environmentally efficient backdrop for complex urban relationships.

3. IF ALL THAT GLITTERS IS NOT GOLD, NOT ALL BUILDINGS ARE COMPLEX

The fundamental role of architecture in affecting urban areas has recently been brought back under the spotlight. This interest arose thanks to the New European Bauhaus initiative and the rising need for a specific architectural typology that, going beyond its functional aspects, can readapt itself in time while promoting or triggering new human behaviours and identity processes through its peculiar space. The authors of the A+T journals [5, 6, 7] have identified these particular architectural features within the so-called Complex Buildings. In the three special issues published in 2018, the authors describe how these buildings can trigger urban effects and new human behaviours by working as complex systems, presenting a space designed to dismantle the relationship between form and function. In. This work Complex Buildings are described as tools becoming effective through two essential aspects whose simultaneous presence seems unavoidable. The first is the *highly experimental space in which the traditional relationships between inside/outside and public/private are newly designed to transform architecture into a generator of new human behaviours*. The second is the *disassembled relationship between architectural form and function via a flexible in-time and in-space activity program*.

Unfortunately, the work is concluded with a selection of case studies in which the *Complexity of Space* is controversially reduced to a hybrid program of functions. But a *hybrid program of activity* is still a *program of activity*, and yet we do not have any further glimpse of spatial features leaving the “How” questions wide open.

So, if complexity makes Complex Buildings public sphere activators and complexity does not lie only within a hybrid program, what makes Complex Buildings Complex?

To answer this question, it is necessary to overturn the perspective described so far and understand complexity as a design matter that architects and urban designers must embrace to produce a generative space. In other words, this paper intends to consider *space as a complex system* and describe *complexity as a spatial problem* that architecture and urban design are called upon to address rather than a tool to justify its forms.

This is possible thanks to two recent publications by Morin (2022) and Estrada (2023). Estrada introduces its article by pointing out a crucial question that can be applied to all Complex System Theories (and therefore CTC, too): What makes *complex systems complex*?

The author tries to answer this question by pointing out some inconsistencies in the various definitions of *Complex Systems* that have evolved over time. From these contradictions and taking into consideration Morin's work on the matter of *Complexity*, the author develops a new definition of Complex Systems, which is based on the idea that *it is the nature of interactions between the elements that determine the complexity of a system* and not the presence of these interactions itself. These interactions, defined by Estrada as Morinian are relationships able to modify the behaviours or the nature of the elements, the bodies, the objects or the phenomena that constitute or influence a system. Put simply; these interactions behave like actual transformers of the nature of the parts constituting a system, of the system as a whole and of the environment where the systems exist.

Aren't these interactions supposed to be at the core of architectural production? Moreover, shouldn't this production result from a design process where the relationships between internal spaces, the spaces and the whole, the whole and the city, the final product and its inhabitants, and how these relationships mutually influence or transform the identity of these parts are central?

An emblematic – but unfortunately not well known – case study where these matters are placed at the core of the design process, is the so-called Edifício Transparente designed by the Spanish architect Manuel Solà-Morales in Oporto between 2000 and 2004 [8]. This project is part of a more comprehensive set of interventions for the redevelopment of the old bourgeois Vilas do Porto promenade and the new speculative waterfront of Matosinhos's suburban and port district. At the beginning of the year 2000, Solà-Morales is called to infrastructurally redesign the Avenida Marginal, a route between Matosinhos neighbourhood, the City Park (Parque da Cidade) and a system of ocean beaches spread along the litoral connecting the Douro River mouth to the Swimming Pool in Leça da Palmeira designed by Alvaro Siza in 1966. The main municipal objectives were mainly two. On the one hand, it was asked to develop a pedestrian connection between the Parque da Cidade and the Praia Internacional and, on the other, to reconstruct the protagonism of the natural form of the beach and the artificial prominence of the Castelo do Queijo through a connecting element able to dialogue with the horizon of the sea and ample urban distance.

To achieve these goals, the architect designed a white concrete viaduct where the park and the beach merge, redefining and fading out the boundaries of the Parque da Cidade itself. Two project heads limit this viaduct. The first is an out-of-scale roundabout substituting the former Praça de Gonçalver Zarco, specifically designed to host a car park in the middle and to provide a lively transition between the metropolitan road system, the City Park and the Atlantic beaches. The second head of the viaduct is a large transparent building for recreational use that directly connects the park with the beach via a ramp that extends from the park's dune to the highest floor of the building and then, unfolding itself within the transparent volume, reaches the shore.

The word transition may be used as a keyword to describe the space of this impressive building. Solà-Morales, introducing the ramp as the generator of architectural space, dismantles the relationships between plan and section, generating a promiscuous continuity between architectural and urban scale and between antithetical spaces such as interior/exterior, above/below and open/close. For example, by observing the original drawings - but even more, visiting this building - it is possible to see how the ramp allows the continuous transition of spaces that are no longer interior or exterior. For example, the City Park dune through the ramp is stretched until the building's terrace, an open area designed as a portico covered by an astonishing structural system realised in white concrete that gives figurative continuity between the architectural and the urban project. This transposition of the portico from the basement to the highest level of the building represents one of its most impressive experimental aspects. In other words, with this gesture, the architect declares that his compositional method lies in playing with spatial hierarchy, reversing the common understanding of spaces to introduce its original and dynamic use. In this way, the portico, usually distributed alongside the walkway to filter the architectural space from the urban ones, is suddenly abstracted and transposed in the highest part of the building. This design solution is far from casual since the architect, to reinforce it, detaches the structure from the sidewalk, inviting users to reach a different elevation to enter the building. However, transposition, ambiguity and promiscuity do not lie only in the relationships between architecture and urban context. These characteristics indeed lie also between the same internal spaces. The rooms hosting the main activities - interchangeable through time - are organised within suspended transparent pavilions placed at the centre of the building. All around, the ramp, enlarging itself, evolves into a space both of connection and staying, thus guaranteeing that continuous transition essential in generating promiscuous spaces that are neither open nor close, neither residing nor crossing.

Through this (in)constant transition between only apparently non-separable boundaries of antithetical spaces, the human movement within a four-storey linear building has paradoxically become predominantly vertical. At this point, it seems possible to understand that the architect, defining the Edifício Transparente's spaces, does not consider the relationships between form and function as a leading problem but rather the *abstraction* of spaces, the *human movement*, and the integrations between *architecture, city and landscape* (Morales, 2006).

The architect's words can support this hypothesis, so in the following lines, is reported a crucial interview released by Solà-Morale in 2006 for the *Arquitectura e Vida* journal, no. 76. The original text is in Portuguese, so this is an original English translation.

“The abstraction is created with two main options: the building is transparent (no façade) and ambiguous (no designation). However, someone believed its ambiguity and transparency indicated that it had neither utility nor programme. On the contrary, the bet was to use abstraction to design a content building, already defined by Kenneth Frampton as *Megaform*. A Megaform is a building whose architectural space is not dictated by a particular monographically use - as happens in naive functionalism - but by its promiscuity with the urban significance. Thus, in the Edifício Transparente project, architectural form arises from a responsibility assumed towards the place, more as an offer than an obligation, more as a generator than a product. The Transparent Building structure stands like a stadium tribune looking towards the Atlantic Ocean. It is made of concrete and glass and welcomes the passage of people moving from the top of the park hills to the beach while offering options for recreational, cultural and exchange activities. Although the original project proposed a clear and quantified programme of activity (comprehending the dancehall, the beach bars, shops and boutiques, exhibition spaces, laboratories, sports areas and also a luxury restaurant), the fundamental objective of the project was to create open paths where the movement of the human being would mix with the voices and the noise of the sea, under the protection of a gantry roof. The internal spatial organisation of the building is, in fact, that of a path. Ramps await the passage of people - athletes, visitors and all sorts of citizens - who, from the dunes of the Parque da Cidade, walk or cycle towards the beaches and cliffs of the Atlantic Ocean. These ramps show the variety of uses the different building parts can acquire. The continuous vision of this space of multiple, where the movement of people is the best performance, is combined with the constant contemplation of the ocean and the coast, of the park and the city, made possible by effective transparency. This building is neither a hotel nor a shopping centre, neither a cultural complex nor a conference hall. Instead, it could be all of these activities simultaneously or just some of them performed at separate times. Modern urban architecture's interest is in multifunctional, hybrid, adaptable structures. Only the old monumental building uses, the museums, the auditoriums, the cathedrals, and the town halls still defend the typological specificity and monographic architecture.

However, the contemporary city needs other flexibilities. It needs a design of a 'content building', namely a versatile building that can allow a multiplicity of space uses. The Edifício Transparente was a modern proposal generated from the public paths and interpreted as a fixed internal structure. Therefore, the ultimate goal was to expand the idea of transparency while simultaneously achieving a transitional space between the different scales of the site, accepting among the various possibilities even that of creating a large volume with only an apparently empty interior.” (Solà Morales, 2006)

4. INTRODUCING BENTO-BOX ARCHITECTURE. IT SOUNDS NICE, BUT IT IS NOT.

What has been described so far has highlighted how, more than ever, it is essential to observe the built environment as a complex system where all the elements mutually transform each other. In architectural and urban design terms, it seems essential to enable a new design approach where there is not so much distinction between the two disciplines, where both architecture and the city are designed starting from a more comprehensive strategy where the first is essential for the second and vice versa. Thus, it becomes the generator of new resilient urban polarities that are able to embrace

and include the original condition of a place and, through a new spatial conception, trigger new inclusive social phenomena.

This does not seem to be the case for the Prada Foundation building, recently realised by the well-known studio OMA in Milan, which restored a former industrial establishment set in a peripheral area of the city. As recently described by Elena Granata, the building *has an outcome of great architectural value, and the operation has given the city a place of excellence worthy of the great European capitals* (Granata, 2021). However, it still represents *an intervention that does not generate 'effects of place' because an absolute lack of relationship with the surrounding area prevails. It is a monolith, an erratic boulder, a mute presence outside its wall* (Granata, 2021). Observing the original drawings but also visiting the building itself becomes clear how its space, however much defined by the juxtaposition of contrasting principles (such as old and new, wide and narrow, open and closed, horizontal and vertical), although it presents a programme that includes diverse activities (such as an art gallery, a cinema, a library, an observatory tower, a restaurant, a multipurpose space as well as administrative and technical space), and, finally, although it entertains *supra-local relations on a national or international scale, it plays once again on the displacement between a refined and cultured interior and a popular exterior* (Granata, 2021). In other words, its architecture does not promote any spatial, cultural and social continuity solution between the two worlds, which does not entail a process of exclusion.

Fondazione Prada's building in Milan, with its extraordinary research for a specific aesthetic, is thus configured as an astonishing airtight container in which both the art collections and the public facilities are kept safe inside. Moreover, public activities are stored in internal containers that are architecturally well separated, thanks to the treatment of the façades. In this sense, the relationships between inner and outer space and between the individual parts that constitute the whole are profoundly dismantled.

We may define this project and similar ones as Bento-Box Architecture. Bento Box is a traditional Japanese all-in-one lunch box hermetically closed to the outside, incorporating smaller containers of different sizes interlocked by the matryoshka and Tetris double technique. This lunch box is specially designed to keep the food well separated and avoid promiscuity between the individual portions. Similarly, Bento-Box Architecture can be defined by large building enclosures comprising smaller units organised within well-defined borders that often force the architectural form. Also, these small units are designed as a space of separation without allowing any promiscuity solution that does not involve dismantling the space itself. As demonstrated by Fondazione Prada, this lack of spatial relations and continuity has as its ultimate result the triggering of those real estate processes addressing the issue of the suburbs by disregarding the suburbs themselves, namely by widening the boundaries of the fashionable and touristic urban centre by shifting - without approaching - the problems of the suburbs further and further away from the downtown area. In other words, those indirect positive impacts, such as attracting more valuable functions, do not lead to an improvement of suburban conditions, but rather, by raising the prices of housing estates and the services supplied, to the exclusion of the poorer and younger social classes, thus effectively making the city more and more inaccessible.

By their intrinsic characteristics, Bento Box architectures seem to be the generator of those *non-places* defined by Frampton in the fourth editorial of the *Oppositions* Journal. According to him, these *non-places* emerge from those buildings where the objectification of architecture *is granted absolute priority over any morphological - and sociological - consideration* (Frampton, 1974). So forth, we may say - borrowing Frampton's words - that Bento-Box Architecture *has the unfortunate tendency of inhibiting rather than facilitating the creation of receptive places, and doing so, through an abstract optimisation, leads to a manifest impoverishment of the environment* (Frampton, 1974). Moreover, these types of architectures, eschewing any complex relationship, cannot overcome the *frustration of utopia* described by Frampton as the result of the conflation of the *objects of elitist*

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culture with the *elaborate rationalisation of the environment* (Frampton, 1974). Something that has been demonstrated so far by the Prada Foundation building in Milan, which was unable to activate the urban sphere except through the well-known process of gentrification.

Solà-Morales building seems, instead, to tell a different story from that of Bento-Box architecture. A story where the different spaces are so promiscuous that they end up being a new original place in which the semantic meaning of space became multi-layered and sometimes incomprehensible. This unreadability of common spatial meaning allows self-organisation, makes the space a complex space, and, therefore, transforms a building into a complex one. However, at this point, it seems essential to draw the strands of the discourse together and describe how such a building typology becomes a space activator.

As described in the case study of Edificio Transparente, promiscuity, dismantling some consolidated boundaries in the domains of space and function, generates new kinds of use of space, introducing a new rituality that brings back attention to the realm of architecture's purpose as defined by Saarinen. According to Saarinen, the purpose of architecture is *to shelter and enhance man's life on heart* (Saarinen, 1950). This reference to the shelter is not casual since, through it, Saarinen can demonstrate that architecture is much more than its utilitarian meaning [...] *has a much more fundamental role to play for man, almost a religious one* (Saarinen, 1950). The purpose of architecture then lies in this sense of religiousness and rituality that architecture embraces, *going beyond its purely functional aspects* (Saarinen, 1950).

This reinvented purpose put into play by Complex Buildings generates original architectural forms, thus allowing the space to assume a role that «goes beyond its purely functional aspect». To sum up, we may say that promiscuity of space and function, as also demonstrated by Solà-Morales's example, generates a new use of the space and, therefore, a new rituality that gives original meaning or purpose to that building typology.

Moreover, going back to Bill Hillier's theories, it is possible to say that this new architectural meaning will generate further social organisation forms, namely, renewed human behaviour. Finally, this generative quality of promiscuous space recalls those identity processes that are invoked by Frampton in the already mentioned editorials - through which it becomes possible to create a place, namely a space where human beings may come into being.

5. CONCLUSIONS

So far, complex buildings have appeared as tools to activate the public spaces of our cities. However, they are not a new architectural typology but rather have origins in all those new architectural experiments which, from the definition of the eight-hour working day at the beginning of the 20th century, have dealt with translating the organization of leisure time into spatial terms. Emblematic cases are the Soviet Workers' Clubs, the Italian Dopolavoro, the more recent Brazilian SESC, and the current experiments of the Urban Think-Tank.

The SESC Pompeia, a visionary project by the renowned architect Lina Bo Bardi, which she eloquently describes as the "Citadel of Freedom," embodies a transformative approach to architecture centred around the concept of leisure. This project envisions a dynamic and flexible interplay between form, space, and architecture, where the form is not dictated by function but rather anticipates it. This architectural marvel starkly contrasts the urban reality of São Paulo, a city often lacking in squares and public spaces. The *Citadel of Freedom* thus becomes the residence of pluralism and differences, where the anthropological character becomes the strength of an architecture that does not want to impose itself as an object but as a *place*, much in the spirit of Frampton's ideas in opposition. In this way, architecture becomes a centre for disseminating new values— such as education, culture, dignity, tolerance, respect for cultural diversity, and the heterogeneity of society — whose presence is fundamental for a livable public space.

It is precisely on these assumptions that the experience of the Urban Think-Tank is rooted. UT-T has been involved in numerous projects in South America and beyond in informal contexts. At the centre of their architectural experimentation is always the search for a spatiality that acts as a spark, capable of triggering processes of inclusion and sociability in fragile contexts. Their architectures, which have become real spatial prototypes of social activators, contrast with what happens in the case of the Prada Foundation. Their prototypes “serve as a lighthouse, responding and speaking to the community's common needs and collective pride”.

It is these lighthouses that our city needs, not golden lanterns. Welcoming, inclusive, livable spaces are not by definition a priori but for the daily experience of a space that transcends the distinction between architectural and urban scale and, in doing so, defines new sustainable rituals of inclusion and resilience.

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Nature Based Solutions at Landscape Scale to Reduce Urban Hydraulic Hazard

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Extended abstract

Nature Based Solutions (NBS) offer significant potential to address contemporary water management challenges, particularly regarding sustainable cities and their adaption to climate change. The relevance of NBS for water emerges, for example, thinking to their high potential to contribute to the achievement targets of the 2030 Agenda, such as SDG 11: *Making cities and human settlements inclusive, safe, resilient and sustainable* and SDG 13: *Addressing climate change*.

It is believed that NBS are even more important than traditional (structural) systems for mitigating hydraulic risk because they allow us to act on its causes, which means the reduction of the hazard, i.e. the intrinsic territorial conditions that expose the area to risk.

Hazard generates risk if damage conditions occur, due to the presence of infrastructures and people. In fact, risk is defined by the following formal relationship: $R=H*D$, where R is the risk, H the hazard, D the expected damage for infrastructures and people.

Through a case study for an area of Salento (Apulia, Southern Italy), this paper aims to give a contribution to reducing hydraulic hazard by the most efficient choice of type and location of some NBS.

It is then necessary to encouraging as much as possible the infiltration of rainwater runoff into the soil and, in consequence, into groundwater, where water is stored and available for a long time. This process is pursued first of all by the accurate knowledge of the runoff paths and, in consequence, NBS are positioned to intercept and to slow down the runoff “forcing” its infiltration. This process is the basis of the hydrological resilience of the territory, pursued specifically by the following project milestones:

- a) Definition of the hydrographic micro-network, through a digital terrain model of high resolution, (a starting raster of 8 m) reclassified to 4 m thanks to integrations obtained from the available analogic cartography.
- b) Interception of the runoff through landscape structures typical of the area:
 - dry-stone walls, which have been significantly increased and renovated, evaluating the permeability of the stone foundations, so that they act on the runoff as drainage trenches.
 - Redevelopment of the drainage ditch to the west of the town, whose impluvium is shaped by a grassy channel.
 - Reservoir to the South-east of the town, with a lamination basin effect on the floods.

The overall effect of the project responds to the strategic objective: mitigation of hydraulic risk by reducing hazards, i.e. “*soil conservation by soil use*” and landscape design.

Keywords: *hydraulic hazard; Nature Based Solutions; landscape structures design*

1. INTRODUCTION

The relentless urban expansion that began in the 20th century has resulted in the loss and degradation of ecosystem services and functions, such as microclimate and water resource regulation [1, 2].

Coupled with climate change, this has exposed cities and their surrounding territories to increased vulnerability and exacerbated hydraulic risks [3].

The primary causes lie in anthropogenic activities which have drastically altered the hydrological cycle, both at the regional and urban scales [4]. The widespread impermeabilization of surfaces and the consequent simplification of drainage networks have accelerated the “runoff response to precipitation” [4]. This phenomenon, coupled with the limitation or inhibition of water infiltration into the subsurface, has triggered a series of critical issues, including the inadequacy of drainage systems in handling urban stormwater, leading to flooding and significant pollutant loading into receiving water bodies [5]. These impacts cascade onto the quality of aquatic ecosystems and exacerbate soil erosion phenomena [6, 7]. It is estimated that extreme events have caused tens of thousands of fatalities and economic losses of \$650 billion in the past two decades [8].

In response to these challenges, it is necessary a new paradigm for landscape and urban planning. In consequence, research and its technical application have turned in many cases to Nature-based Solutions (NBS), defined as “solutions that are inspired and supported by nature” [9]. NBS have emerged as a paradigm capable of offering a multitude of benefits:

- **Ecological benefits:** NBS provide crucial ecosystem services, such as water and air management and purification, microclimate regulation, and biodiversity protection.
- **Social benefits:** NBS contribute to human well-being by providing green spaces for recreation and interaction, enhancing the quality of life in both urban and rural areas.
- **Economic benefits:** NBS generate employment opportunities.

Nature-based Solutions (NBS) have also proven effective in supporting resilience and sustainability goals [11, 3], with positive impacts on flood risk reduction and climate change adaptation [12, 13, 14, 15]. The advantage of implementing nature-based hydrogeological risk management strategies lies in conferring self-organizing and learning capabilities to the urban system, enhancing its response to future events for greater resilience [16], thus overcoming the dichotomy between adaptation and mitigation. The inherent multifunctionality of NBS [17] represents a strength compared to traditional “grey” structural solutions that are rigid (and therefore more fragile) and do not address the root causes of the phenomena [18]. The versatility of NBS allows them to be successfully integrated at different scales, from building, neighbourhood, catchment and urban point of view, bringing the urban water cycle closer to its natural counterpart [19, 20]. Recently, NBS have been classified according to the ecosystem services they offer and the urban goals they aim to achieve [21]. In particular, green roofs, green walls, rain gardens, retention and infiltration basins, drainage trenches and constructed wetlands can be introduced at both urban and landscape scales [21]. An additional advantage lies in the possibility of integrating NBS with grey infrastructure; the latter has the sole task of intercepting excess runoff, while green systems offer the benefits of resilience, biofiltration and infiltration of water, which then enriches groundwater bodies [22].

Despite the promising potential of NBS, further research and practical experience are needed to address, still existing uncertainties regarding the planning process and the integration of NBS with grey infrastructure [10]. An empirical approach is crucial, as NBS design is highly site-specific due to the vast array of applications. The only valid generalization lies in the centrality of natural elements in the chosen solution.

The literature reveals a stronger focus on the social and economic acceptability of NBS [23] compared to the analysis of the processes targeted by NBS implementation. This hinders the development of truly effective interventions. In other words, it is essential to quantify the ecosystem service intended to be achieved with NBS, necessitating careful consideration of the proposed solution’s efficiency.

Accordingly, this paper utilizes a case study to contribute to the analysis of the NBS design process, leading to the formulation of novel NBS proposals.

2. MATERIALS AND METHODS

The study area is the municipality of Presicce-Acquarica, located in Puglia, Southern Italy (Figure 1). The city faces significant urban flooding challenges due to its unique topography, characterized by a depression between two hill chains, situated to the east and west of the town (Figure 2). This results in frequent flooding from runoff originating from almost the entire surrounding area. To mitigate these issues, two drainage ditches were constructed approximately a decade ago to intercept runoff from the eastern hills (Figure 2). These defence hydraulic structures consist of drainage trenches that divert runoff from the eastern hills. While they offer some degree of risk control, their effectiveness is still largely insufficient, necessitating further interventions.

For this purpose, specific Nature-based Solutions (NBS) have been proposed, following these steps:

1. Identify the underlying causes of the risk.
2. Develop control strategies based on NBS.
3. Select NBS inspired by the existing landscape. The chosen NBS include:
 - A vegetated swale on the western side to drain runoff from that direction.
 - A runoff detention area on the southern side to intercept and regulate the flow of the stream originating from that direction.
 - Construction of dry-stone walls to intercept and infiltrate diffuse runoff, typical of the eastern and northern parts of the town.

The dry-stone walls deserve particular attention as these structures are a defining feature of the Mediterranean landscape, including the study area.

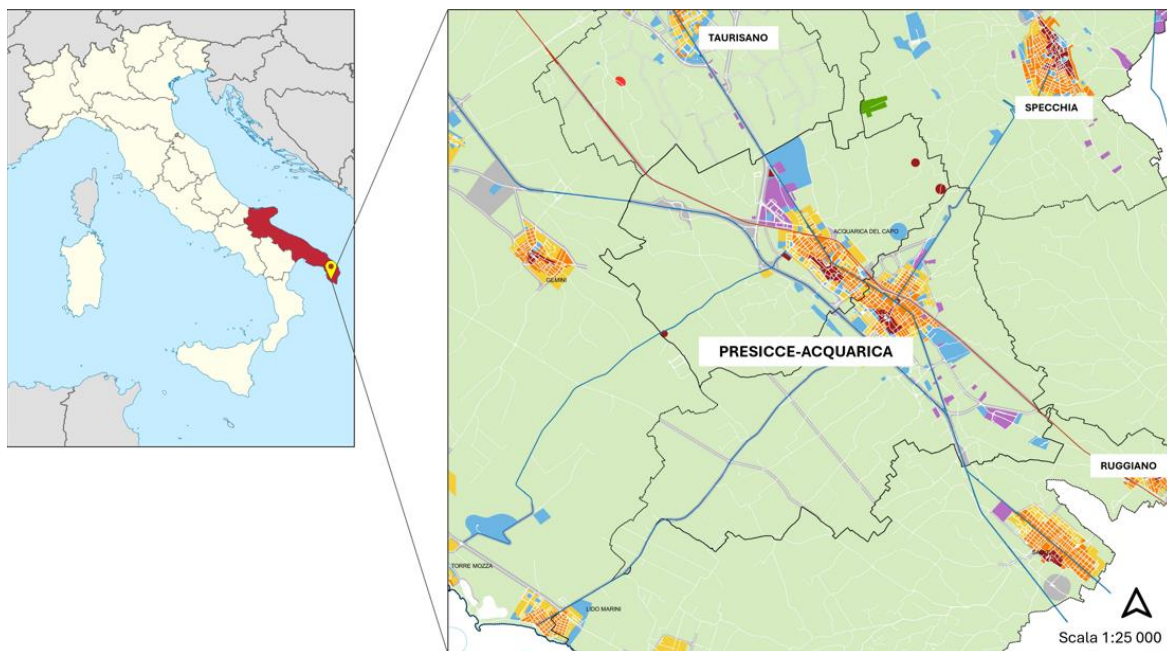


Figure 1. Map of the study area. *Presicce-Acquarica*. (<https://commons.wikimedia.org/wiki/User:TUBS>)

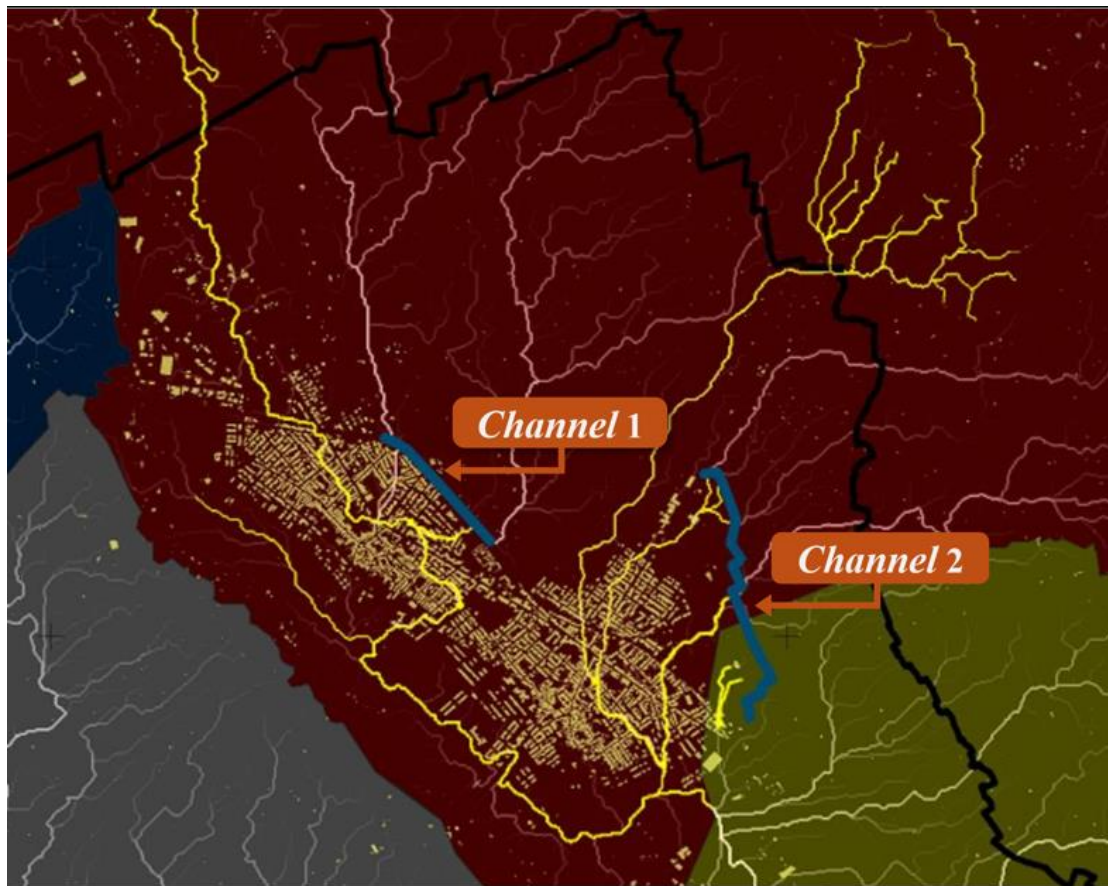


Figure 2. GIS-processed flow accumulation detail for the study area: the yellow flow accumulation represents the runoff that is not intercepted by the existing guard channels.

2.1 Introduction to Dry-stone Walls (DSW)

Dry-stone walls (DSWs) are a testament to a millennia-old traditional construction technique [24]. They are constructed solely by interlocking roughly shaped stones, typically extracted from the land on which the wall is built, without the use of binding materials [25, 26].

These structures are the result of a meticulous selection process of calcareous and/or calcarenite stone quarried directly on site. The stones undergo minimal shaping necessary for the proper execution of the structure and are adapted to the laying plane, all done manually.

Dry-stone walling, although rooted in the distant past, transcends mere landscape humanization, rising to the paradigm of a harmonious union between human and nature. It not only represents a tangible and unique sign of this encounter but also stands as a far-sighted solution, intrinsically eco-sustainable and endowed with exceptional functionality [24].

In 2018, the art of DSWs in seven Mediterranean countries (Italy, Croatia, Cyprus, France, Greece, Slovenia, Spain, and Switzerland) was awarded the prestigious UNESCO Intangible Cultural Heritage status, included in the relevant list as a transnational element. This recognition represents a significant celebration of the “Wisdom of Building,” a millennia-old tradition passed down from generation to generation [24].

2.2 Human-Nature Link: A Symbiotic Relationship

Dry-stone construction techniques serve as “guarantors of harmony, prevention, and environmental conservation” [25]. Through this technique, human intervention reshapes the landscape in a virtuous dialogue with nature.

Originally associated with rural contexts, its initial function was to delineate property boundaries. However, the DSW has evolved into a structurally significant element for the construction of terraces that have softened particularly harsh landscapes [24]. Thanks to this technique, slopes have been “smoothed” and made suitable for agriculture and forestry [27].

The harmony between dry-stone walls and the natural environment is evident in the rich biodiversity that distinguishes them. The structure favours the creation of microhabitats ideal for small fauna and insects, providing them with shelter, suitable sites for gestation and egg-laying, as well as feeding opportunities. The typical flora that thrives on the wall also contributes to the ecological chain, offering protection from the elements, shade and sunspots, and a microclimate that is varied in structure and its immediate vicinity, especially in terms of temperature and humidity [28].

2.3 Construction Technique: A Testament to Traditional Skills

DSW construction employs the technique of interlocking irregular stone blocks, juxtaposed without the use of mortar, in a variable order, to form a structure with two inclined faces towards a central core, composed of loose and unshaped smaller stones [26].

The base of the wall section, the foundation, lies below the ground level, arranged in two parallel rows of rough stones that define its width. Above the foundation rises the body of the wall, consisting of successive layers of stones without the use of binding material. These layers protect the central core, formed by stones of smaller size. Once the desired height is reached, the wall is completed by a cover of squared stones, the so-called cope stone, which levels the top of the construction.

2.4 Functions and Ecosystem Services: Beyond Physical Barriers

As discussed, dry-stone walls represent a landscape and cultural heritage of inestimable value, distinguished by ecological and functional characteristics of great relevance, as well as custodians of historical memory.

The original function of DSWs was to delineate properties, acting as fences for livestock and defining spaces dedicated to cultivation and grazing. Over time, their function has evolved, transforming them into retaining walls, such as terraces, now categorized as “ingenious natural solutions”.

This has allowed humans to practice agriculture even in areas otherwise impossible due to significant slopes. Terraces, in fact, interrupt the slope of the hillside, creating an embankment behind the wall, which offers multifunctional effects in addition to slope reduction: soil protection from erosion; increase in soil depth and organic matter content; reduction of the surface runoff velocity and consequent rainwater infiltration, which feeds the groundwater.

Given the hydrological cycle alteration scenarios described in the paper’s introduction, DSWs emerge as an element to consider in hydrological cycle management, assuming a new role in runoff interception, even in flat areas, such as the present case study. Indeed, their structure, if strategically positioned, allows for runoff interception, dissipating its energy and retaining rainwater, which infiltrates and feeds the groundwater.

This results in significant benefits of DSWs, such as:

- a) Contribution to the control of hydrogeological instability and the impacts of urbanization and climate change.
- b) Ecosystem services such as aridity mitigation. The stone acts as a dew catchment surface, thus guaranteeing a precious water reserve for plants and favouring a soil moisture level necessary for vegetative growth. This ecosystem service is essential for the arid and semi-arid Mediterranean areas, where water scarcity is a critical factor for the survival of flora and fauna.
- c) Role of true ecological corridors, favouring biodiversity conservation and creating habitat for diverse plant and animal species. The interlocking construction technique employed, in fact, presents gaps between stones, from a few millimetres to a few centimetres, which act as refuges.

d) Microclimatic regulation, because the mass of natural stones significantly influences the external thermal behaviour of the wall, acting as an excellent heat accumulator. There is then a gradual transition from high external summer temperatures to a cooler internal environment, with constant humidity at the base of the structure [24].

These are therefore ecosystem services offered by DSWs which allows them to be classified as “Nature Based Solutions” in all respects.

2.5 Design DSW as NBS

The foundation of a dry-stone wall is composed of highly permeable stonework, which structurally acts as a drainage trench that further promotes runoff infiltration (Figure 3). This inherent drainage capacity of DSWs has been utilized in the presented project, which proposed the restructuring and expansion of DSWs in areas where runoff is not adequately intercepted by existing channels, as illustrated in Figure 2.

To assess the runoff patterns across the entire settlement, a flow accumulation analysis was conducted in a GIS environment using a digital terrain model (DTM) with a resolution of 8 meters. The resulting runoff map, shown in Figure 2, clearly indicates that the existing channels in the eastern part of the settlement are insufficient to intercept runoff effectively. Furthermore, the further excavation of new channels or the extension of existing ones is not a feasible solution due to practical constraints.

Due to the limitations of the existing channel network and the need for improved runoff management, the project proposed the implementation of a strategic DSW network, as depicted in Figure 4.

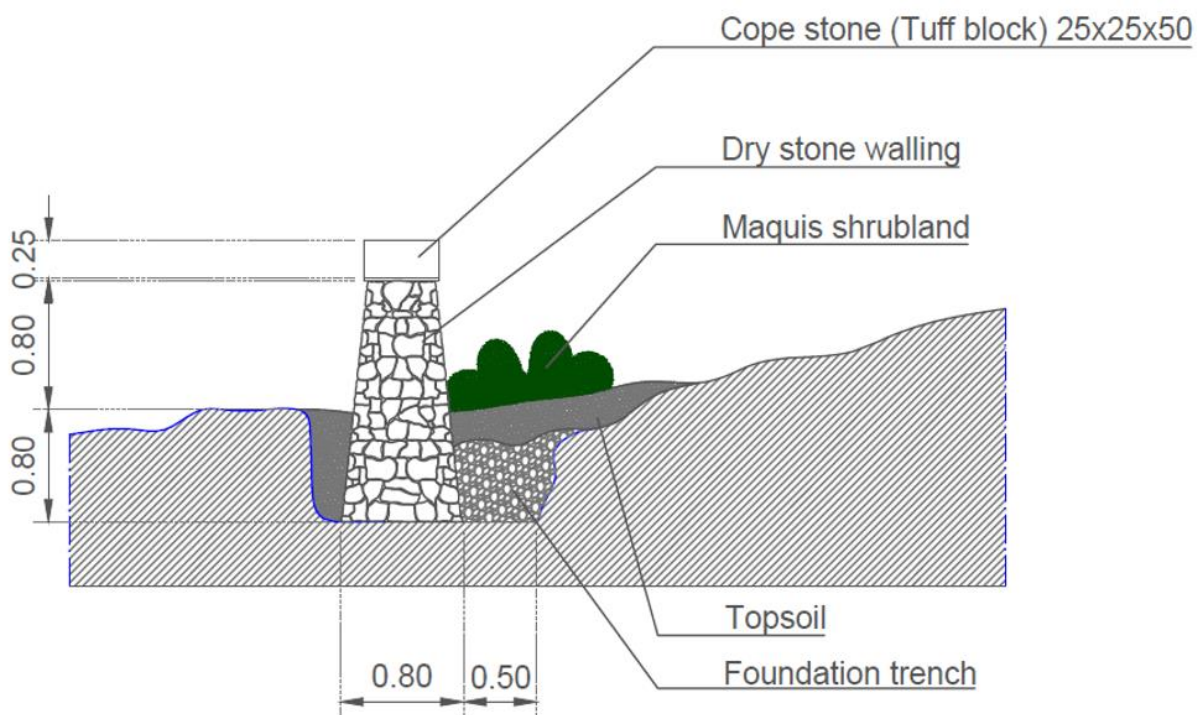


Figure 3. Cross-section of the dry-stone wall proposed in the Presicce-Acquarica project.

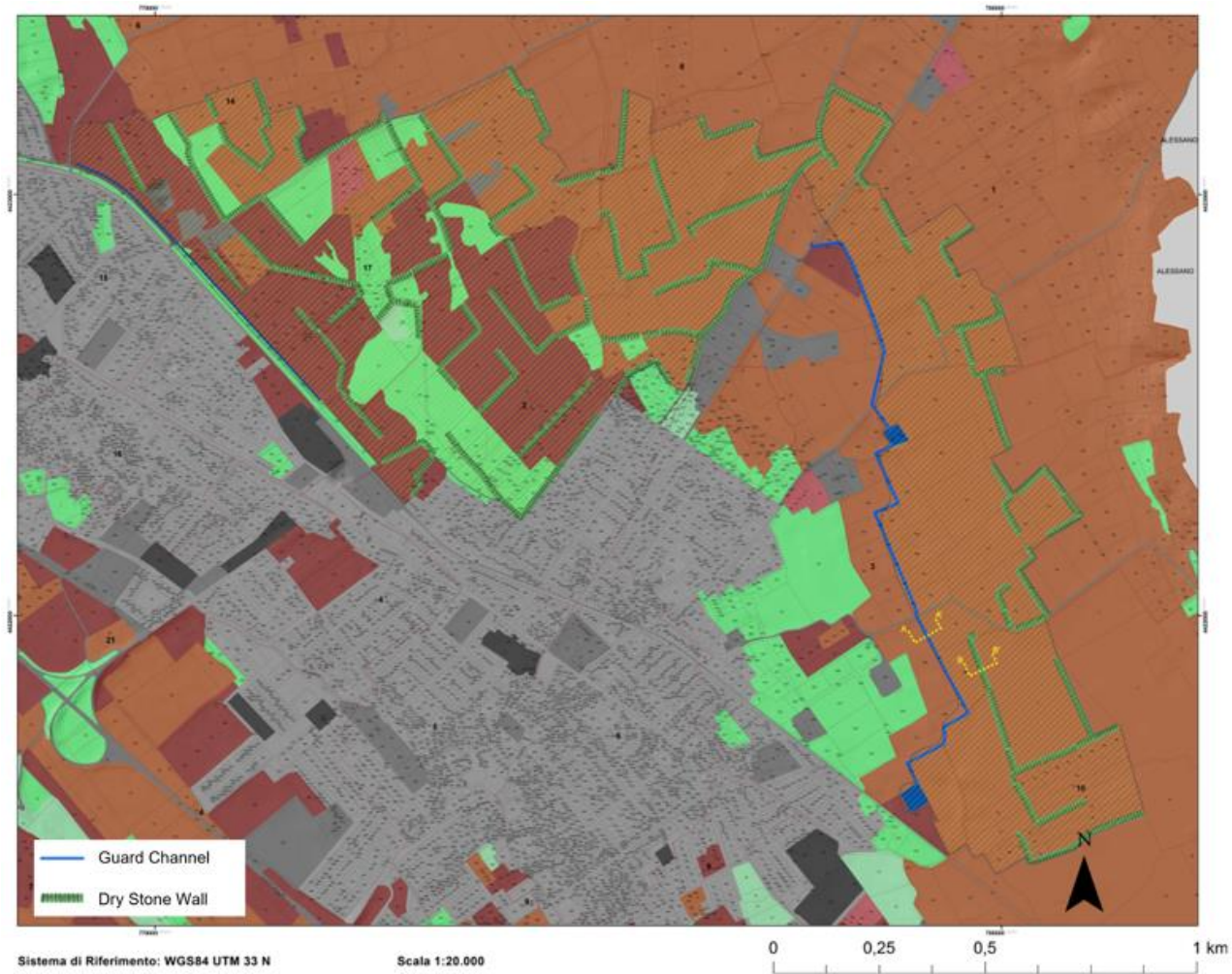


Figure 4. Implementation of a strategic dry-stone wall network in the study area.

3. DISCUSSION

DSWs can be categorized as NBS due to their contribution to biodiversity by creating a unique ecosystem. The moisture retained on the stones and penetrating the gaps between them promotes vegetation growth, which, along with the stones, provides habitat for diverse fauna, establishing a specific biocenosis [29].

This concept highlights the general principle that the physical diversity generated by landscape structures, such as DSWs, triggers the development of biocenoses, provided that space and time are allowed for the adaptive capacity of plant and animal species.

Extrapolating this concept, all environmental arrangements through landscape structures can be classified as NBS, as long as nature is allowed to take its course and “appropriate” the physical spaces. Beyond their role in fostering biodiversity, DSWs offer valuable solutions for mitigating the risk of hydraulic hazards in urban areas. This capability stems from their inherent structure, which facilitates runoff control through two mechanisms: the barrier created by the wall and the infiltration promoted by the loose stone foundations. Additionally, both structures create water impoundments, further reducing runoff volume, resulting in an overall decrease in the hydrological load on the territory.

By reducing runoff and the associated erosion potential, DSWs effectively lower hydraulic risk. Risk is defined by the following relationship:

$$R = P * D$$

where:

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- P represents the hazard, or the system's inherent propensity to generate risk due to its intrinsic characteristics, such as climate, morphology, geological and pedological characteristics, and physical configuration of the landscape.
- D represents the expected damage, generated by the presence of exposed and vulnerable elements, indicating their susceptibility to harm.

This formula clearly underscores the importance of land use and landscape arrangement in risk generation. For a given set of infrastructure and expected damage, if the terrain is less hazardous due to its higher permeability to runoff, the overall risk is reduced.

In the specific case of runoff-induced hazards, the proposed solution involving DSWs entails runoff interception and infiltration, thereby lowering the hazard level.

4. CONCLUSION

This paper sheds new light on the significance of landscape planning and design, highlighting the potential of landscape structures as proactive measures for hydraulic risk prevention. As the adage goes, prevention is always better than cure.

The proposed approach follows a structured methodology:

1. **Problem Identification:** The first step involves clearly defining the problem, in this case, hydraulic risk. This entails a thorough understanding of the landscape system, including the factors contributing to the risk, such as runoff pathways (as illustrated in Figure 2).
2. **Adaptive Solution Design:** The next step involves devising adaptive solutions that aim to prevent the problem by reducing the hazard potential of the landscape.
3. **Leveraging Traditional Structures:** This paper proposes the utilization of dry-stone walls, ancient and traditional structures prevalent in the Mediterranean region, as effective risk mitigation tools. Their unique construction characteristics enable them to intercept and infiltrate runoff, thereby reducing the hazard potential.
4. **Nature-Based Solutions:** The proposed approach goes beyond mere risk mitigation, offering the added benefit of enhancing landscape quality and biodiversity. This aligns with the principles of Nature-Based Solutions, which promote sustainable and environmentally friendly approaches to problem-solving.

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The Repercussions of the COVID-19 Pandemics and the Path Towards Urban Regeneration in Portuguese Cities.

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Abstract

This contribution discusses the images of the students' private geographies, in several Portuguese regions, as confinements made travelling forbidden across municipalities, during the pandemic outbreaks. This national directive had repercussions in the daily life of every citizen, and IGOT students only had online courses, during the second semesters of 2019/2020 and of 2020/2021. This research project took as object twenty-eight mental maps elaborated by the participants during lectures within the framework of the honor's degree in Geography, gathered in the first semester of 2021/2022, and twenty more by drawers of a master's degree Seminar on Fieldwork in Geography, in February/March 2022. The forty-eight maps manifested daily situations of isolation experienced inside the residences, within neighborhoods, municipalities, and cities. This contribution aims to point new urban planning post-Covid directions, particularly targeting public spaces. The research question is: What changes must be introduced in cities planning and functionality, to make them more resilient to future extreme events, natural or induced?

The paper presents the mental maps or *pandemaps* built by the University students during lecture seminars, registering the landmarks and public spaces they've visited during lockdowns, in Lisbon as well as in other Portuguese cities and rural towns. Previous research has focused world representations on the Southern Hemisphere (East Timor and Mozambique), Lisbon old city neighborhoods, (strolled by tourists in our days), and representations of the capital city of Portugal. During the COVID-19 outbreaks the students received classes through online platforms, but when they returned to face-to-face classes, they answered a questionnaire about their activities during the lockdowns and were asked to map the public and private spaces around their home and the city they lived, to study new ways to deal with future multilevel risks, such as floods, other pandemics or even earthquakes.

This permitted us to investigate the concept of 15-minute cities, as recent engineering and urban planning proposals recovered the Vicinity Units designed by the architects and urban planners Lúcio Costa and Oscar Niemeyer when conceiving Brasilia, in the 20th century. Spatial justice could be ideal if not only the allocation of trade and services would be at a walking distance from home, but also if the residence and the working place could be within the 15-minutes planned unit. The Planet and the cities would gain with this choice. Gardens and, in special, community food gardens, are new requirements. Post-COVID cities and neighborhoods should be greener; they should have a good number of green squares and open spaces, available to all citizens. The need to walk, bike, and participate in the urban turmoil that always characterized European cities, should be reintroduced, because conviviality is part of human nature.

Keywords: *food gardens; pandemaps; risks; urban planning; 15-minute cities.*

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1. INTRODUCTION

In his 1976 article “What is a mental map?” Elspeth Graham, from the University of St Andrews, defines it as a model of the environment, which is built up over time in our brain [1]. Norbert Gotz and Janne Holmén [2] argue that images are framed, coded and so the conception of drawings of our street, for instance, involve a mental conversion. In this sense, mental maps are imaging that a person has about the locations and characteristics of places at a variety of scales [3, 4], from the local (a neighborhood), to the continental (Portugal’s location in Europe) and the global (the distribution of oceans and continents across Earth).

Mental maps can change with direct experience (such as travel by car, by public transportation or strolling on foot on our city and neighborhood) and indirect experience (such as media exposure and looking at other maps to find places where you can buy whatever you might need during the movement restrictions imposed in the COVID-19 outbreaks). Kevin Lynch’s “The image of the city”, first published in 1960, was pioneer in the field of urban mental maps conception and decoding [5]. According to Schenk: “developments in the areas of geography and urban planning contributed to the concept of the cognitive map or mental map becoming a paradigm for interdisciplinary research on the spatial orientation capacity of humans in the 1960s” [6]. These have been researched both by historians and geographers. The paper will continue with the methodology, results, and the proposals, towards the conclusions.

2. MATERIAL AND METHODS

In this case-study we’ve asked two groups of students to identify from memory the locations of landmarks in their neighborhood, such as the building where they live and the services (ATM, banks) and trading posts (cafes, supermarkets, markets, pharmacies) located close to their residence that they frequented to purchase basic needs (food, remedies, cleaning items, pocket money, etc.), during Corona confinements. Additionally, they had to answer geographic questions about themselves (e.g., city and place where they’ve stayed during confinements) as well as to explain practical aspects of their daily life during the pandemic movement restrictions (e.g., the number of times they abandoned their residence to shop, to go to the hospital, to visit relatives in need of help, etc.).

The mental map resulting from the compulsory “stay at home” period, due to COVID-19 virus outbreaks in Portugal, is quite different from any other experience of imaging our environment, as the students had longer time than usual to identify details of a route used frequently (e.g., to and from the grocery store, to and from a park, to and from a relative's home); they also had several opportunities to add details to their perception of the world, due to the length of travel restrictions. The resulting map is called a *pandemap* or map of the COVID-19 pandemic [7]. It is the student’s unique image, as Graham wrote: “His or her private geography” [1].

A first group of twenty master students was instructed first to design a *pandemap* of the neighbourhood where they usually live or the house/apartment and street where they stayed during the worst virus outbreaks. They photographed the image drawn with their mobile phone and handed out the sheet with their mental map to the professor. Later, at home, they were invited to revisit the spaces represented and asked to handle out a formal digital map of their *pandemap*, using Google Earth, Google Maps or Street View tools [8]. A second group of twenty-eight honours students was shown examples of *pandemaps* drawn by Brazilian scholars and then invited to represent either their house/apartment or their street and neighbourhood in a mental map of Portugal. The sheet of paper with their drawn *pandemap* was given back to us that later scanned the result, further discussing formal cartography conception with the class of second year students, in the curricular unit of Social and Cultural Geography.

3. RESULTS

The results were compared by building tables containing the students' responses to the inquiry and the type of maps drawn, some of which were representations of their apartment or house located in a Portuguese city, and others the surroundings of their locations during lockdowns. *Pandemaps* from the municipality of Lisbon were organised by neighbouring areas; then the mental maps of other Metropolitan Region of Lisbon municipalities have been ordered, dividing the Northern from the Southern Metropolis; third, the North, Southern (Évora) and Western parts of the country were also tagged and analysed separately; as well as detached provinces such as Ribatejo (Tagus River Basin); finally, the islanders and the foreigners have been examined in their specificities (Table 1).

Honours		Degree		Masters		Degree	
Location	Males	Females	Total	Location	Males	Females	Total
Lisbon	3	1	4	Sintra	-	1	1
Loures	1	-	1	Odivelas	1	-	1
Odivelas	1	-	1	Oeiras	-	1	1
Sintra	1	-	1	Loures	-	1	1
Mafra	-	1	1	Amadora	2	1	3
Vila F. Xira	-	1	1	Vila F. Xira	1	1	2
North AML	6	3	9	North AML	4	5	9
Barreiro	1	1	2	Barreiro	-	1	1
Seixal	1	1	2	Seixal	1	1	2
Setúbal	-	-	-	Sesimbra	1	-	1
South AML	2	2	4	South AML	2	2	4
W of Lisbon	2	3	5	W of Lisbon	1	-	1
Ribatejo	-	1	1	Ribatejo	1	1	2
N. Portugal	3	2	5	N. of Portugal	-	-	-
Faro	1	-	1	Alentejo (Évora)	2	1	3
Madeira I.	1	-	1	Azores I.	-	1	1
Foreigners	1	1	2	Foreigners	-	-	-
Total	16	12	28	Total	10	10	20

Table 1: Question 1. Sex, number, and location of the students, during confinements

Regarding the Metropolitan Region of Lisbon (AML), it integrates eighteen municipalities, nine North of the Tagus River and another nine between Tagus and Sado Rivers. It has seventeen cities and possessed 2,871,133 inhabitants in the last census (2021). The most populous city is Lisbon, the capital city and main municipality, located to the north of the Tagus Basin, with 544,851 residents, followed by Sintra (385,954) and Cascais (214,134). Census data are available in the News Agency Lusa [9]. The metropolis is divided by the biggest river of the Iberian Peninsula and the students were

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equally divided among these locations. Nevertheless, 46,4% of the honour's degree respondents resided in other country sites, either cities or countryside areas, against 30% of master's students. About 79% of the universe studied during confinements watched television, mostly movies and serials in the evenings, and 25% played games in their computer. Post-corona era governments should work better on public TV programming alternatives, from the news to latest cinema options, to permit that possible future confinements might not improve addictions to gambling and extra expenses with movie platforms, which payment is heavier for most household budgets. Those students who spent confinements away from their families were totally dependent on TV and computer connections, so national authorities must regulate internet distributors, to prevent total isolation and resulting depressions registered in students and among the public, in general.

About 50% of the universe of respondents observed no more than buildings and parked cars from their best window (Table 2). This proposes an urban planning recommendation for post-COVID-19 Era, which is to better isolate apartment house buildings with greenery, thus giving urban residents fewer depressive views in times of isolation. As Jessica Verheij argues: "the justice implications of urban greening strategies are often not addressed by policymakers" [10], even in case of Lisbon, elected as the "European Green Capital 2020", by the European Commission. Greenery, trees, and parks are repeated in this table, as they were by respondents to the Survey, and trees are scarce in old central neighbourhoods. As Andrea Boeri et al. wrote: "The pandemic has forced us to review our lifestyles and to practice different forms of social distancing, exponentially increasing the amount of time spent at home and fortifying the desire to spend more time outdoors." [11].

Honours	Degree	Masters	Degree	General
Landscape	Total	Landscape	Total	Total
Buildings	12	Buildings	6	18
Cars	4	Cars	2	6
People	7	People	3	10
Trees	7	Trees	6	13
Food Gardens	2	Food Gardens	3	5
Tagus River	3	Tagus River	2	5
Parks and Greenery	5	Parks and Greenery	4	9
Total	40	Total	26	66

Table 2: *Question 3.* Describe the landscape observed from your best window.

The research question is: What changes must be introduced in cities planning and functionality, to make them more resilient to future extreme events, natural or induced? One of the most thought-provoking best practises are Lisbon's green corridors, designed back in 1976 by the Portuguese landscape architect Gonçalo Ribeiro Telles but only inaugurated by the end of 2012 [12]. The main green corridor of Lisbon, connects Monsanto Forest Park (dark green big spot, located West in Fig. 1) with the northern central Edward the 7th Urban Park, located in the vicinity of Liberty Avenue (a fancy boulevard), and leaves behind many old neighbourhoods. The green passageways integrate some community food gardens (coloured dots), totalling 21 in our days (Fig. 1), where residents grow their own legumes, cereals, horticulture species and kitchen spices. These corridors were one of the reasons why Lisbon received the title of European Green Capital 2020.



Figure 1. Green Passageways or Corridors [13].

Recent engineering and urban planning proposals recover the Vicinity Units designed by the architect and visionary Le Corbusier, in the first half of the 20th century, and develop the 15-minute community-life circle within cities, now actively introduced all over China, according to Li, Zheng and Zhang, Y.K. [14]. The self-contained city together with the vertical garden-city were the inspiration of Brasília, the capital of Brazil, designed by the urban planner Lúcio Costa (1957-1961), friend and great admirer of Le Corbusier, and built-up by the also famous architect Oscar Niemeyer [15]. The Brazilian capital was drawn to permit that every resident could have access to food trade and basic services within a reasonable walking distance. In Lisbon, the Portuguese capital city, 15-minute neighbourhoods already exist in Alvalade (N) or Arroios (central areas).

During lockdowns, the students that lived in these areas could walk to purchase their basic needs; yet students came from all over the metropolitan region (37,5 % from northern Tagus River and 16,7 % from Southern River municipalities), as illustrated. The respondents that resided in other localities not always were lucky enough to meet their needs without use of public transportation, where they could be infected, despite the face masks. Some were also gifted with nice views of Tagus River from their apartment window (see Figs 2 and 3), but greenery was absent and public spaces were requested to exercise, during confinements. The students missed contact with enlarged family members, and

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close friends; they also missed going to the shopping malls; to the movies; to football stadiums; to dine out with their relatives and friends, and to attend concerts and music festivals.

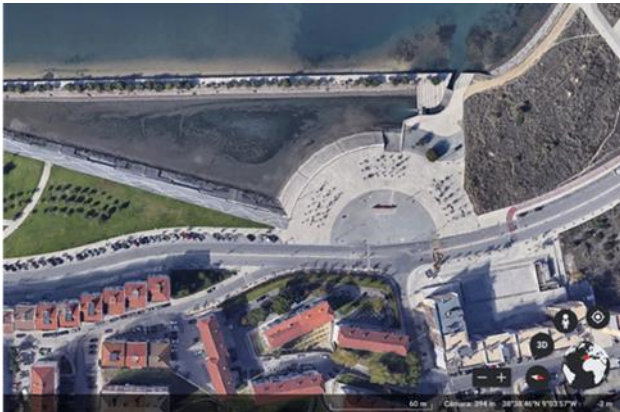


Fig 2. Barreiro Google image (South of Lisbon)

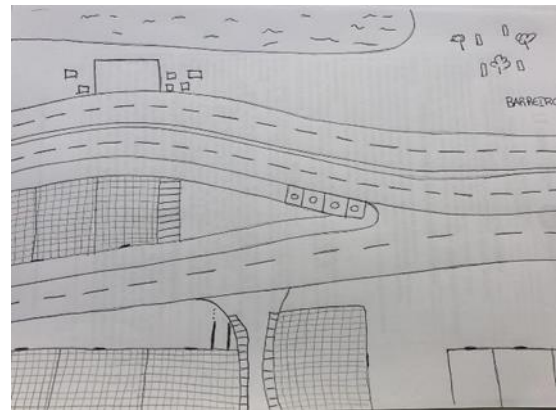


Fig. 3. *Pandemap* of master's Student

Unlike the perspectives created during the pandemic, that a new and more sustainable world would come out of the COVID-19 virus outbreak, everything went worse. The supply of food and other goods became more difficult because of the start a new war in Europe and, more recently, in the Middle East, turning transportation logistics towards the old continent a nightmare. As Gejo and Rebottaro wrote: “The States, which had never ceased to be so, have returned to being the undisputed protagonists and are facing the bids for international dominance, giving war an unavoidable presence.” [16]. The solidarity created during the pandemic among states vanished.

This resulted into new and even unwanted use of public spaces, so much sought-after during outbreaks, because some old Lisbon neighbourhoods (Arroios, Mouraria) have been taken by immigrants without a job and a roof. Those possessions were given to them and also assured to almost any Portuguese resident during the COVID-19, but the social cohesion disappeared with the return to “normality”. Avenues, public squares, and parks in the capital city now have tents with unemployed or underemployed people, as the jobs became scarcer and the replacement of face-to-face jobs by online platforms, accessible to a few, degraded life expectancies for almost everybody in Portugal.

3.1 Fifteen-minute cities and some good examples of public squares

In December 2020, the City of Paris organized a Zero Carbon International Contest, to commemorate the 5th anniversary of the Paris Agreement [17]. Eighteen cities, including capitals like Paris or Madrid, participated on this event and launched the challenge to the academia: plan a more environmentally sustainable neighbourhood. During six months, scholars from local universities developed and presented their projects of green cities, to the so-called “Students Reinventing Cities” competition. Lisbon and other Portuguese cities didn’t participate, but Spain did, with Barcelona and Madrid [18]. The mayor of Paris also started implementing 15-minute areas, in the French capital.

In the Spanish capital, the Barrio Catalysts was targeted by one of the Zero Carbon International Contest winning teams that adopted a sustainable and holistic approach for the area of the Gran Blas Sur. In the existing buildings they worked on solar thermal energy and green roofs development. The team further proposed that the 5 hectares sector proposed should increase its green areas to up to 1 hectare. Another key component was a safe bike and pedestrian infrastructure, encouraging car and bike sharing [18]. Green corridors, like the already existent in Lisbon municipality, were also proposed in this San Blas neighbourhood of Madrid.

In Lisbon big avenues are shaded by platanus, jacarandas and silver lindens. As researched by Ana Luisa Soares [19], the most remarkable squares display: 1. Pine trees (*Pinus pinea*, 31), European nettle trees (*Celtis australis*, 98), Cypress (*Cupressus sempervirens*, 100 in Fig. 4) and olive trees (*Olea europaea*, 125), in Belém neighbourhood; 2. European white elms (*Ulmus laevis*, 26), Canary Island date palms (*Phoenix canariensis*, 10), Silver lindens (*Tilia tomentosa*, 20) and magnolias (*Magnolia grandiflora*, 5), in Central Misericórdia; 3. Fancy Santo Antonio possesses European nettle trees (4) and pomegranates (*Punica granatum*, 3); 4. Areeiro neighbourhood also has nettle trees (5), Casuarinas (*Casuarina glauca*, 8) and Coral trees (*Erythrina crista-galli*, 5); 5. Central Arroios possesses European nettle trees (36) and jacarandas (*Jacaranda mimosifolia*, 9).

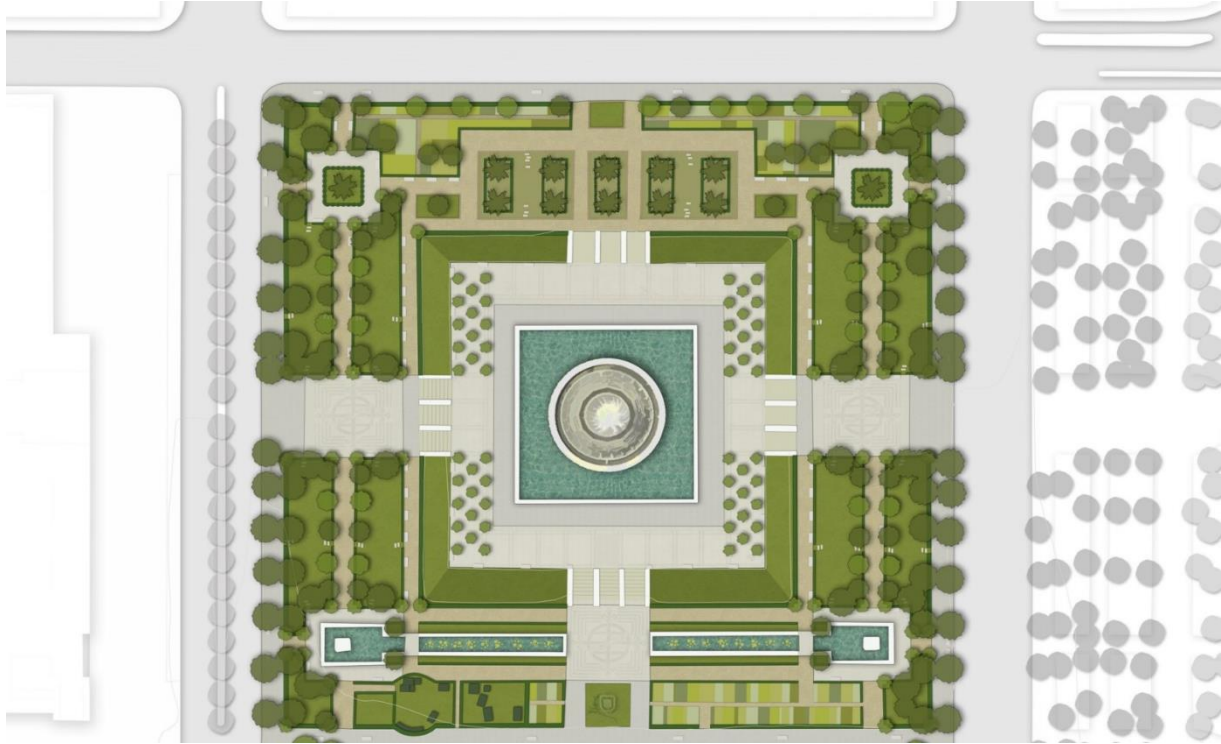


Fig. 4. Empire Square located in Belém western neighbourhood of Lisbon (<https://construir.pt>).

4. CONCLUSION

The image students had of their environment during lockdowns was influenced by the location of their home. Even inside their apartment, the central piece was their bedroom, the preferred place to study, game playing, video watching and sleep space. There was emptiness in the student's lives during the pandemic outbreaks, and a change in lifestyle among youngsters. The mental maps displayed in this paper show the quite detailed imaging of the blank streets and the contiguous buildings, as well as the design of the public spaces located in the vicinity of their house or apartment. Nevertheless, the return of "normality" didn't give them better future, as the students returned to their classes and their hobbies but were presented with scarce job perspectives in the next future and had to remain in their parent's houses or apartments. The urban planners should plan better cities, like the 15-minute proposal, and build more houses and apartments, using the available workforce. The recommendation is to use less Artificial Intelligence (AI), as machines don't eat nor need a roof, but people do.

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Enhancing Connectivity by Reducing Barriers between Plots: A Perspective from High Line Park in China's High-Density Urban Centres

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Extended abstract

The rapid urbanisation process in China has slowed down and now it is transitioning into the phase of gradual development, with a major focus on enhancing the quality of urban public spaces. The prior implementation of rigorous urban development, guided by legal planning requirements, resulted in a diminished emphasis on urban public areas. This has resulted in lost spaces (Trancik, 1986) like corner lots and abandoned areas within extensive streets, while urban public spaces are encroached on by motorized traffic, leading to human-scale imbalances and reduced comfort.

This paper analyses the concept of lost spaces that occur during the development of densely populated new areas as a case study, focusing on the Bao'an Central District in Shenzhen, China. The analysis is based on Roger Trancik's theory of urban design. Trancik (1986) emphasises the importance of taking into account human experiences in small-scale urban areas while designing from a bird's-eye view. The initial focus of urban design should be on the inhabitants of the city, requiring specific spatial design strategies to influence human behaviour. The emerging urban hubs frequently have elaborate transport systems that divide the city core, while constructing towering structures and expansive urban developments on different parcels of land, which is resulting in disparities in the spatial dimensions of the city. This paper proposes a solution to the issues by taking inspiration and learning from projects like New York's High-Line Park and Seoul Sky Garden in Korea. The High-line project integrates park and street elements, repurposing disused elevated transportation structures to enhance user satisfaction. Expanding the range of events places in these parks improves their cultural and commercial value, while also enhancing their role in the city as a vibrant hub of activity. It also promotes connectivity between the city and the new parks via staircases, lifts, bridges and escalators enhancing engagement with the surrounding urban environment.

The Bao'an Baywalk project in the Bao'an Central District adopts the high-line park concept, bringing innovative effects and influences to the previously unused areas in the newly constructed high-density urban centre. (1) Minimising obstacles between plots and creating physical and visual links between different plots; (2) Introducing diverse viewpoints of the city, known as Sky-view, which includes the building facades above ground level and views from treetops. This brings new factors and concepts to consider in urban design and spatial design; (3) Incorporating three-dimensional (vertical) urban public space and connections at multiple scales, where the sky garden enables connections at a small scale between upper-levels of buildings and neighbouring plots; at a medium scale between streets through motorised traffic, and a long distance through underground spaces in the city.

Keywords: *High Line Park; High-Density Urban Centres; Connectivity*

Re-read the urban complexity into planning tools through the definition of urban proximity systems. The case study of Mantova.

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Abstract

The term ‘proximity’ describes a field of application that has been analysed by many researchers in the past and that has become a central concept in recent years to respond to the critical issues of contemporary cities, as highlighted by the Covid-19 pandemic. In this paper, proximity has been identified as an urban strategy to be included in city planning tools to guide urban regeneration processes that reshape a dynamic city with diversified functions, a mix of public and green spaces for communities, residential areas, productive and commercial activities, linked by slow mobility. A proximity-oriented system is necessarily measured by the need to rearrange units with their functional autonomy in the territory, relating to each other in a polycentric vision. Indeed, from an initial ‘Knowledge Framework’ it appears that the traditional articulation into neighbourhoods was not sufficient to re-read the urban complexity of Mantova in terms of proximity. This awareness has led to the reorganization of the territory into autonomous units, called ‘urban proximity systems’, capable of describing different modes of urban functioning. They represent heterogeneous areas in which ground proximity and identify some common strategies that can be proposed in the planning tools of contemporary cities, particularly in the Territorial Government Plan (PGT) of Mantova.

Keywords: *planning tools; urban complexity; community; qualitative services; urban proximity system.*

1. PROXIMITY: AN OLD CONCEPT FOR NEW MEANINGS AND INTERPRETATIONS

The two years marked by the pandemic have functioned as an accelerator of the effects induced by multiple global crises we are facing, engendering conditions of risk and uncertainty in communities. Amidst this precarious scenario of community life, proposals have emerged for urban reform based on enhancing proximity relations. The conceptualization of ‘proximity’ is deemed simple, easily comprehensible, and highly efficacious during the pandemic period. It allows the envisioning of new dimensions that can generate urban well-being on a neighbourhood scale, realized on a human scale, wherein all services are conveniently accessible within a short walking or cycling distance for citizens. This functional proximity, characterized by its diversified functions and integration of a mix of public spaces, residential areas, and productive activities, is complemented by a relational proximity facilitating connections among diverse individuals within the spatial domain. Being in proximity fosters the establishment of relationships, thereby enabling collaboration, idea-sharing, the cultivation of common identities between communities, and mutual care provision [1]. It should be noted that these basic concepts underlying the proximity approach are not novel within the culture of urban planning and its associated disciplines. Indeed, it deals with issues and principles that have been widely acknowledged, shared, and consolidated by numerous researchers in the international context. The concept of proximity was initially linked to the ‘neighbourhood unit’, which was introduced as early as 1929 in studies conducted for the New York Regional Plan by Clarence Perry. This concept proposed neighbourhood as a physically delineated unit, characterized by diverse functions and infrastructures aimed at fostering social interaction and cohesion among residents. This model was considered in the debate concerning the reconstruction of cities following the Second World War, spanning from Patrick Abercrombie’s Greater London Plan to the establishment of New

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Towns. Inspired by the concept of Garden City of Ebenezer Howard, Peter Abercrombie introduced a polycentric vision centred on autonomous and distinct entities, known as neighbourhood units, that works as several small communities' functions [2]. While the modern movement was prioritized the efficiency and specialization of cities through the division into single-function areas, thereby drawing people away from the urban centres, the New Urbanism movement in the United States advocated for mixed-use neighbourhoods, encouraging a return of people to the city center. Furthermore, in London, a report was done by the Urban Task Force in 1999 [3], under the coordination of Richard Rogers, aimed at planning a city with a human dimension and sustainability, directly addressing the needs of its inhabitants. The dynamics of globalization and metropolitan expansion that occurred in the years, overlooked the concept of proximity and bringing in a radical shift in the economic scale of settlements towards efficiency and specialization. Consequently, this led to spatial dispersion and the multiplication of population, relationships, and services [4]. The modern cities, or 'cities of distance' as Manzini defines them, have expanded in a progressively fragmented and zoned manner, in which people must move through long networks from one functional proximity to another in continuous search of the services they need. With the recent pandemic outbreak, a radical spatial constriction has challenged the prevailing model reliant on long distances, reconsidering the concept of proximity. The necessity to reconsider the proximity is intricately linked to individual lifestyles characterized by the prioritization of essential services and slow movement within a nearby urban environment [5]. This period demonstrated the need to rethink cities within a human dimension, as initially defined by Jahn Gehl in 1960 and further elaborated upon by Carlos Moreno in 2016 with the concept of the 15-minute city. This urban paradigm prioritizes human beings and their needs, aiming to address their concerns by facilitating easy access to a variety of urban services within a 15-minute walking or cycling radius [6]. As a result of that, many cities are progressing from this recognition towards the experimentation and implementation of design solutions derived from these theoretical conceptualizations. Metropolitan areas are employing methodologies to inspire the revision of their urban policies and planning tools, with an emphasis on the concept of urban proximity. This aims to promote an organic vision of the city that is increasingly equitable, ecological, sustainable, and resilient. The administration of Mantova city has chosen to confront this urban challenge, initiating with the revision of the PGT, the Territorial Government Plan. As researchers from the 'Unesco Research Lab' at Politecnico di Milano, Mantova Campus, we are actively collaborating in this research endeavour. The aim is to verify and experiment some innovative practices and strategies into planning tools able to re-read the urban complexity of the cities, based on the needs of people.

2. NEW CHALLENGES FOR THE PLANNING TOOLS: THE CASE OF MANTOVA

Cities occupy a central position in public debate and international development strategies. They serve as hubs of both public and private innovation, fostering social interactions and sustainable collective mobility [7]. Nevertheless, the climate, economic, health, and demographic crises that cities have faced in recent years highlighted their fragile social, economic, and spatial structures. Confronted with these needs, cities are called to reconsider their existing structures fundamentally and innovatively. This entails effecting a transformation capable of harmonizing various urban policies and actions contained into traditional urban planning instruments, even those that may not be outdated, with a focus on proximity, sustainability, and inclusion. This stems from the current challenges posed by technological and revolutionary transitions, for which the existing urban planning tools often lack solid foundations and effective solutions. Indeed, these instruments were made up during a historical period characterized by different housing, employment, and mobility requirements, rendering them well-equipped to address contemporary urban complexities. For that reason, the revision of these planning instruments presents an opportunity to reorganize cities and territories through innovative paradigms of territorial governance, envisioning new modes of living,

working, and commuting, thereby fostering holistic urban development. However, starting a process of revising these instruments to define a urban dimension is a complex process and necessitates thorough preparation, study and confrontation between different realities, stakeholders, and actors, as well as the utilization of new resources. Moreover, this urban development must be based on strategic planning that can comprehensively analyse the territory, prioritize sustainable interventions, and guide planning on a human scale, ensuring easy accessibility to all amenities. In this process, local governments must play a leading role in ensuring the construction of a shared and strategic vision that considers the needs of the people along the way, starting from their active participation [8]. Some cities, such as Milano and Bologna, have already begun this process of revising their planning tools toward a city characterized by proximity. Among them is Mantova with its Territorial Government Plan. The PGT serves as an urban planning instrument of the Lombardy Region, to delineate the framework of the entire municipal territory. It consists of three main documents: the Plan Document, the Services Plan, and the Rules Plan. The Plan Document contains the cognitive elements of the territory and outlines the development lines intended by the municipal administration. The Services Plan defines the procedure for integrating public interest facilities, both material and immaterial, in the urban settlement. The Rules Plan contains regulatory aspects, quality criteria and elements of the built city. Each of these documents needs to be revised and updated considering the new awareness and need to govern the territory in terms of environmental sustainability, urban resilience, inclusion, participation, and proximity. This entails the development of a multidisciplinary tool that seeks to integrate social, economic, and environmental considerations. In collaboration with the Technical Office and the Municipality of Mantova, we are pursuing a double objective in this first phase of exploration: firstly, to deepen the knowledge of the socio-demographic characterization profiles able to highlight the needs and requirements expressed by the urban communities; and secondly, to assess the adequacy of the provision of proximity services, encompassing both material and immaterial aspects, based on an analysis of the Service plan. The aim is to recognize the nature of the components composing the city and to construct an articulated 'Framework of Knowledge' of the territory, which currently exists in a fragmented state. It entails moving away from the traditional perception of the city's organization around the neighbourhoods and embracing a more flexible and organic structure capable of responding to the changes that cities may encounter, as underscored by the lessons drawn from the pandemic experience. These insights can subsequently be used to define a system of neighbourhood strategies and actions that can be integrated into the city's urban planning tool.

3. RE-READ THE URBAN COMPLEXITY FOR SHAPING NEW 'NEIGHBOURHOODS'

Cities have grown as the automobile allows us to live further away from work and services. In this sense, people have changed their habits to adapt to the fast time of the 'city of distances'. With the pandemic, where our life experience has been forced into the space of neighbourhood, we have gained the realization that life in a post-fossil city can be considerably better in terms of living standards than the urban lifestyles we aspired to in the twentieth century [9]. The pandemic puts on the table the need to actively think about the future of cities. It is essential that this new awareness of proximity is incorporated into urban planning tools, to propose a model of spatial organization that considers the evolving needs of the urban community where neighbourhoods represent the crucial point of this new perspective. We must reconstruct cities starting from the traditional articulation in neighbourhoods, which represent elementary urban units with their functional autonomy, centrality and where the social life of the community takes place. This is possible by a set of functions, spaces, and services create for people. The spatial organization of our cities is undergoing a process of gradual decline, with many of the neighbourhoods that define this organization losing their attractiveness and functional autonomy. These areas are becoming increasingly anonymous and lacking in identity, gravitating towards a single center, which is usually the historic one, and becoming increasingly peripheral. This is defined monocentric model, and it is characterized by a centripetal force, whereby

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political, economic, cultural, and commercial functions are concentrated. The possibility of developing cities towards a single centrality, to date is currently not capable of responding to the new challenges, urban and otherwise, that contemporary cities must respond to within a relatively short period. Furthermore, it is unable to meet the needs of the people who inhabit them. For this reason, proximity has begun to refer to a polycentric model, already used and consolidated in the past, characterized by a centripetal force that seeks to move certain issues away from the center, identifying in the territory functional and autonomous nodes linked by networks characterized by infrastructures, intercity relations, and mobility flows. These centralities are dispersed throughout the city and synergistically interact with each other, making the whole network of centralities more than the sum of its parts [10]. Proximity finds a new and fertile declination in the experiments of the polycentric urban model, for which the equal city is one of the differences [11]. In this sense, we have based our research on this model, which allows us to re-read the complexity of the city of Mantova from the urban dimension of the neighbourhood. Cities have always had neighbourhood but now they take a new significance as an urban form that allows us to fight the global crisis with the wish to improve the quality of people life. This is the motivation that led us to restart from the traditional neighbourhood, theorized in the past, to propose a model of spatial and functional organization on a human scale, based on urban service centres, sustainable mobility, green and public spaces, and other amenities that are easily accessible by all in the city.

3.1 Exploring a double analytical approach to investigate new proximity needs

Creating a dynamic city from the neighbourhood, characterised by different functions, a mix of public and green spaces, residential areas, industrial and commercial activities, requires a high level of awareness of the context and comprehension of its character. It represents a process of reinterpretation of urban complexity that requires study, preparation, and comparison between different realities. The activity with the Municipality of Mantova started from the awareness of the need to articulate a framework of knowledge aimed at grasping multiple elements of urban characterisation, working in the knowledge that managing the transformation processes of a territory requires the elaboration of a knowledge path of the complexity of the city. In this sense, it is important to think about a framework to be used as a reference for the formulation of the PGT provisions, capable of taking the form of a coordinated and continuous process of planning and implementation of activities, based on continuous review, and updating of data. At the beginning, we developed this way of processing and transmitting data, aimed at overcoming the quantitative analysis of demographic phenomena to arrive at a qualitative one, capable of recognising the composition, distribution, and structure of the population in terms of fragility. The survey process involved a series of mappings in which the different demographic dynamics of citizens are defined. These maps represent both the demographic status of individual citizens and households, as well as the dynamics of social component replacement (arrivals and departures) and natural component (births and deaths) within the community. The study has shown that to structure an image of the demographic consistency of the city, it is necessary to overcome a static vision linked to the reading of the absolute values of the population; for example, in the analysed period of six years described in the Table 1, from 2017 to 2023, the resident population of Mantova, although it presents a substantially stable overall demographic balance, in reality shows within it variations determined by the natural and social component that defines its demographic dynamics. This is visible in the Table 2, related to 2023, where against a percentage variation in the absolute value of the population of 0.48%, there is an internal dynamic of 9.95%. This data underlines the features of the communities settled in each neighborhood, describing an articulated and dynamic population framework capable of highlighting people's needs and strategies to be implemented in the future.

Table 1. Demographic variations during years determined by natural and social components

Survey Year	Resident population	Variation from previous year	Variation percentage	Survey Year	Resident population	Variation from previous year	Variation percentage
2017	49480			2021	49316	- 55	- 0.11%
2018	49529	49	0.10%	2022	49591	275	0.56%
2019	49585	56	0.11%	2023	49828	237	0.48%
2020	49371	- 214	- 0.43%	2024

Table 2. Description of demographic variations by natural and social components in neighborhoods

2023							
Neighborhood	Birth	Death	Enrolled	Cancelled	Residents	Natural replacement index	Social replacement index
Belfiore	4	10	43	26	948	1.48 %	7.28 %
Borgo Angeli	8	13	36	42	1338	1.57 %	5.83 %
Dosso del Corso	10	22	60	47	1411	2.27 %	7.58 %
Borgochiesanuova	13	21	134	84	2285	1.49 %	9.54 %
Pompilio	17	26	115	85	2153	2.00 %	9.29 %
Due Pini	1	3	20	20	523	0.76 %	7.65 %
Te Brunetti	12	16	44	49	1278	2.19 %	7.28 %
Fiera Catena	9	9	52	45	1123	1.60 %	8.64 %
Valletta Valsecchi	13	47	159	111	2904	2.07 %	9.30 %
Valletta Paiolo	38	157	386	199	6958	2.80 %	8.41 %
Centro	86	217	840	600	16687	1.82 %	8.63 %
Colle Aperto	15	24	82	106	1915	2.04 %	9.82 %
Cittadella	9	12	117	86	1219	1.72 %	16.65 %
Ponte Rosso	7	2	97	33	634	1.42 %	20.50 %
Virgiliana	3	9	23	38	535	2.24 %	11.40 %
Lunetta	27	39	183	159	3752	1.76 %	9.12 %
Frassino	6	11	46	13	741	2.29 %	7.96 %
Gambarara	2	9	39	32	498	2.21 %	14.26 %

In addition, the elaborations have point out the concentrations of demographic characteristics that can be associated with situations of potential social vulnerability. Vulnerability is understood as a state of life in which the autonomy and self-determination of individuals are permanently threatened by an unstable integration into the main systems of social integration and resource distribution [12]. This survey takes the form of a methodological experiment and makes use of the equipment that has been collected in the municipality's computer system over the years. Indeed, by using geocoding techniques to locate these demographic phenomena, it was possible to show the exact location of the phenomena affecting demographic mobility within each neighborhood of the city of Mantova. We considered in the research eighteen neighbourhoods, including the historic centre. Although it is divided into historic districts, in this first phase of the study experience it has been deemed as a single entity to understand its centrality in relation to other neighbourhoods. These were analysed individually, even if they can be represented in a single systemic view with their characterization.

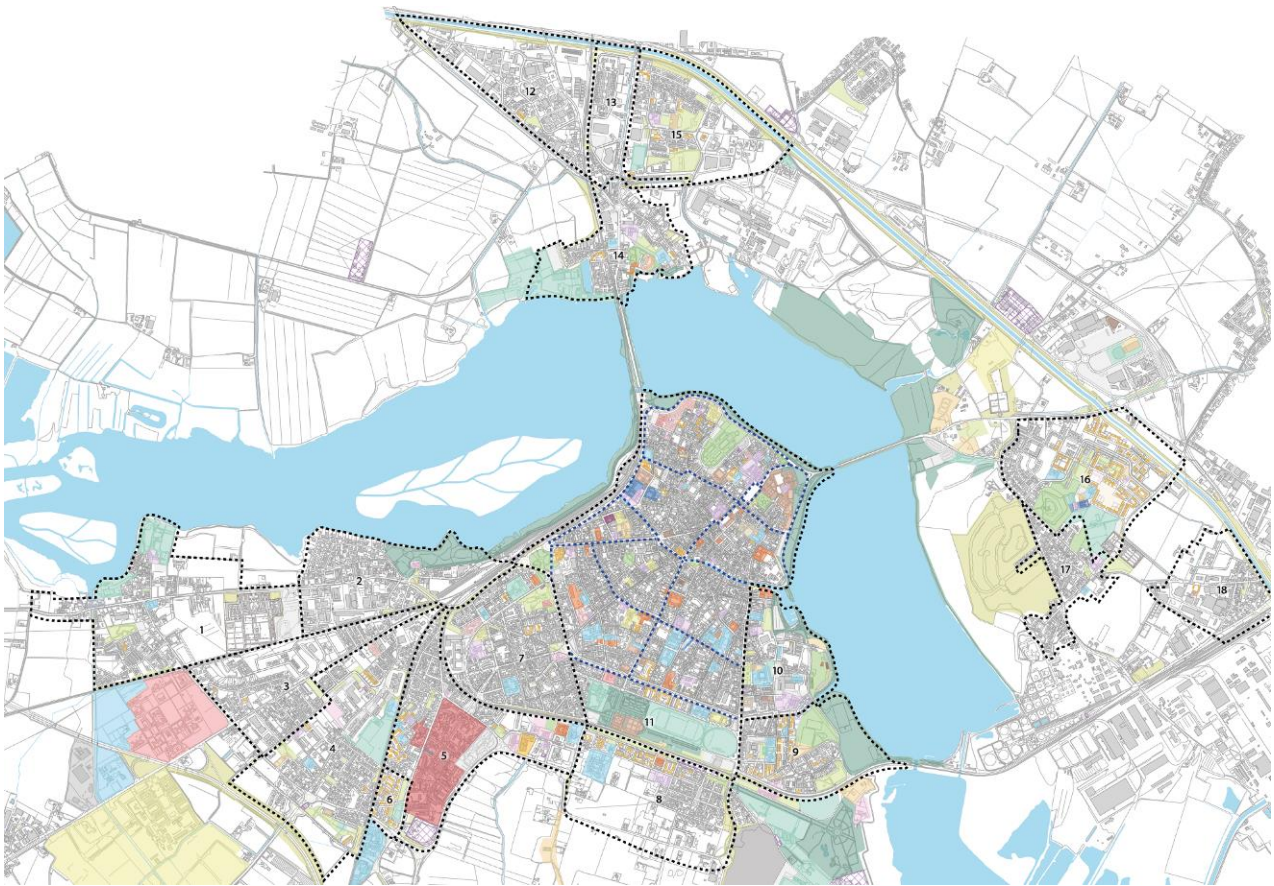


Figure 1. General map of provision of existing services divided into traditional neighborhood

The second part of the research, carried out in parallel with the reading of the characteristics of the population, focused on developing an analytical-interpretive framework for service systems. This framework considered both tangible resources, such as material amenities distributed and organized within the territory, and intangible values. This analysis entails reviewing the contents of the current Service Plan to ensure the adequacy and completeness of its analytical framework before updating all documents of the PGT by the Municipality of Mantova. Additionally, the survey facilitated this phase of updating and enhancing data regarding tangible and intangible services available.

The research has led to the production of six geo-referenced thematic maps for each of the neighbourhoods previously analysed, all contained in an atlas, covering: a reading of the provision of existing services; an analysis of the characteristics and densities of the settlement system; a survey of intangible services of social and proximity value; a map of mobility and accessibility; the green and water system; elements of urban characterization. These fact sheets are outcomes of reviewing planning tools and understanding the neighborhoods comprising various local contexts, emphasizing the unique features of each neighborhood. They also serve to assess the utilization and accessibility of available services in the city to search for greater proximity. The reading of the fragile characters of the population and the analysis of the endowment of services are developed simultaneously in our research to have an overall vision of the characters and needs of the city, to identify which services are essential and which can interpret the daily needs of the citizens. The final phase of the work was a moment of synthesis and recognition of the reflections that had emerged in the two previous sections and allowed us to question ourselves on the new needs of the city and its citizens in terms of proximity, trying to understand what strategies should be integrated into the urban planning tools to promote this urban approach [13].

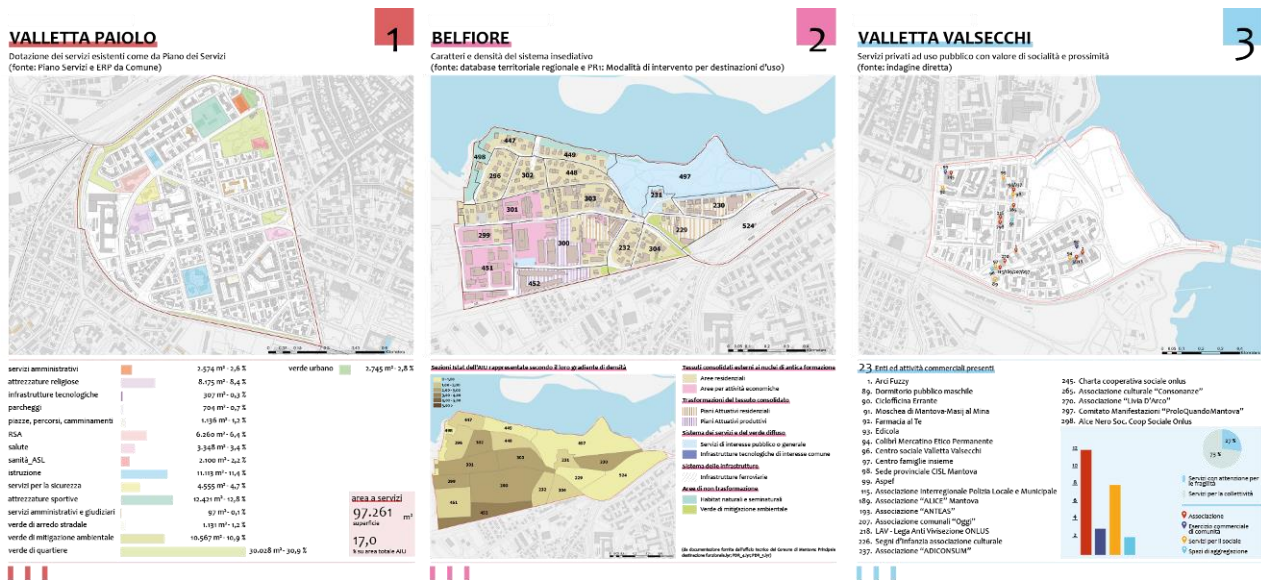


Figure 2. Examples of thematic map for each neighbourhood

3.2 The new needs demanded by the ‘city of proximity’ in urban planning tools

In this phase of evolution and necessary adjustment of urban planning tools to govern the sudden changes in the territory, exploring the issues of population size, land endowments, access to services by citizens and the human dimension of proximity, represents an opportunity that should be welcomed by all municipal administrations. This evidence has allowed us to direct our research, carried out in collaboration with the Municipality of Mantova, towards a new direction in the transformation of the city, to define urban proximity strategies that try to find a place in the PGT of Mantova, and in the documents that make up the Services Plan. In this phase of post-pandemic transition in which we find ourselves as urban planners, it is necessary to start again from these urban planning tools that govern the territory, going on to renew and rethink the existing public facilities to respond to the new environmental well-being, resilience, sustainable accessibility, and social inclusion of the urban system. These services are recognized as 'urban centres' that enhance the city, as they are attractive nodes within the territory, capable of creating synergies and effective links between all urban elements; this also makes it possible to understand how the types of services useful to the population have become more articulate and have evolved towards ever higher levels of quality [14]. With this in mind, we asked ourselves during the research process which route we should take to try to embed the strategy of urban proximity in urban planning instruments. It has become clear that the current organization of the city into administrative neighbourhoods, defined as elementary and geometric units delimited by rigid and unknowable boundaries, no longer meets the functional and social needs of the cities, which seeks to respond the demands of proximity.

4. A FUNCTIONAL AND SOCIAL REORGANIZATION INTO ‘URBAN PROXIMITY SYSTEMS’ TO SEARCH FOR GREATER PROXIMITY

Re-read the urban complexity through a dual approach has allowed us to synthesize and reflect on issues of proximity within an interpretive and multidisciplinary framework of different resources and characteristics of the territory, which dialogue together in a systemic vision. Given the concepts developed in this phase, it's apparent that prioritizing proximity could prompt a reorganization of the neighborhood's urban space. This would ensure residents have easier access to essential urban facilities and services. For this reason, the need to broaden the true meaning of these urban entities gradually became apparent in the research, as the need to measure the quality of daily life and living in the city in terms of the completeness and complementarity of the services available, the

opportunities and quality of urban life, environmental sustainability, social inclusion, and integration. It was decided to try to imagine a new concept capable of reinterpreting the notion of the neighbourhood as an elementary urban unit, geometrically delimited by rigid boundaries defined administratively by the municipalities to spatially subdivide their internal territory. The 'Urban Identity Areas', so prematurely named in our reinterpretation of complexity, represent the first attempt to define polarities in the territory, endowed with their functional autonomy and capable of reinterpreting the needs of citizens and the city in continuous evolution and transformation. The new perimeter of these areas redefines the rigid boundaries of the neighbourhood of Mantova, describing homogeneous parts of the territory that adapt to the different architectural, morphological, spatial, and social characteristics of the urban settlement. In this new vision, the 'Urban Identity Areas', although still recalling the form of the previous administrative units, seek to reinterpret the concept of boundary by defining variable and flexible borders that can change, overlap, and interfere with each other to quickly adapt to the different needs of urban settlement. These areas therefore aim to create an internal dynamism within the territory, where proximity allows the consolidation of new relationships, capable of generating an urban welfare that confronts the dimension of the sphere of identity, usable on a human scale, and where different functions are easily accessible to citizens in a few minutes on foot or by bicycle. The definition of these 'Urban Identity Areas' has attempted to go beyond the idea of a static neighbourhood, gradually approaching the description of dynamic polarities, increasingly capable of imagining a polycentric vision supported by relationships between different urban elements. They have not been able to guarantee the functional and social autonomy required by neighbourhood cities and imagined at the beginning of the work. This reflection, which has matured after a series of research experiments, has led us to realize that the spatial configuration we have hypothesized only takes up and modifies the edges of the original neighbourhoods, without reinterpreting them according to the new needs and different modes of urban functioning that proximity requires. It was decided to build on this awareness and redefine these areas by no longer considering them as individual autonomous entities, but as systems of centralities that function together; the name 'Urban Proximity Systems' was chosen for this reason. They represent areas that are substantially heterogeneous in terms of their spatial, morphological, social, cultural, and economic characteristics, and that functions both autonomously, ensuring the interweaving of short proximity networks, and in conjunction with other systems located in the territory. While the definition of urban identity areas was based on the external perimeters of the original neighbourhoods, to examine their characteristics, the opposite approach was taken to define urban proximity systems. The systems have been defined based on the identification of certain centralities of urban functioning linked to the presence of historical identities (nuclei of ancient formation), collective and social public services, gathering places for people, local commercial concentrations, and other amenities [15]; a series of urban places on a human scale, with a high pedestrian frequency, where everything is easily accessible and reachable for citizens. This is enabled by the relationships each polarity forms with those nearby, creating an interconnected system of identity centralities. Urban proximity systems thus become functional, autonomous concentrations within the territory, reflecting urban and social diversity in their relations with nearby living environments. [16]. The definition of these systems is the first tangible result of our research and allows us to imagine a possible reorganization of the city, different from the previous one of the neighbourhoods, in which proximity is tested as an urban strategy. In agreement with the Municipal Technical Office of Mantova, we have tried to divide the territory in 12 heterogeneous proximity systems, delimited by variable boundaries that change, modify, and adapt every time to the characteristics of the urban settlement that is in constant transformation. Given that proximity is a primary focus for the PGT, these systems were chosen as a common field of application for envisioning future perspectives and planning with proximity in mind. This includes promoting sustainability, resilience, inclusion, and accessibility. Our future challenge is to define design actions

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within these systems, both temporary and permanent, to reactivate the internal dynamics of the territory and promote proximity as a crucial urban strategy.

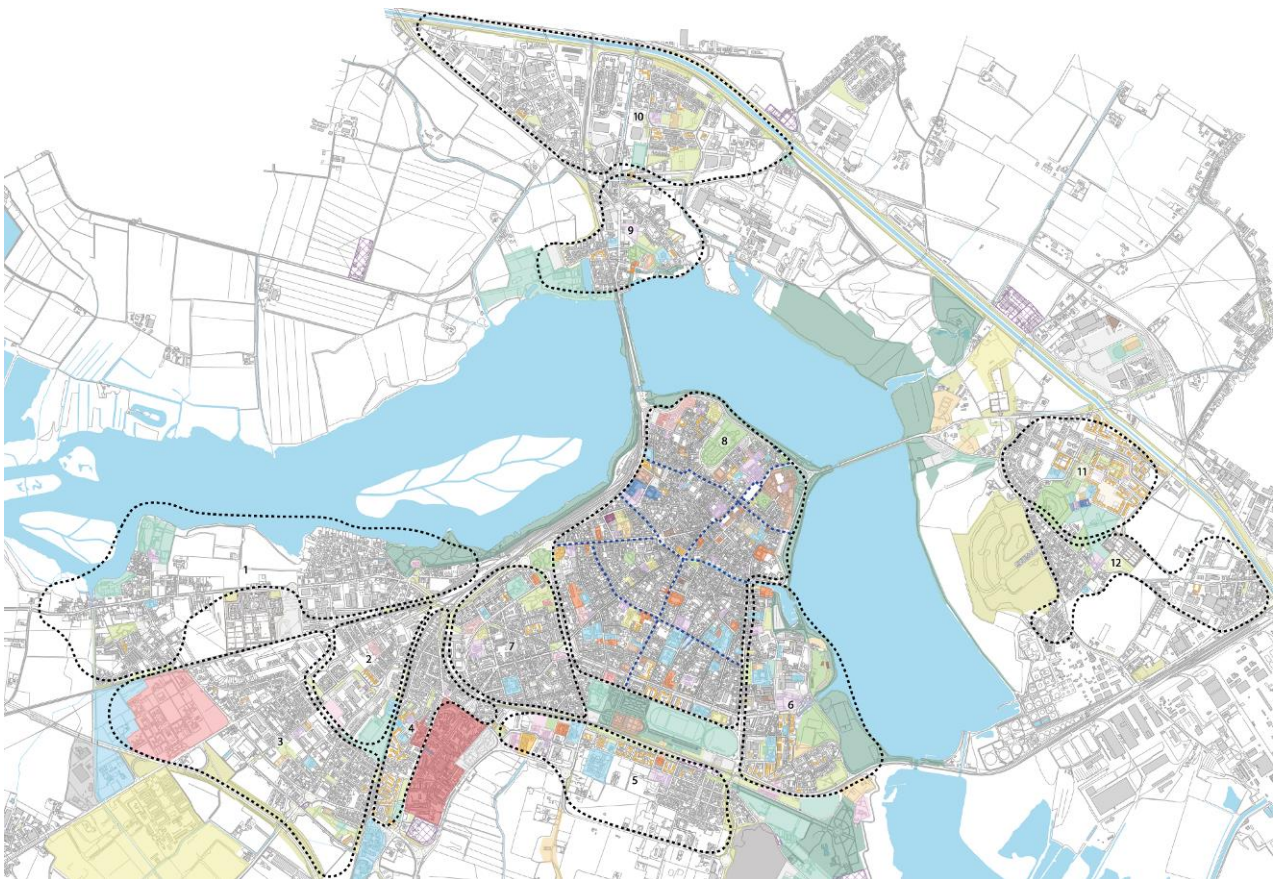


Figure 2. Identification of the 12 Urban Proximity Systems in the city of Mantova

5. CONCLUSIONS: EXPLORING LIVEABLE PROXIMITY SCENARIOS

During these years of post-pandemic transition, all the municipal administrations are striving to experiment with new urban planning approach centred around proximity. As Manzini stated in 2021, proximity seeks to reinterpret design themes such as sustainability, resilience, and inclusion, aiming to enhance liveability by providing multiple services and opportunities to those in close physical proximity. This approach fosters increased chances for social interaction, sharing, and community building, linked to an emotional dimension. Spaces for conviviality and relationships should be promoted to cultivate a sense of belonging and responsibility within the community that inhabits these spaces daily. The proximity dimension, in this sense, could enhance and activate networks of discussion and practice, seeking to identify innovative tools capable of meeting both people's needs and the city's public policies [17]. As described in this paper, proximity requires considerable effort and organizational change on the territory to improve the liveability and the quality of life. What emerges is the need to rethink proximity as an asset, as a social and economic value, as an inclusive and participatory process, not a mere service or even a model that can be applied uncritically everywhere but contextualized by rooting the design in local space and policies.

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Unlocking the Potential of Placemaking. How to enhance citizens' engagement to analyse, design and implement urban spaces.

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Abstract

Placemaking is a flexible approach to creating vibrant communities around places, focusing on civic engagement, and enhancing local identity. Placemaking can take many different forms, depending on the specific needs and goals of a community. It is an open-ended process that looks at the involvement of a community as a key factor for the success of urban designs in all the step of its process. Due to its multidisciplinary approach, Placemaking can positively contribute to improve resilience, flexibility, and proximity issues. Promoting shared values and cross-sector collaborations for the creation of great places, Placemaking can foster social and spatial resilience. It supports flexibility both through its process and its outcomes. Then, Placemaking can also support proximity improving accessibility, walkability, density, mixed use, design diversity, and the users' experience for all ages. With these premises and with the aim to easier integrate Placemaking into planning, I suggest to use a meta-design that combines both the steps of the Placemaking process and three urban design scales with a selection and organisation of tools that should be added to the usual toolbox of architects; among those, most of them have been directly tested and applied by the author. This idea proposes co-design activities for each step of the Placemaking process to easier involve citizens and adopt a collective place-making approach. I think that a focus on Placemaking offers a practical, proactive, and integrated approach for addressing global change and urban challenges at every scale.

Keywords: Placemaking framework; Placemaking tools; liveable places; co-design; citizens engagement.

1. INTRODUCTION

1.1 Placemaking: the art of creating communities around places

In literature, urbanists, geographers, and planners consider Placemaking a basic, primordial human activity. Some of them state that making places is necessary for the well-being of the individual and the society, while others promote the idea that a sense of place is an innate quality and a necessary component of human interaction [1]. For the Placemaking Europe team, the definition of Placemaking is “an approach to urban planning and design that focuses on the people who use a space, rather than just the physical structures or buildings” [2]. The aim behind this notion is to design spaces that are attractive and important to the people who live, work, and play there, in addition to being useful. Placemaking inspires people to collectively reimagine and reinvent public spaces as the heart of every community [3]. It emerges that Placemaking is an approach and a process in which people are invited to reinvent public spaces collectively, so it addresses both the reshaping of an urban space and the engagement of a community. Based on the specific requirements and objectives of a community, it can take many different forms, considering the social, cultural, and physical identities that contribute to the definition of a place and its ongoing evolution. Placemaking projects can take many forms, such as designing public art installations, furnishing parks and plazas with benches and playgrounds or lighting, or planning neighborhood gatherings for celebrations, farmers markets, or festivals.

The current debate in Urban Design is animated by the topic of the livability of public spaces with a special focus on themes such as resilience, flexibility, and proximity. Due to its multidisciplinary

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approach, Placemaking can positively contribute to improve those issues. Placemaking promotes the shared value, community capacity, and cross-sector collaboration that are the cornerstones of resilient cities and vibrant communities through a broad focus on creating quality places. The flexibility of Placemaking is recognizable both in its process and its outcomes. In terms of process, Placemaking seeks to skip over statutory planning stages and focus on concrete, relatively rapid changes in the built environment. Placemaking is described to have a cyclical rather than linear dynamic, with fluid process and many point of entry for the willing actors, so it is super adaptable to different cases. In terms of outcomes, due the involvement of several stakeholders, a Placemaking project must combine different needs so the design proposal should be very versatile. Having more flexible spaces also allows to change their use and makes room for temporary interventions. Placemaking can also support proximity improving accessibility, walkability, density, mixed use, design diversity, and the users' experience for all ages. It can consider all the dimensions of proximity such as geographical, social, cognitive, organizational, and institutional.

1.2 Research questions and objectives of the project

The considerations of this study were made within the development of the PhD research of the author with the aim to investigate co-design methods for the regeneration and improvement of public spaces with and for communities; and to investigate how those processes could be integrated into current urban plans. Since the academic field of this study is "Urban and regional planning" the perspective on those themes and approaches is a systemic thinking to define technical and political processes that can better develop a sustainable built environment to serve an ever-changing society and to improve people's lives.

Change is hard and there is the need to make it less difficult, so, the research wants to explore how supporting the change towards a systemic implementation of Placemaking through these lines of research: "How to disseminate the Placemaking approach where it is not well known?", "How is it possible to make Placemaking systemic (e.g. able to combine bottom-up and top-down initiatives within an urban)?", and "How is it possible to embed Placemaking into current urban plans?".

Starting from a deep reflection on Placemaking as an approach able to help all those who contribute to reshape and activate public spaces with the community, the idea has been to define a strategy to implement Placemaking into planning, considering the contexts in which that approach is not familiar and well consolidated. Since the focus of this paper is not as wide as the whole PhD research, it mainly addresses the challenges of how it is possible to unlock the potential of Placemaking and how is possible to enact a systemic change step-by-step. Then, the paper focuses on the outcomes that have emerged from the thesis to face these challenges.

2. METHODOLOGY

To develop this research, I adopted several methods such as the analytical approach, the interviews of experts, the research of case study, a practical experience with the leading team at a European level (Placemaking Europe), and the implementation of a project through a local practical experience in the city of Mantua (Italy). Initially, I started with the study of bibliographic references about co-design, civic engagement and the importance of designing great public spaces while enhancing the sense of belonging of communities; but, it was only thanks to my hands-on experience with the Placemaking Europe team that I truly understood the power of Placemaking and its purpose of creating communities co-designing and co-creating public spaces to make them more inclusive, healthy and safe. I was involved in a two-years programme named "Cities in Placemaking" [4], aimed at building awareness and practical knowledge of Placemaking in a way that allows it to foster important long-term change. Thanks to that experience, I learnt that is very helpful to guide administrations in the implementation of new ways of working through the sharing of new tools, new

methods, and successful case study. Also, the interviews with experts, public administrators and facilitators were very helpful in defining the most pressing concerns on the management of co-design processes within urban design. Thus, to answer the research questions and meet the needs of interviewers, I consider it appropriate to define a way to make Placemaking more familiar through the sharing of best practices, to create a flexible frame of reference to guide designers in the implementation of Placemaking step-by-step, and to create an organized toolbox with some Placemaking tools useful to manage the direct involvement of citizens.

2.1 Defining a Placemaking process

In terms of process, Placemaking seeks to skip over statutory planning stages and focus on concrete, relatively rapid changes in the built environment. Placemaking can be seen as a two-way process: both place shapes the community and community influences the space [5]. This mutual connection is called “virtuous cycle of place-making” [6]. Placemaking is described to have a cyclical rather than linear dynamic, with fluid process and many point of entry for the willing actors. Similar relation was described already by Lynch [7], who claimed that the image of the environment is created by the observer, but at the same time, environment exerts its influence on people who use it. In that sense, such an image is dynamic, as it is formed during the interaction between the observer and the place. That process fits well with the complexity of society, it is open to experimentations, improvements, changes, and ongoing re-evaluations. The Placemaking process is inclusive, dynamic, trans-disciplinary and collaborative, so the design of places is adaptable, flexible, focused on creating destinations and context specific. The process is centered around observing, listening to, and asking questions of the people who live, work, and play in a particular space to understand their needs and aspirations for that space and for the whole community. Once having created a vision for that space, it could be implemented through small-scale improvements that bring immediate benefits to the spaces and the people who use them. Placemaking encourages planners, designers, and engineers to embrace grassroots involvement and view a place in its entirety rather than focusing on isolated components. By doing so, common problems like traffic-dominated streets, safety in public spaces, inclusion and accessibility, urban health, spatial and social divide, climate action, nature preservation and so on, can be addressed at a small scale.

To define the process for my research, I evaluated several Placemaking procedures, but the most influential one was that of the Project for Public Spaces [8] that uses a five-step process, so I followed this direction customizing a bit each step. The Placemaking Process that I propose includes the following phases: get ready, evaluate the context, create the future vision, do short-term experiments, improve and implement. The first step aims to identify problems, needs or aspirations at a macro-level and to assess which stakeholders and partners should be involved. The second step is about the analysis of the context including for spaces, uses, activities, how people experience these spaces to identify strengths and weaknesses. The third step is about creating a vision, defining the goals, and planning. The fourth step is about putting the vision into action through prototyping and tactical urbanism, to unleash the power of acting together. The fifth step is about assessing and implementing the short-term experiments to fine-tune the vision and the design solutions of the overall project. These steps are mostly sequential, but, after the fourth phase, it is better to check whether the determined goals are achieved or not during the process itself. Moreover, the phase of doing short-term experiments is very useful and represents a key-point in Placemaking because it usually implies actions that can be reversible, modifiable, expandable, or repositionable. Casanova & Hernandez [9] state that working with the time factor, the intervention can acquire enormous versatility, becoming a temporary or ephemeral intervention, a test intervention, or even a mutating intervention with the ability to transform over time. So, after checking the design solutions it is possible to go back to the evaluation step to better verify the context and its real needs, then decide how to continue also

considering some improvements or different solutions. Since, the main purpose of Placemaking is creating community around places, there is the necessity to make the community and the place alive after the end of the process itself. This is another key-point of Placemaking because it should continue with the management part sharing a calendar with activities, festivals and other initiatives to ensure the continuity with the sense of belonging that has been created during the project phases.

2.2 A matter of scales and impact

Cities are very complex organic bodies that include many sub-systems such as energy, water and sewerage, food, transport, health, and biodiversity, as well as economic, social, and cultural systems. This network of systems, interconnections and flows can be described as a system of systems. Moreover, we could define cities as “Complex Adaptive Systems” (CAS) characterized by heterogeneity, interconnectivity, circular causalities and have sub-systems that operate at different scales [10]. An interesting contribution in that way is given by John Tillman Lyle, a former professor of landscape architecture at the California State Polytechnic University, Pomona. In his book “Design for Human Ecosystems” [11] he claims about the interdependence between ecosystems saying that “landscapes, like people, rarely stand alone”, everything is indeed related, at some level, to everything else. So, every landscape is joined with all other landscapes in a network of interdependence that extends over the entire earth. One of his key-concepts is that one of “scale”, or the relative size of the landscape in question and its connections with larger and smaller systems and ultimately with the whole. Scales provide a frame of reference for interventions, activities, and to identify the stakeholders for projects. Also considering the impacts on the subjects involved is a matter of great importance within co-design and Placemaking processes. Different groups of people will be affected by different scale of projects. So, the community of a specific neighborhood will be more interested in taking part in a process than the ones which live far away. A different case would be that one of a city center that usually capture the interest of many. Gardner J., Marpillero-Colomina A., & Begault L. [12] consider four scales of design for urban interventions (site, block or neighborhood, city, town, or country, and regional or national); and four levels of impact (individual, community, network and population).



Figure 1. Images created by the author to represent the scales of design for this research.

Since the aim of this research is to investigate Placemaking for the activation of public spaces, I choose to adopt only three scales of design (and their relative levels of impact) that are: place, neighborhood, and city.

The place represents a specific location, has definite boundaries and is usually small enough to be perceived in its entirety from a single viewpoint. Common examples include roads, paths, sidewalks, parks, public squares, natural areas, beaches etc. A neighborhood is a specific geographic area with a set of social networks within a larger city, town or suburb. Sometimes, it consists of a single street and the buildings lining it. Every neighborhood has its own character and peculiarity together with uses and specific activities that are not the same in each part of the city. Some neighborhoods have a

vocation to public services (since the plan includes this kind of zoning) or they could have artisan laboratories, or they could be mainly residential. Knowing the character of areas is important to deliver contextually responsive urban design, allowing the urban designer to understand and respond to the unique qualities of any site or neighborhood. A city is a large human settlement. It can be defined as a permanent and densely settled place with administratively defined boundaries whose members work primarily on non-agricultural task. It is a complex system and an organic body. A city scale usually covers an area that is small enough for an individual to know and personally relate to, but large enough to involve complex political decisions.

2.3 Placemaking tools

Placemaking is a process that wants to bring together different stakeholders, users, and local citizens, aiming to capture the local culture, knowledge and the collection of different ideas and aspirations. How is it possible to do that? How can we organise workshops to help people share ideas, collect proposals, and allow them to become city-makers? Tools are the answer, they are fundamental instruments to collaborate and co-create. For the Collins Dictionary online, a ‘tool’ is a power-driven instrument, it is anything used as a means of performing an operation or achieving an end. They really help in organizing the Placemaking process and in keeping the community pro-active.

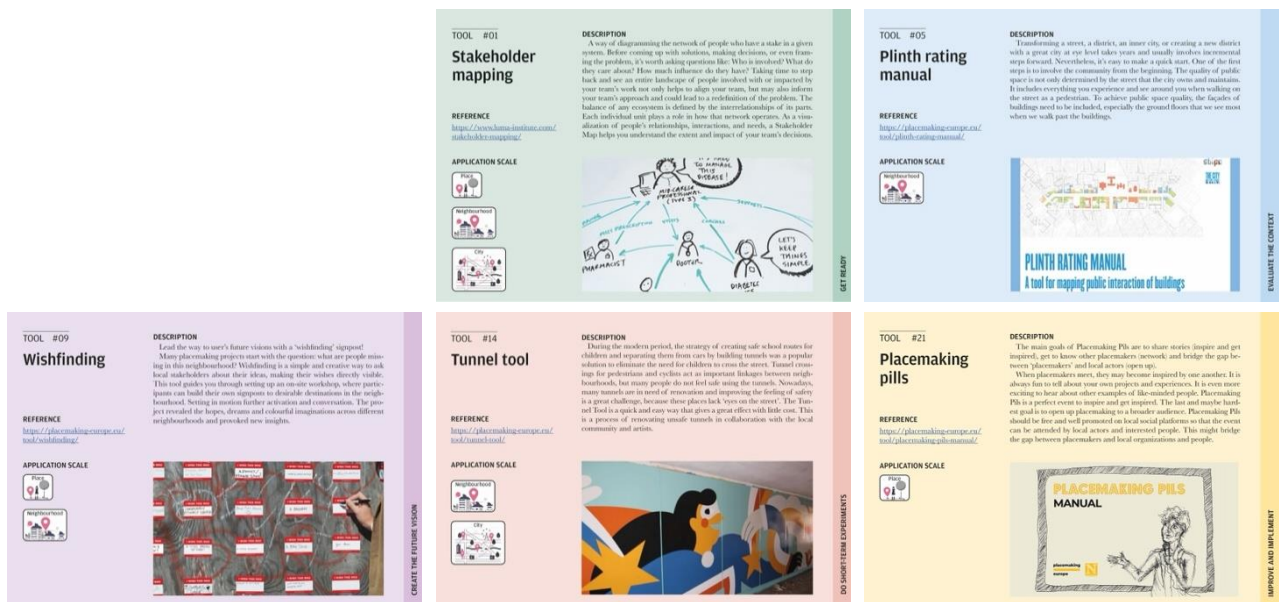


Figure 2. Some of the cards created by the author within the selection of tools presented in the PhD research referred to this study. Each color represents a different step of the Placemaking process.

There are a lot of Placemaking tools in the Web and many associations have created their own toolbox. For the selection of tools, I mainly referred to the “Placemaking Europe Toolbox” [13], a collection of curated Placemaking resources for all to access, learn from, and practice; and to the “LUMA workplace” [14], a platform that aims to create more human centered organizations and empower everyone to make things better through co-design and cooperation. From these sources I selected about twenty tools and some of them have been directly implemented and tested personally. That selection is not meant to be exhaustive, but to give an overview of the most impactful tools that can be used to apply Placemaking. Then, with the aim of creating an organized toolbox, I divided them into the five steps of the Placemaking process that I already explained, and I made it clear what application scale best fits to each. The organized Placemaking Toolbox provides a wide selection of

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potential tools to collect data, analyze the users experience, define goals, collect proposals, define priorities, etc. for the co-design and the co-creation of great places.

Tools are thought to be helpful in the application of Placemaking with particular attention to put the actors involved at the center of the project from the very beginning, offering practical and tactical advice on topics like partnership, community engagement, and evaluation. This resource can be utilized flexibly, to fit the team's needs, and is meant to serve as a guide for anyone interested in starting a creative placemaking programme.

3. FINDINGS: A PLACEMAKING FRAMEWORK FOR A SYSTEMIC CHANGE

Placemaking is not a brand-new approach, it is already implemented in many parts of the world (in different contexts and with different peculiarities), but in most cases, it is not perceived as something that could be systemic and applied for a long-term change both between citizens and public administrators. To facilitate the implementation of Placemaking for a systemic change, for its dissemination, and to embed it into urban planning, I thought of creating a meta-design that combines the steps of the Placemaking process, the three urban design scales, and the selection of tools. The idea behind this “meta-design” is to create a set of rules able to give designers and facilitators a wider degree of interpretation. This output could be understood as a conceptual toolkit [15] made of a set of concepts, ideas, ways of thinking, intellectual notions, and instruments to make understanding, exploring, and acting upon a problem easier. Its aim is to generate a form of mental agility in thinking through city issues, to look at problems in a rounded way, from a multiple perspective and holistically. So, the Placemaking framework could be seen as a set of techniques and box of tricks. There is a metaphor that came into my mind when thinking about the frame of reference, is that one about the recipes, the ingredients, and the action of cooking. I can know all the best ingredients of the world, but if I miss the basic rules to create a tasty and healthy plate, I will not obtain a great plate! The same with Placemaking, I can know the best tools, but if I do not know how to start a Placemaking project and which tool best fits in each step of the process, I will struggle with the project management and community engagement. There is the need to know the approach, know the tools, know the steps of the process, their characteristics and have some guidelines to rule the project management before approaching it. Following the metaphor, I think that the Placemaking Framework represents the basic rules for good combinations so that everyone can create its own recipes.

The specific goals of the framework are manifold:

1. **SUPPORT THE SUBJECTS** that make city transformations with a frame of reference for those who are not familiar with Placemaking approach considering different scale of design and explaining the step of the Placemaking process, together with a collection of organised tools.
2. **INTERPRET THE PLACEMAKING APPROACH** to understand its common thread with the definition of criteria and the collections of tools divided into design scales and steps of the process.
3. **GIVE A DIRECTION TO URBAN TRANSFORMATIONS**, to create human-centered places that can achieve the self-fulfilment needs of people in addition to the basic needs.
4. **SHARE IDEAS** on how to engage citizens showing a variety of workshops and co-design activities that can be organised to let people participate and have a say in urban transformations.

The Placemaking Framework has a shape of a matrix in which the entries are the steps of the Placemaking process (in columns) and the application scales (in rows). In the intersection between rows and columns I can find the selected tools per each phase and each design scale. Some tools can be applied to many scales of design, and they are repeated in more cells. The only case of the first column has only three tools that are helpful for every design scale. Since it is a matrix, it is possible to query the framework in many ways, so, for example, if I had to create a whole Placemaking process

for a project that concerns an entire neighborhood, I can choose among the tools of the relative row of that design scale. In this case I can also have a look at the tools of other design scales to check if there are specific issues to assess or activities to make at a different level to guarantee consistency in the overall project. If I only need to find the tools for one specific step, I select the column and the scale of interest, and at their intersection I find the tools to choose from. The tools included in each sector are options with different shades, so it is possible to choose the one which best suits a particular situation. Although it would be better to consider and apply a complete Placemaking Process, it is possible to adopt the Framework also in case of a singular activity or including only some of the steps. This flexibility is part of the idea of the framework, and it is considered a way to start a new approach gradually.

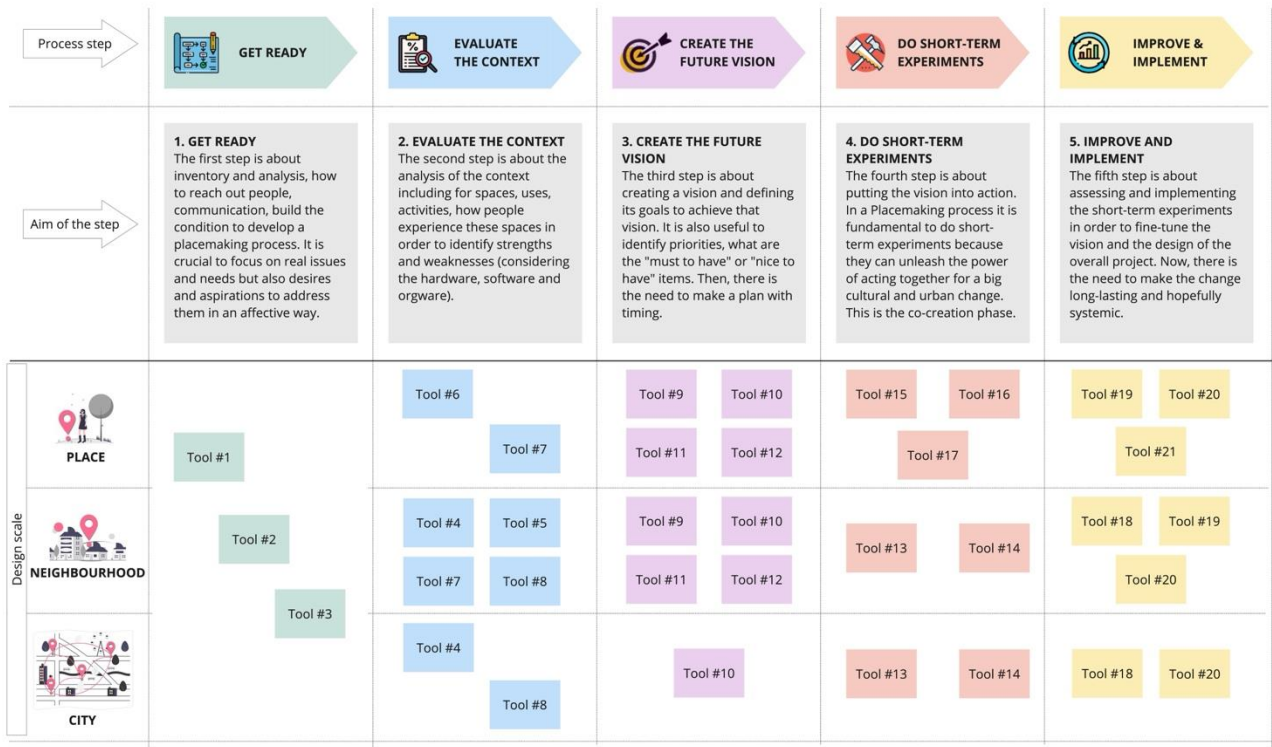


Figure 3. The Placemaking Framework created by the author.

5. CONCLUSION

To unlock the potential of Placemaking I think that there is the need to support a systemic change for its application to a broader perspective. This means defining a strategy to implement it into planning, considering the contexts in which that approach is not familiar and well consolidated. I think that the Placemaking approach can combine the widespread bottom-up initiatives with the usual top-down approach of public administrations through a more effective cooperation and dialogue between public and private. To achieve this, it is not only a matter of knowing the approach, or knowing its tools, but it also a matter of understanding its process and its perspective, so for this kind of change, having a frame of reference could be very helpful.

Thus, I thought to create a meta-design which can be perfectly accompanied by current urban plans and urban designs to start changing the perspective on them. To make this change there is the need to interpret current city challenges, reorganise the usual workflow, and adapt the usual process with an innovative approach. So, I felt the need to define a frame of reference with criteria, rules, and tools to be referred in applying the Placemaking approach. This work has been done with the aim to make Placemaking systemic and easier to adopt for designers, facilitators, public administrators, and all those who contribute to reshape and activate public spaces with the community; this has been done thinking mostly about the Italian context. Since the framework is plenty of co-design tools, it represents a way to enhance citizens engagement for the analyses, design, and improvement of urban spaces. I found very useful to create this frame of reference because to me it has been a way to make order to the myriad of tools and methods that I investigated during my PhD research and my experience with the Placemaking Europe team. Also, from many interviews with experts I had the suggestion to create a frame of reference, to have a guideline to be shared.

Moreover, I had the opportunity to apply and test the framework in the initial phases of the Plan for the Elimination of Architectural Barriers (PEBA) for the city of Mantua. During that project, I realized that is a very flexible frame of reference that can adapt itself to many different cases. Even if a designer does not start a Placemaking process for its own sake, it is possible to re-interpret current planning tools through the lens of Placemaking, re-arranging the step of the process to the phases of the urban plan.

To conclude, through Placemaking and the “Placemaking Framework”, this study wants to propose an urban development model that can easily combine bottom-up and top-down initiatives creating a collaborative process that is socially and culturally inclusive, foster resilience, flexibility, and proximity.

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Commerce and public space: questioning roles, meanings, risks, and potentialities.

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Extended abstract

The paper proposes a reflection on the nature of public space in urban centers, starting from its relationship with commercial activities.

In its various articulations, commerce has always functioned as an attracting pole. It has been capable of orienting flows and routes, providing visual "protection". It has also been able to connote significantly the public space facing it, if not, in some cases, occupying it, through forms of privatization. The relationship between commerce and public space, particularly neighborhood commerce and public space of proximity can be a formidable key to ensuring quality and urban vitality. Market dynamics and the often supra-local rules and laws are decisive in orienting the commercial offer. Nonetheless, a reciprocal and positive relationship between public space and commerce can occur, provided several aspects are considered.

Among others:

- the presence and observance of adequate regulations concerning the occupation of public land (to ensure sufficient levels of publicness, walkability, and urban quality);
- the take-over and care actions done by economic actors that do not result in exclusionary operations but, on the contrary, in fruitful cooperation with local actors (from sponsorships for management to forms of direct involvement);
- the need for stringent dialogue between various urban actors and trade associations (to consolidate a culture capable of recognizing the territorial and not just the economic role);
- in more general terms, the need to consolidate a culture of public space, acknowledging its role as central to urban quality in its most entire forms of 'publicness'.

The author has had the possibility to collaborate with the project *Cities*, a program of Confcommercio (the Italian General Confederation of Enterprises, Professional Activities and Self-Employed Work) aimed at reflecting – from the point of view of the economic actors - upon the city as a 'laboratory of change', building knowledge to improve urban centers and support neighborhood economies. Starting from the analysis of several cases in Milan and other Italian cities in which economic actors played a role in the transformation of 'innovative public spaces', observed within the *Cities* program, the paper critically discusses the potentialities and criticalities of the relationship between commercial activities and public space, returning some elements that emerged from the dialogue between different subjects.

Keywords: *public space; commerce; publicness; management; Milano*

Piazzale della Lana in Feltre, Italy. Urban regeneration projects

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Abstract

The paper concerns a relevant area, named Piazzale della Lana, close to the historic city of Feltre. This is an area located in a strategic site of the city that has suffered transformations over time, not coherent today with the morphology of the place. Piazzale della Lana is on the edge of the historic city in a peripheral position with respect to the ancient core. It allows a crucial connection between the residential fabric of the ancient and contemporary city, having preserved a significant symbolic value for the residents over the years despite the state of abandoned condition in which it lies following its gradual disuse over time.

An essential premise of the urban regeneration project is the idea that the historic centre is a place of stratifications and meanings. The project is the result of a dialogue with historical pre-existences. This means giving new civic life to a building or part of a city not only through new functions and volumes, but above all by reinventing the form in order to generate new value to architecture and contexts, in a balance between memory and invention. This is why the heritage of history becomes relevant, recognising in the forms of architecture of the past our memory or identity.

The authors of this article are deeply convinced that the public quality of life in the city is connected with the formal choices made by the project plan. They think that it is possible to trace a close relationship of identification between the community and the architectural forms that create a sense of belonging in those places. One of the identifying forms of the city is certainly provided by the piazza, the place par excellence throughout history in which the community recognises itself.

The paper includes the results of students' workshops developed in the framework of the course on "Architecture of the city" taught on the master's degree in Architectural Engineering at the Department of Civil, Environmental and Architectural Engineering of the University of Padua, academic years 2022-23. The working method is based on the belief that the study of urban morphology and the history of the city are basic to face a design theme. The history is considered as an indispensable tool to know the deep reasons of the urban structure which is the memory and the image of the community. The methodology contemplates the urban form as a result of its spatial structure. Progressing from the study of how the area has evolved through time, students defined new proposals for the area that involved testing new building types.

Keywords: heritage; urban public space; identity; memory; urban regeneration

1. INTRODUCTION

The Piazzale della Lana area is part of the urban context of Feltre, a town located at an altitude of 325 metres above sea level, at the foot of Monte Tomatico and west of the river Piave. It is located outside the walls of the historical centre at the point where the Renaissance Porta Imperiale (Imperial Gate) is. (Figures 1, 2). To the south it is bordered by Viale Monte Grappa, one of the main roads around the town. Its proximity to the historical centre makes it of considerable interest. In fact, the area, despite being close to the historical part of the town, is easily accessible by cars.



Figures 1, 2. Domenico Falce, view of the town of Feltre in the 17th century showing the area of the present-day Piazzale della Lana. View of Porta Imperiale (Imperial Gate), current state.

From an analysis of the plan of the Napoleonic Cadastre of the early 19th century (Figure 3) and other historical maps, it can be deduced that the Piazzale della Lana has always basically been a crossing point, which was gradually built up over time. It was a green area, probably dedicated to local cultivation. The volume that hosted the school activity until a few years ago had already been built, behind which a section of the Molini irrigation ditch ran and powered craft activities such as dyeing, wool processing and grain milling. The study area owes its name, indeed, to the processing of wool, and today, with its extension of almost 4,000 square metres, it is almost entirely used as a car park, which is largely exploited due to its proximity to the city centre (Figure 4). The area is entirely carriageable, even if minor, various and disconnected activities take place there. It is accessed from the north via a narrow subway through the built front opposite the walls, opposite the Imperial Gate. It is bordered to the north by the façades of three and four storey buildings, predominantly residential, uneven in design and dating from around the 1980s.



Figures 3, 4. Plan of the Napoleonic Cadastre (early 19th century). Current state planivolumetry representation (drawing by Francesca Madormo e Angela Polo).



Figures 5, 6. General view of Feltre, current state. View of the main building bordering Piazzale della Lana to the west.



Figure 7. Piazzale della Lana, view from the south-east, current state. In the centre is the abandoned building with barrel-vaulted roof.

The construction of these buildings took place without any evaluation of the public space that would have resulted, and which is now, in fact, unresolved in plan and inconsistent in elevations. These buildings lack elements of mutual correspondence in their façades and characters of dialogue with the elevations of volumes constructed in earlier times.

The monumental former Dal Piazz school building closes the Piazzale della Lana to the south-west. It had previously housed a wool-processing factory. The school has long since moved to more modern accommodation, leaving the complex in a state of abandonment, without a use and in an increasingly degraded condition. A preservation order protects this architecture of historical value protects and austere appearance, characterized by a symmetrical layout albeit unbalanced by the addition of a wing at the east end.

A building with rectangular plan and barrel-vaulted roof stands in the middle of the forecourt. Three of the façades, devoid of the plaster cladding, show the reinforced concrete frame and terracotta infill, while the main façade, set at right angles to the former school, is plastered and designed according to a monumental theme. In this case, only this façade has to be conserved in the design proposals for the redevelopment of the square. The façade and the former Dal Piazz school building are protected by the law as they identify the place and have characterised it for more than seventy years. Their demolition would change the memory that has characterised the place for centuries.

2. METHODOLOGY

The project proposals presented in this contribution deal with the theme of critical reconstruction of the historic city. This theme is part of the cultural debate at an international scale that began in the 1960s-1970s to respond to questions raised on urban form and to identify ways of constructing the contemporary city [1].

The experiences developed in the workshop of the Architecture of the City course provided an opportunity to pose the question and attempt to answer it: what idea of the city can we rethink today? Corresponding to this question is an idea of architecture that considers the project as the direct consequence of a conscious and critical relationship between new and old, understanding the word rethinking as the art of rethink the characteristics of the historic city.

Intervening within the historic city through a process of urban regeneration implies dealing with the values that these areas have sedimented over time and therefore a good practice of regeneration should not disregard the recovery of the old in continuity with the formal characters of the historic city [2]. This perspective brings the theme of redevelopment and urban regeneration closer to the term reconstruction, perhaps the most appropriate term for intercepting a criterion of work within the existing city. A word that does not exclude the terms regeneration and redevelopment, which, however, seem insufficient to meet the expectations of form of architecture whose aim seems to be, precisely, to give form to the places of human life: “Analysing urban architecture, one can attempt to classify the city according to many categories of judgement: economic, social, historical, technological, physical. Favouring only one of these perspectives leads to a partial result, necessarily limited by the borders of the chosen field of reference. Therefore, it may be important to try to overturn the now abused criterion that considers urban facts as an essentially economic or technological product, and instead place the accent on an aspect that has so far been rather neglected: the formal aspect” [3]. Facing the open challenges that await us and concern the preservation and care of the city's architecture, the projects presented here propose urban places capable of enhancing the quality of space and relations between the forms of the city, old and new, according to the principle of historical continuity. They resort to the typological and morphological repertoire of the place, recognising in the square, the courtyard, the street, the artefacts and the parts of which the monuments and forms of the city are made the tools to be applied to urban design, going beyond the reductive schemes of functionalism and the anti-urban ideologies of the modern. The reflection on the critical transformation of the historical city started from the reading of the ways of constructing space, the place of representation of the values in which the community self-identifies. According to Uwe Schröder, a careful and thoughtful analysis of the spatial conception of buildings and the city “can foster not only reflections on the form of places, but approaches capable of resolving some of today's social issues” [4]. The theory of spaces developed by the German theoretical architect is not just a tool for analysis, but for design too. Urban regeneration plans can become a valid tool for defining urban form when they consider architecture as a tool that deals with the construction of the quality of space, its role as a discipline that arranges volumes in space, designing relationships between physical forms. A good urban design cannot ignore the problem of the quality of urban spaces. It is the shapes of urban spaces, the spaces of squares and streets, that underpin the idea of the city [5]. As Carlo Moccia has well put it, referring to Uwe Schroder's studies on spatial relations, “urban form is investigated in its spatial value, measuring the degree of internality or externality that connotes the spaces of the city and recognising the relationships of concatenation between spaces of different character and hierarchy that organically make up the space of the city” [6].

3. DIDACTIC EXPERIENCE

We will now present some project proposals elaborated by the students of the fourth year of the Architecture of the city course at the Department of Civil, Environmental and Architectural Engineering of the University of Padua, under the guidance of the author of this contribution. Students worked in pairs with the aim of creating proposals for the generation of new spaces in which the Feltre community could recognise itself. Projects originate from the idea of defining a place of new sociality.



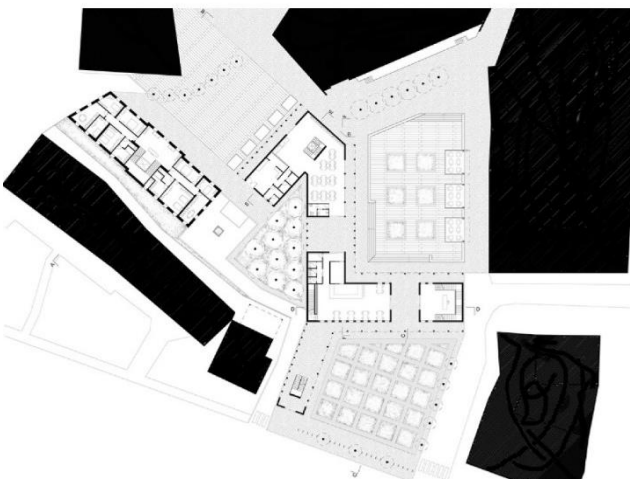
Figures 8, 9, 10. Federico Diddoro, Alessia Ferron, redevelopment project of the area named Piazzale della Lana in the city of Feltre. Project planivolumetric representation, general ground floor plan and view.

This condition is achieved through a process of articulation of the form designed for parts, process that actively participate in the reorganisation of the urban spaces for the community. Project proposals eschew the idea of asserting a strong centrality through a monolithic building, affirming instead the intention of a decisive openness with spaces related to the surrounding urban context: “A work of architecture cannot exist as an isolated object, as a reality in its own right, as a self-referential expression; on the contrary, it finds its reason for being in the close confrontation with the context, in the dialogue with the complexity of the surrounding space” [7].

The following three projects developed by the students Francesca Madormo, Angela Polo, Lorenzo Grego, Giovanna Maracci, Reyes González Maese and Esther Rodríguez Álvarez-Ossorio, should be read in this sense: recovering a formal continuity with the historic city, with its compact volumetric nature and simple geometric forms, and re-establishing new and significant relationships to inhabit the places of one's own time. The complexity of functions encourages an articulation of spaces within the area. This acquires the character of a small city within a city, conceived as a narrative composition of volumes and spaces, paths and courtyards. The urban project is disassembled into autonomous bodies architecturally characterised by form and materials, each corresponding to a specific function of the programme, held together by a network of internal and external walkways composing an articulated and richly evocative urban landscape. Composition by parts is adopted as an attitude to construct an urban place where each part interprets and evokes a repertoire of architectural arrangements already given by the formal experience of the historic city. The use of established

architectural spaces, passages, arcades, courtyards, loggias, halls would like to bind the project to the city and make familiar a civic place where everyone can recognize themselves in the clarity of architectural forms.

The project by students Federico Diddoro e Alessia Ferron plans to give the area a commercial and residential vocation by enhancing spaces for collective life and focusing on urban green (Figures 8, 9, 10). Fundamental is the focus on the area's relationship with its surroundings by favouring new paths and walkways. The area is spatially organized considering that the building next to the former Giorgio Dal Piazz school maintains the main facade which is subject to protection by the municipal administration, while seeing the rest of its consistency demolished. The general organisation of urban spaces and the arrangement of volumes derive from the application of settlement principles typical of historic city construction. Starting from the pre-existing building works that are confirmed, the one that used to be the Dal Piazz school and the façade of the building next to it, the new project volumes have been arranged to define three urban spaces.

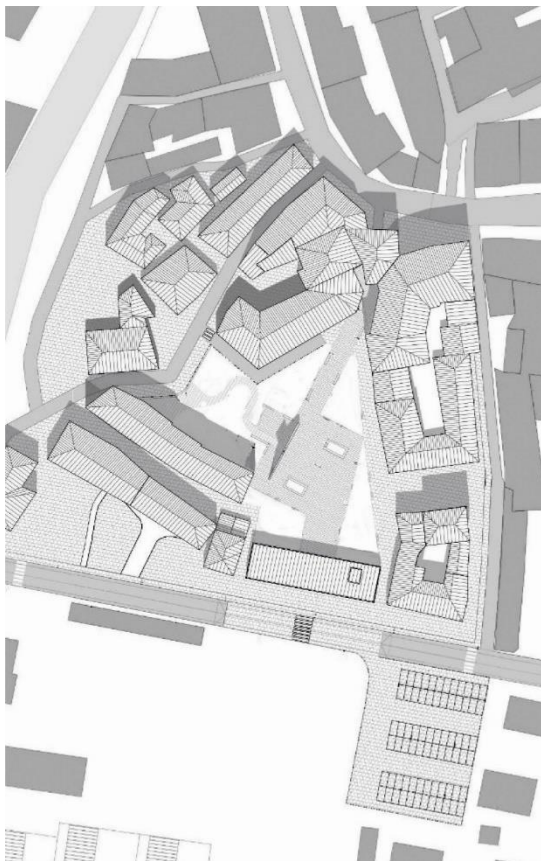


Figures 11, 12, 13, 14, 15. Lorenzo Grego, Giovanna Maracci, redevelopment project of the area named Piazzale della Lana in the city of Feltre. Project planivolumetric representation, general ground floor plan and views of the new three squares.

The first, to the south in relation to the road, represents the new entrance to the city with its own formal recognisability. The second in succession, an urban square equipped with greenery, is imagined to restore value to the existing and new commercial spaces that overlook it. The third is the urban space on which the former Giorgio Dal Piaz school stands: it receives new meaning and role from the central position it occupies.

According to the idea of students Lorenzo Grego and Giovanna Maracci the project area becomes the ideal place for the beginning of a path and narration of spaces leading inside the walls of the historic centre (Figures 11, 12, 13, 14, 15). a sort of gateway from which to enter the ancient city by passing through Porta Imperiale and follow the main road inside the walls until reaching Piazza Maggiore, the culmination of the route. Starting from this premise, since the area is a kind of gateway to the city, it was assumed that three connected urban squares would be built as transition phases towards the historic city. The first square, the beginning of the route up to the city, is located to the south, opening on one side to Viale Monte Grappa. It welcomes pedestrians arriving at the area. The second square, which is reached by crossing an urban gallery, is the main project square around which the pre-existing urban buildings and the new project buildings are located. It is enriched with urban furniture to encourage social interaction. The third square is located in front of the former Giorgio dal Piaz school. On the square, this historic building reacquires importance and takes on new value.

The historic building, the former Dal Piaz school, is re-functionalised by transforming the interior with accommodation and spaces for a student residence, knowing that Feltre is a university citadel, hosting a nursing degree. The external image is maintained as required by the historical protection.



Figures 16, 17, 18. Reyes González Maese, Esther Rodríguez Álvarez-Ossorio, redevelopment project of the area named Piazzale della Lana in the city of Feltre. Project planivolumetric representation, general ground floor plan and views of the new public spaces.

The newly constructed building that limits the square on which the student residence stands, with its double-height portico, is designed as a canteen for students.

The third project proposal, developed by Reyes González Maese and Esther Rodríguez Álvarez-Ossorio, Spanish Erasmus students, is organized in the below summarized points (Figures 16, 17, 18). First of all, it is planned to move the parking spaces to an equivalent surface area on the opposite side of Viale Monte Grappa, with a raised pedestrian crossing that facilitates the connection and reduces vehicle speed. The proposal also includes the pedestrianisation of the entire study area to prioritise pedestrians in a safe and comfortable place. New paving will communicate cohesion with the surroundings. The façade of the barrel-vaulted building, which is protected for its historical-artistic value, will become a junction point between the ancient residential area and the more recently built fabric that develops around. The new square was also closed off to the south with a building along Viale Monte Grappa, giving independence from heavy car traffic. Regarding the former Dal Piaz school, spaces dedicated to various cultural activities and for all ages were planned.

4. CONCLUSION

The project activity highlighted the complexity of the question posed at the beginning, i.e. what idea of a city can we rethink, making us aware that one cannot exclude from design thinking the deep relationship with the heritage inherited from tradition, that the characteristics of the historic city and the morphological identity of the place constitute the lifeblood of the project. The idea of the compact city in its many different forms still seems to be a safe way and a valid operational tool for intervening in the historic city and resolving in the form of its spaces, buildings and monuments the relationship between architecture and citizens. In this perspective, the reconstruction project would have to deal more with the form, spaces, relationships, limits, hierarchies and sequences that define the character of the city. Aim that meet the aesthetic expectations of architecture, the memory of places and the identity in which a community recognises itself.

The beginning of an urban reconstruction process involving the degraded sites under consideration has highlighted two important issues. The first is that the historic city represents the reference for a critical judgement on the project. We must recognise the beauty of the pre-industrial city, of the city of stone whose formal results, the outcome of a millenary design culture, still seem to be the salvific antidote to the production of often insubstantial architecture. In the time of liquid architecture, in the era of globalisation, we can respond to the condition of crisis that pertains to us by taking a radical position against the prevailing conformism by deepening the sense of ancient thought that is a constant in our Italian and even European tradition: “If we want to raise the question of the identity of European architecture, we must first of all look back to our own origins and the evolution of our own civilisation. One must also, and above all, get rid of the precariousness of ideologies and recover confidence in the centuries-old heritage of knowledge and experience. Legitimate fears should not stem from a feeling of being outdated or obsolete, but from a lack of self-confidence, lack of knowledge and poor understanding of the cultural development that has accompanied us for millennia. Fears represent the real loss of identity of European architecture. The real danger lies in the commercialisation of values, the banalisation of concepts, the demythologisation of ideas and thoughts” [8]. The second decisive theme for the urban reconstruction of derelict areas is to think of the city and the project as a spatial phenomenon where the quality of places depends on the order in which physical objects are arranged in space. For this reason, it would be appropriate to consider the reconstruction of degraded areas in the logic of a development of spatial sequences that relate to others that already exist, enhancing important urban architectural themes.

The ancients still concern us [9]. They are a powerful resource for understanding our identity and not denying our memory.

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Growing resilience roots for proximity public spaces.

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Extended abstract

Contemporary cities are facing increasing challenges due to their fast evolution and need more efficient urban planning and development, potentially reducing costs and improving the quality of life for residents. Anthropogenic pressure in the consolidated city, concurrently with climate change, poses the need to find solutions that ensure the citizen's constant urban and social well-being in the enjoyment of public spaces. It is internationally recognized, nowadays, that intervening in the "greening" of cities provides short and long-term benefits in addressing climate change and contributing to human health [1]. Green Infrastructure like nature-based solutions fulfill a multi-scalar and multi-sectoral role and must be planned to ensure its production of ecosystem services starting from the local level which is the one most experienced by the inhabitants.

Central is the role of marginal areas, creeping between buildings or randomly carved out between lots, interstices between one dwelling and another, residual spaces that can become points of regeneration/mitigation and for preserving adequate levels of quality of life. These small areas in highly anthropized contexts represent a resource, despite the fact that to date they appear as non-places, spaces waiting for intervention to be in balance with their surroundings and to become possible poles of ecological and social reconnection thus providing space for nature-based solutions. The environmental and social benefits that nature in the urban environment can bestow depends of their proximity for easy access and use by a greater set of city-inhabitants [2]. Benefits include daily nature encounters, noise reduction, absorption of pollutants in water and air and also those related to identity and social interactions.

In this framework, identifying opportunities for enhancing public spaces and underused areas can play a vital role in fostering social inclusion and community engagement, helping the public sector create more cohesive communities under a climate change perspective.

Vegetation becomes, in this way, the leading element in the design of public space, giving places a new green identity, a work of "green mending": around the world initiatives are trying to occupy growing urban spaces by greening them with gardens, trees, flowers, trying to recover spaces that the gray of concrete had irreversibly invaded" [3]. Actions that promote nature-based solutions at a local scale represent small reactivation devices to trigger territorial transformations in urban voids of a city that is always over-cemented in which vegetation can rebalance in the relationship between the built and the natural environment by helping to deal with extreme climatic situations.

The contribution aims to bring forth a shared reflection on how territorial public bodies can benefit from the insights and recommendations proposed for a green and flexible use of proximity public spaces and interstitial areas within urban contexts.

Keywords: *proximity public spaces; ecosystem services; green mending; climate adaptation and mitigation; urban regeneration*

1. Climate change and cities

Climate change affects cities in numerous ways, spanning from environmental impacts to socioeconomic repercussions. Climate change adaptation strategies have a strong urban dimension, and cities have a major role to play in their implementation. It is nowadays widely recognized that

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adaptation strategies are needed at local, regional, national, European and international levels to anticipate the negative effects of climate change and to prevent or reduce damage.

The need to act on climate change and biodiversity loss is recognized throughout Europe and around the world. In order to make progress in combating and adapting to climate change and to stop biodiversity loss and ecosystem degradation, it is necessary to fully integrate these issues into plans, programs and projects implemented in cities.

From an institutional view an emblematic approach has been set by the EU's Climate Change Adaptation Strategy, adopted by the European Commission in 2021 that proposes measures to develop awareness of adaptation in order to collect more and better data on climate-related risks and losses. The EU's Climate Change Adaptation Strategy [4] links directly to recent global agreements, such as the Paris Agreement, the Sendai Framework for Disaster Risk Reduction and the Sustainable Development Agenda as well as the EU implementation of these goals. It also connects directly to major EU initiatives like the Mission for a Climate resilient Europe and the Union's sustainable finance agenda.

The Strategy sets out how to adapt to the unavoidable impacts of climate change and become climate resilient by 2050. The Strategy has four principles objectives: to make adaptation smarter, swifter and more systemic, and to step up international action on adaptation to climate change. The Strategy is therefore in line also with the UN cross-stakeholder initiative of Making Cities Resilient 2030 for improving local resilience and the global network of mayors C40 of the world's leading cities that are united in action to confront the climate crisis.

Gencer et al. [5] clearly stated that the urban environment is stressed by often exacerbated effects of climate-related disasters. Furthermore "the frequency and severity of weather and climate-related disasters in urban areas are projected to increase in the coming decades".

The exacerbated impacts of climate disasters are caused by the human intervention in a direct or indirect way posed by air and water pollution, overuse of water, removal of natural elements and unplanned urbanization which perform as human-induced stresses. In the last decades the built environment has suffered more intense and frequent heat waves [6], as well as different types of flooding [7]. Those phenomena are significantly damaging the urban context and posing human lives at risk.

The intensity of the effects of this deterioration depends on the vulnerability of cities to climate-related disasters. Vulnerability is influenced by cultural, demographic, and economic characteristics of urban residents, city governments, built environment, ecosystem services, and over-exploitation of resources and environmental degradation [5].

The Climate Change 2023 Synthesis Report summarises the state of knowledge of climate change. The report recognizes the interdependence of climate, ecosystems and biodiversity, and human societies [8]. Global warming is demonstrated to have been caused by human activities, principally through emissions of greenhouse gases.

Observed widespread and substantial impacts and related losses and damages attributed to climate change related to cities, settlements and infrastructure are especially causing inland flooding and associated damages, flood/storm induced damages in coastal areas, damages to infrastructure and damages to key economic sectors. Except for the last typology the confidence in attribution of the observed impact to climate change is high or very high confidence [8].

Moreover, more than half of the world population and the major part of the societies' assets and economic activities is located in urban areas [9]. According to Giordano [10] there is evidence that this coexistence of factors transform cities both in a contributor to climate change and victim because of the vulnerability to the related impacts [11,12]. The World Bank confirms that today over 50% of the population lives in urban areas and this number will increase to 6 billion By 2045 [9].

While problems caused by urban climate phenomena are a growing concern with urban population growth and aging infrastructure there is still an effort to be made to implement urban climate adaptation measures [13].

Addressing the impacts of global warming on cities requires coordinated efforts among several and diverse actors at the local, national, and global levels to mitigate greenhouse gas emissions, adapt to changing conditions, and build resilience in urban communities. This includes measures such as implementing sustainable urban planning and design strategies, enhancing green infrastructure, improving disaster preparedness and response mechanisms, and promoting community engagement and capacity building. The urgency of those measures are claimed by the results of Lenzholzer et al. inquiries [13] that showed that there is a overall ignorance on how urban design influences the climatic characteristics in cities; even if new awareness-raising phenomena are moving, starting from the overwhelming awareness of the young generations in the wake of the Greta Thunberg's movement, much still needs to be done in increasing awareness.

A paradigm shift will require urban decision-makers and stakeholders to increase the institutional capacity of many communities to apply adaptation measures.

As stated by Raven et al. [14] "Urban planning and urban design have a critical role to play in the global response to climate change" and nature must find the place it deserves in the urban environment. Green Infrastructure are a main tool at the disposal of urban planners to provide ecosystem services that can be directly perceived by the inhabitants. The multi-sectoral role of those planned interventions generates biodiversity and provide services that increase the resilience to the effects of climate change following the path posed by Pope Francis' encyclical "Laudato si" [15]. for which everything is connected and we must take care of our common home.

Thanks to the Climate Change 2023 Synthesis Report the close linkages between climate change adaptation, mitigation, ecosystem health, human well-being and sustainable development are shared [8]. Grafakos et al. [16] clarify that a holistic analysis and a proactive planning offer solutions both to mitigation and adaptation policies across multiple sectors and levels of governance. Integrated city climate action plans should include a variety of actions and concrete measures for assessing progress. A synergic approach is able to implement short-, medium-, and longterm goals improving cost-effectiveness of the interventions such as urban greening and green infrastructure practices which take place in the public space. Many authors confirm that urban greening is highly relevant thanks to the capacity to absorb and store water, the capacity to contribute to the cooling of the surrounding areas (less effective but still present) and to the biodiversity enhancement [16].

For example, functional green areas can regulate rainwater flow thus reducing the risk of flooding. Ecosystems and their services can be used with success as a cost-effective alternative to building infrastructure, for example, to manage flood risks. Green areas and vegetation also provide cooling within cities and thus reduce the impact of heat waves and the effect of heat, and plants stabilize the soil, thus reducing the risk of landslides and erosion. This is directly related to the European Adaptation Knowledge Platform called ClimateADAPT, developed by the EEA. It highlights adaptation priorities at the local level, natural solutions aimed at adjustment and the integration of adjustment issues into macro-fiscal policy.

The urban climate context, which can be theoretically articulated in the 3 key elements of temperature, precipitation, and winds, plays an evident role in providing well-being within cities and related exacerbated conditions lead to higher risks to the more vulnerable parts of the society (children, elderly and people with disabilities or pre-existing medical conditions) [17].

The exposure to green space is in fact a critical element in linking urban green space and urban residents' health [18].

The revitalization of urban green areas complete the efforts to provide strategic planning through the concept of "build back better" thus maintaining biodiversity into cities. Supporting biodiversity provides clear carbon benefits by enhancing the natural environment's ability to absorb and store

carbon across soil and plants. Healthy natural habitats such as soil, wetlands and forests can absorb significant amounts of carbon. Damage to the biodiversity or physical environment of these areas can release this stored carbon, even indirectly, thus contributing to climate change and biodiversity loss.

2. The project of public space in the historic and consolidated city

During the recent pandemic there has been a rediscovery of the value of public spaces as a key element in ensuring a good quality of urban life: outdoor areas in which to reorganize activities that used to take place predominantly indoors, such as study or book presentations, theater workshops. In this context, the redevelopment of degraded urban spaces offers a unique opportunity to create vibrant and vital new urban places within walking distance of one's home in a city that is always too dense. High urban pressure presupposes intervening on the existing by developing an adequate knowledge of the available resources, the characteristics of the area, the memory of places and what they represent, in order to establish a stable relationship between old and new. A transformation that must not disrupt material and immaterial values as well as environmental balances but and at the same time must be able to accommodate new functions in relation to new needs [19].

It is a development of the city understood not as an extension of buildable areas but as a study and use of the existing urban structure, to intervene on a compact plot by soliciting a new urbanity as well as a new vision of public space at different scales from neighborhood to neighborhood to municipal. The morphological and functional criteria of open space in this case verge toward the negative of the fabric of the city, understood as a generating element of urban transformations to build both meeting places and to blur the boundaries between public and private, between built and unbuilt, between the realities of work and that of leisure. A reconfiguration of the city in which public space remains a place of excellence for social, cultural, material and immaterial exchange, "*restoring to it the primitive and noble flavor of a sphere addressed to collective practice, an ideological model of lifestyles, a recognized narrative form of evolution and growth of the city*" [20].

The role of the spatial composition of the city, which cannot have a rigid definition as society, especially after the pandemic experience, moves toward a much more fluid enjoyment of open space, seems evident. Thus, "*accidental*" and unconfigured places are taken into account and become the object of attention for open space design [21].

On the other hand, in the historic city, where the urban characteristics are well defined, the endowment of public spaces and gathering places today turns out to give ineffective answers to the high demand for the places of being, of the search for neighborhood areas where it is possible to find a state of environmental well-being and moments of sociability. However, people's lifestyles must be taken into consideration so that we do not end up with projects without identity in which the citizen does not recognize a sense of appearance, since they are either too much at odds with the context or not very permeable and accessible.

The lack of gathering places thus leads to realizing public life in informal but proximate spaces to which new functions can be attributed by reinterpreting them as opportunities.

This vision in the design of public space leads urban planning to constantly confront the existing, material and non-material cultural heritage, of which the citizen is the sole user. If we take into consideration urban areas in the historic city there is a radical change of gathering spaces, in relation to different lifestyles and different users that include not only local inhabitants, but workers and commuting students, tourists this leads to a diversification of the ways in which places are used, which overlap with each other sometimes in a contradictory way. The strong tourist pressure in large European cities, especially in capital cities, has led to an aggression of the main gathering places representative of historicity such as squares and even markets, where streams of visitors meet leading the citizen to seek meeting spaces in secondary but more intimate areas that still give the sense of authenticity.

Hence the search for places albeit informal but identity in a city with a well-defined fabric, leads to intervention in urban voids considered possible containers of activities and functions.

Intrinsic in the creation of areas for neighborhood sociality is the concept of proximity, thus a search for areas on which to intervene at the boundaries of housing; it is therefore the interstices, the places of urban waste that play a central role in the design of the public space of proximity.

In this perspective there is a revision of the built environment, to intervene on the undefined, on the spaces of waste, on those places that can become small neighborhood green polarities and give the sense of "breathing space" in a city now defined and still too little inclusive.

2.1 Designing between : the urban voids

The city understood as part of an evolutionary process, in which the transformation of places is linked to the succession of temporal and cultural aspects, which have led to the creation of densely built-up areas in which, nevertheless, small spaces of proximity defined by sometimes imprecise geometries have developed spontaneously, unintentional places, not determined by urban design but which can have fundamental ecological and social functions in highly cemented contexts.

The voids that have suddenly come to form between the dense and compact fabrics form inner suburbs, sometimes incurring where the contrast is marked by the occupation by tertiary activities of vast residential areas, and the location of social services and facilities far from the users [22].

Secchi speaks of a sometimes incurrent city where the "undefined," the spatial imprecision, identifies a particular condition of places and proposes a regeneration strategy to make potential that in-between space, formed by the layering of multiple identities [23].

Identity in an intervention of a "space between" is a factor that should not be overlooked; a place always has an intrinsic meaning, which comes from people's use and perception of it, and not always according to a negative meaning, since an unexpected urban landscape can result from a discarded place. In acting on voids, one is therefore also acting on giving new meanings to spaces that for better or worse have taken on an identity; if one thinks, moreover, that the concept of discard coincides with that of remnant, of what remains, of what is possible, its negative meaning is diminished since it opens the door to new perspectives.

We are in a historical period in which waste becomes the primary material for a recycling project, the trend today is to act on places exposed to degradation by rediscovering forgotten spaces in everyday life.

Acting leads toward the fragments of vacant land that parcel out the city " *opportunities in which the urban project rediscovers its effectiveness in the transformation of the contemporary city by operating predominantly at an intermediate scale, between the exterminated scale that detects the pulverized nature of settlements and the exaggeratedly reduced scale that dwells on the purely sensual aspect of individual buildings*" [24].

The design of the void does not stand as a simple spatial organization, but as an organizational structure of the open place highlighting the existing and directing future processes, as a narrative of different urban situations. There is an inversion in determining the form of space, of the full and empty relationship, in which it is the void a defines the full by penetrating and redeveloping it, to give a new form to the settlement [25].

In this perspective, new small polarities of proximity are created, which in a larger scale represent nodes in of a network of possible spaces, a work of green stitching of the existing is therefore carried out, micro-interventions that are part of the process of urban acupuncture agend or in nerve points in a local scale always referring to the territorial one.

2.2 The role of vegetation in the regeneration of proximity spaces

If the contemporary city is a fragmented space subdivided by many disconnected entities, building a network of small areas endowed with the right amount of vegetation means giving continuity not only ecological but especially social continuity.

It is a process of transforming an interstitial space in which we take note of existing ecological contaminations, Gilles Clément's spontaneous vegetated landscape, which autonomously reappropriates land taken from nature.



Figure 1. The Iris garden in Rome's historic Garbatella neighborhood was created by the community in a small space pertaining to the buildings

The hypothesis of a more naturalized anthropogenic habitat and its benefits on people's well-being is supported by various studies by Catharine Ward Thompson and finds confirmation in her research, in which she also condiscates the relationship between green space and proximity, which does not necessarily equate to the area located in close proximity to home, bensità proximity is the area that the inhabitant perceives as part of a neighborhood in which he or she moves easily: "*research in Scotland has shown that, for many people, regular use of green space is not limited to places within 300 m of home, and perceptions of the proximity and accessibility of green space can relate to what is perceived as part of the neighborhood or available for community use, rather than an objectively measured distance*" [26].

During the pandemic wave in spring 2020, there was a "biophilic attraction" , a sudden greening of private space, a rediscovery of nature and the concept of care, in this process is composed of elements of adaptation of outdoor space to sudden health and climate changes through the use of vegetation:

"there has been in private environments enhancement to the balconies and terraces -become new outdoor and green inhabited surface- in addition to the modification of interior arrangements, while in semi-public and collective ones, such as gardens and courtyards, the reappropriation of these (non)-places became new devices of social interaction and contact with the environment" [27]. Nature an engine both to reactivate social interaction and to make spaces adaptive to extreme uses or situations by creating comfort zones by applying in its resilience the concept of adaptation to public space design.



Figure 2. A variety of objects have been arranged that are reminiscent of the home environment according to the philosophy that the garden is an extension space of one's home

3. Conclusions

In briefly illustrating the trend of urban design, we wanted to dwell on the creation of neighborhood green spaces by considering the unused areas of the consolidated city, small interstitial neighborhood spaces that can become social occasions, new identities, born precisely from the layering of multiple events. In these spaces, it is interesting to bring out the interaction that is created between the state of abandonment, the reappropriation by a wild and spontaneous nature and the spontaneous interventions of citizens, even of artistic connotation, which generate places with multiple identities. From the environmental point of view, in addition to the extraordinary ability of plants to absorb air pollutants, particularly from urban traffic, green spaces contribute to lowering the heat island, rainwater runoff and purifying the soil component. We are witnessing periods of high heat stress and sudden weather changes in which vegetation is perhaps the only supporting material for public space

design, coadiuvante to counter climate change. While the ecological contribution of the plant element in increasing the of biodiversity in the urban environment has been evident for several years, during the pandemic the importance of nature in the city in promoting psycho-physical well-being and relieving the stress of an extreme event has become central in the interdisciplinary debate. Can not think today to design public spaces without the use of plant material, a protagonist in regeneration projects, especially of urban waste areas, nature is the key to redefining the places of relationships and community.

Listening to the population can lead to an understanding of the focal points of the urban fabric, in order to identify the areas where the greatest problems are concentrated and where in proves necessary to intervene with effective actions [28].

In this case, a Social Urbanism-oriented approach is adopted that is connoted by citizen participation in the process of change, with targeted interventions of redevelopment that we can define as light and fast: tactical urbanism.

In taking into consideration that the city is a dynamic place where flexible spaces must now be designed, Tactical Urbanism is based on the implementation of quick and low-cost actions to donate long-term social benefits in a very short time by creating new gathering spaces.

This approach has been successfully applied in dense, American and European cities composed of many unused spaces demonstrating how to act on the existing by giving a new identity to (non)places. In the "Asphalt Art Guide" compiled by Bloomberg Associates in 2019 there is an overview of the steps in the procedure for planning a tactical urbanism project , as well as advice for aspiring asphalt artists, there are also several successful examples of areas that with only the use of low-cost materials have become more welcoming and sustainable spaces. The guide compares different practices of redevelopment actions in various cities of the way bringing out the motivations behind the project such as reducing traffic, building neighborhood community, and enhancing cultural identity.

An approach acting on contained spaces makes social relations stronger as it is understood in the project carried out in Zaragoza by architects Patrizia Di Monte and Ignacio Gravalos who realized a low-cost project working on the temporary use of urban voids in the neighborhood of transforming these spaces areas the community as small gardens, play areas or for sports.

Overlooked interstitial areas, if consciously adapted, can improve the resilience and sustainability of contemporary cities. Citizen science and human-centric approaches where citizens are engaged in the sustainable renewal of public space are increasing [29,30] but remain exceptions. Citizens, though often forgotten, are the main users of such spaces [31], and must be part of the participated methodologies employed to make proximity public spaces resilient.

Authors' contribution

This paper is conceived as the result of a common effort by the authors. However, T.V. Di Giacomo wrote section 1 Climate change and cities and E. Paudice wrote section 2 The project of public space in the historic and consolidated city while the whole section 3 Conclusions was authored by both.

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When resilience meets creativity. Art and culture to face climate change in waterfront cities

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Abstract

Global communities are coping with the impacts of climate change in multiple ways. The spatial configuration of waterfront cities makes them vulnerable to extreme events and natural hazards, threatening infrastructures, lives, and livelihoods. Therefore, direct and indirect effects are anticipated in coastal communities, including both material and lived aspects of culture. On the other hand, according to the IPCC, the warming of the atmosphere and the oceans is due to anthropogenic changes, i.e. the way we live on earth and occupy space, the modes of production, consumption and lifestyles. These findings highlight the cultural dimensions of the causes of climate change and, at the same time, the cultural dimension of human responses. The case of the waterfront redevelopment of the Royal Seaport in Stockholm provides an insight into the intertwining themes of sustainability, adaptation, and the critical role of culture. A new neighbourhood, the flagship project of Stockholm's urban development strategy, is currently being developed in the port area, taking advantage of partially decommissioned industrial sites. Design proposals for the Royal Seaport site were drafted and discussed during the SOS Climate Waterfront Workshop held in Stockholm, Sweden, in May-June 2022. This paper reflects on the strategies and design tools proposed for the area by students and researchers within the frame of the workshop. The project *Hazarts* proposes a vision of a neighbourhood where our vulnerability to risks and hazards, as well as the many interrelations we depend upon, is displayed through art, with a focus on education and awareness. Green and blue infrastructures transform space into a flexible and multifunctional public space that absorbs disturbances while maintaining its functions, providing a safe place for cultural and artistic activities to stimulate a new attitude towards change, vulnerability, coexistence, and mutual interdependence.

Keywords: *waterfront cities; climate change; culture and creativity; flexibility; public space.*

1. INTRODUCTION

In times of unprecedented environmental disruption and social-ecological unbalances, creating long-term solutions with effective and innovative approaches to foster resilient cities, design sustainable urban waterfronts, and enhance the health and well-being of waterfront communities is crucial for maintaining the vitality of waterfront areas.

It is on this premise that the Marie Curie Research and Innovation Staff Exchange (MSCA-RISE) programme *S.O.S. – Sustainable Open Solutions for European urban waterfronts (SOS Climate Waterfront)* was set up. With seven cities involved from different latitudes of Europe - Rome, Thessaloniki, Stockholm, Lisbon, Gdańsk, Ankara, and Amsterdam - it aimed to enhance a sustainable research framework for the discussion of solutions and strategies, through a multi-disciplinary approach, building on conferences and design workshops held in the participating cities, where international researchers from various disciplines worked with students from the hosting institution to discuss scenarios and develop creative design proposals for the selected study areas [1].

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Having participated as international researchers in the workshop held in Stockholm, the authors' aim in this contribution is to stimulate, starting from the design workshop output, a discussion concerning the role of culture and creativity to face the impacts of climate change. First, the paper develops a review of current policies and scientific literature concerning culture and creativity in the context of cities facing climate change and is followed by the presentation of a case study, the Royal Seaport area redevelopment in Stockholm, which was the selected study area for the SOS Climate Waterfront workshop. Being a large port-industrial area, the Royal Seaport's redevelopment proceeds gradually, in stages involving smaller sub-areas, of which only one has been completed to date. This allows for a provisional comparison between the results of the first realisation phases and the concept proposed as a result of the design workshop for the adjacent sub-area, still waiting to be transformed.

2. THE FIVE Cs: CITIES, CULTURE, CREATIVITY, CLIMATE CHANGE

Waterfront cities are vulnerable to extreme events and natural hazards at multiple scales and dimensions. Sea-level rise, extreme weather events, flooding, ice sheets, and various crises or shocks threaten infrastructures, lives, and livelihoods. Several direct and indirect effects are anticipated in communities, including both tangible (e.g. cultural heritage and historic buildings, sites, objects and artworks) and intangible (e.g. cultural values, identities, knowledge and language) aspects of culture, threatening cultural security [2] and underlining the cultural dimension of climate change impacts.

On the other hand, according to the 2021 IPCC report [3], the warming of the atmosphere and the oceans is due to anthropogenic changes, i.e. the way we live on Earth and occupy space, the modes of production, consumption and lifestyles that give rise to greenhouse gas emissions. These findings highlight the cultural dimension both of the causes of climate change and of the adaptive responses to climate-related risks. This means that adapting to and mitigating the impacts of climate change require integrated approaches to changing the way we live and act on the planet, which is intrinsically interdependent with our worldviews and value systems [4], i.e. our culture(s). In 2014, the aim of the *Sustainable Lifestyles and Education Programme* [5] was to promote the adoption of sustainable lifestyles as the common norm at all levels and in diverse contexts. According to Light et al. [6], changes of this magnitude could be achieved by introducing creative practices into the process which are able to affect emotions, thus, it is more likely to influence the willingness to engage in pro-environmental behaviour, achieve a shift in self-identity and long-term change.

Creativity, closely linked to cultural and art practices, is associated with originality, imagination, inspiration, and innovation and contributes to sustainable development [7]. By targeting values and attitudes [8], it provides the appropriate context for people to develop creative thinking and act imaginatively in pursuit of change, which in turn will generate diverse positive outcomes in cities at different scales and dimensions [6].

Additionally, the cultural shift towards strengthening social bonds, trust and social cohesion forms the foundation for vulnerable communities to develop appropriate mechanisms for recovering from natural disasters and coping with such stressors. For Blatchford and Young [9], culture and creativity go beyond their ability to shape identities and behaviours and are survival strategies that should be considered an essential part of any community's resilience toolkit. The contribution of cultural heritage in this sense is highlighted in the ICOMOS 2019 report *Future of Our Pasts: Engaging Cultural Heritage in Climate Action*, [10], as well as in the White Paper *Cultural Heritage and Climate Change* [11], stressing the embeddedness of culture and heritage in their socio-environmental contexts. Moreover, Fabricatti et al [12] note that the collaborative actions of heritage care and conservation, implicit in the definition of heritage communities proposed by the Faro Convention on the value of cultural heritage for society [13], can establish a virtuous cycle, strengthening social cohesion while reducing environmental degradation and stimulating urban regeneration.

The relationship between culture and the SDGs, set by the UN in 2015, is quite paradoxical. The 2013 UNESCO Hangzhou Declaration [14], emphasized the need for culture to be integrated into the post-

2015 development agenda with a dedicated cultural goal, as a driving force and enabler for sustainable development. However, culture is not among the 17 goals, and is rarely mentioned in a direct and specific way in a few of them (4.7, 8.9, 11.4, and 12.B). Although efforts to combat climate change have been on the world agenda for decades, greenhouse gas emissions still increasing [15] and global warming continuing apace [16], indicating a failure of climate change governance [4, 17, 18]. To accelerate change, turn good intentions into actions and redefine the role of culture and creativity in the context of sustainable development and climate, mass participation is required [18].

In the current global debate, culture is increasingly recognised in studies, works, policy initiatives and practices as a key driver of sustainable development for the achievement of the SDGs in the context of climate change mitigation and adaptation. In 2018, the report of World Cities Culture Forum on *Culture and Climate Change* [19], demonstrates impactful projects that highlight the convergence of cultural and environmental policy at the city level and aims to accelerate cultural action on climate change. It includes projects that promote citizen engagement, awareness and disaster preparedness, and the regeneration of urban environments through the provision of common public spaces, the preservation and integration of cultural heritage into public life, public engagement, environmental development and cultural involvement. It identifies cities as collaborative commons and serves as a significant tool which can influence, inspire and lead future city policies in addressing environmental and climate challenges through cultural creative actions. The *Thematic Indicators for Culture in the 2030 Agenda* [20], developed in 2019 by UNESCO for measuring and monitoring culture's contribution to the national and local implementation of the SDGs, aims to assess both the role of culture as a sector of activity and its cross-cutting contribution to different goals, targets and policies. In particular, all four dimensions of the proposed indicators highlight the interconnection between culture and the SDGs through a variety of bidirectional relationships. They aim to assess the spatial aspects of the quality of public spaces and cultural infrastructure, the contribution of culture to the transmission of local cultural values, knowledge and skills, and the promotion of inclusion and participation. They focus on equal access to cultural life, cultural education and creative freedom and expression. They assess the level of cities' commitment to the protection of cultural and natural heritage and to culturally sensitive planning and management. Finally, education for adaptation to climate change, the adoption of a sustainable consumption culture and the acquisition of skills for sustainable development are highlighted as separate objectives. The *New European Bauhaus* [21], launched by the European Commission in 2020, is a creative and interdisciplinary policy initiative that identifies cities as hubs of innovation where art, culture and creativity play a key role in assisting green transition, while building sustainable and inclusive communities through collaboration between citizens, experts, artists and institutions, experimentation and connection in its public spaces. The European Cultural Heritage Green Paper *Putting Europe's shared heritage at the heart of the European Green Deal* [22], produced by Europa Nostra in cooperation with ICOMOS and the Climate Heritage Network, aims at demonstrating the relevance of cultural heritage for achieving the goals of the European Green Deal, thus also enriching the New European Bauhaus by stressing the importance of including heritage side to side with culture and creativity [23].

The above documents attribute to culture and creativity a cross-sectoral dimension, strongly linked with all pillars of sustainability. They also make clear that for culture to be effective and for its transformative power to be scaled up towards the desired cultural change, collaboration between different groups - experts, scientists, researchers, artists, stakeholders and citizens – is essential. Such collaborations go beyond awareness-raising because they influence the way of thinking and living on Earth. Soden et al. [24] argue that this is due to art's ability to interpret and communicate scientific outputs (charts, diagrams and risk models) - which are often incomprehensible to the general public - in innovative, effective and attractive ways, addressing the emotional elements of the climate crisis and thus, transform cross-disciplinary cultural and creative actions into platforms for transformative processes. Both *Culture and Climate Change* and *New European Bauhaus*, through a variety of

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actions in open public spaces in cities, promote inclusion and public engagement in the process, creating favourable conditions for knowledge dissemination - to a wider audience - and shared learning through creative cultural practices. Therefore, it is understood that since urban public spaces provide the essential space for cultural expression, participation and contact [25], when combined with cross-sectoral collaborative and creative cultural practices, this encounter can accelerate transformations; especially when politically supported and legitimised [18].

3. STOCKHOLM'S ROYAL SEAPORT REDEVELOPMENT: A CASE STUDY

The redevelopment of the Royal Seaport area in Stockholm – locally known as Norra Djurgårdsstaden – has been discussed and implemented over a wide time span, beginning in the Nineties and continuing until the present day. As large as 236 hectares, the area was the first working class suburb in Stockholm, accommodating since the end of the XIX Century industrial and port uses, including gasworks buildings, an electric plant, and the largest port of the city, as well as a residential area in the higher part. Part of the buildings have been decommissioned, while others, such as the electric plant, are going to stay in function. The plan for the port itself is to keep it active by integrating it into the future neighbourhood.

The Royal Seaport project is considered strategic by the policy documents first because of its location, well connected to the city centre, bordered by the Baltic Sea, and surrounded by the Royal National City Park, the major green wedge penetrating the city, second, because of the industrial heritage available for new “exciting uses” [26]. Once completed, the new Royal Seaport should accommodate at least 12.000 housing units, 35.000 working places, and 600.000 square metres of commercial activities. In 2015, the first construction phase came to an end, with the realisation of the Northern part of the project, a new neighbourhood placed between the existing working-class residential area of Hjorthagen, the gasworks, and the Royal National City Park. By examining the policy document “Sustainable Urban Development Programme” [26], the dedicated website [27], and the realised neighbourhood, a first evaluation concerning the use of culture and heritage can be attempted.

The Royal Seaport is presented as a model of urban sustainability to the international public, following the wide recognition obtained by the Hammarby Sjöstad district redevelopment, pursuing a sustainability profile based on technological innovation, in line with the Swedish policies [28]. This objective also aims at consolidating Stockholm’s role as a leader in the sector: as the then mayor and vice mayor clearly stated in 2010, the Royal Seaport would “support the marketing of Swedish environmental technology and contribute to the development of new technology that will cover all housing construction in Stockholm, Sweden and the rest of the world” [29].

Sustainability is linked, in the project’s statements, to cultural heritage as a means to build and strengthen identity, narratives, and sense of place. Cultural heritage valorisation is achieved by contrast through the search for a dialogue between the old and the new [30], within a perspective that considers natural and cultural heritage not as static data but as co-evolving with the city. A strategic planning approach facilitates the integration of the disciplines of urban planning and heritage conservation, opening new opportunities for a creative reuse of heritage. This kind of gesture is not neutral to the cultural and historic meanings of the pre-existing elements: heritage becomes a bearer of new values and meanings, compatible with its history but closer to the contemporary mindsets. The project is what selects meanings to be valued and reinterprets them as functional to the vision it aims at promoting. Such an approach can offer stimulating possibilities by departing from a logic of rigid constraints, but is not immune from major drawbacks. As a demonstration of how tangible these worries can be, we can compare how different heritages were treated in the already completed part of the Royal Seaport.

The gasworks – Värtagasverket – are a valuable complex of brick buildings designed by architect Ferdinand Boberg dating back to 1893. Shortly after their construction, to accommodate the growing number of workers, the city began to build housing units on the adjacent hill of Hjorthagen. The

neighbourhood grew throughout the first half of the XX century until the Sixties, and provides today a unique testimony of the historical evolution of social housing models in Sweden. Particularly relevant is the Abessinien housing complex, designed by Hakon Ahlberg in the Thirties and inspired by functionalist principles. Both Värtagasverket and Abessinien are classified as heritage goods of national interest with historical-cultural value [31]. While the gasworks have become the core and main identity symbol of the new neighbourhood, the pre-existing residential neighbourhood has been gradually marginalised while the project advanced. For instance, an emblematic decision was taken to relocate the public library to the newly built area, in a clear attempt to move the barycentre of the district's life, rather than the objective of integrating the old and the new the policy statements declared. This gesture can be viewed as representative of the will to privilege a specific kind of heritage and cultural meanings – that of technological development. This kind of industrial heritage is functional to promoting the image desired by the investors, and sustaining a model of elitist sustainability. As a matter of fact, the housing units in this area are going to be the most expensive in Stockholm, pushing the previous residents to move. On the contrary, a valorisation of the social housing heritage would have been coherent with an opposite vision, aiming to address the issue of housing accessibility, which is among the major social emergencies in the city.

It has been observed that the pre-existing neighbourhood could be seen as “standing in the way of the strategic framing of the project into a universal model for sustainable urban planning, because Hjöorthagen adds the kind of localness and historical heritage which makes it more difficult to portray the area as a universal role model for sustainable urban planning” [32]. As Choay [33] puts it, a set of losses including de-memorisation and semantic de-complexification, resulting from the process of globalisation and mondialisation, are at work in the redevelopment of the urban space.

This process has to be seen as inherently de-politicising. Port waterfronts, carrying histories of inequalities and class struggles, are subject to heritagisation processes where only the interpretations of the hegemonic groups are accounted for, namely those related to innovation, symbolised through certain material structures and technological features, while aspects connected to social relations and working-class struggle are marginalised. The expression 'heritage sanitification' [34] has also been used to describe such processes where narratives are simplified through the removal of controversial elements, in order to attract a wider public.

4. THE WORKSHOP EXPERIENCE: HAZARTS DESIGN PROPOSAL

The design proposal for Södra Värtan, part of the wider Royal Seaport area, was developed by Group VI within the frame of the *SOS Climate Waterfront* workshop held in Stockholm, in May-June 2022. The site analysis, based on data collection from urban planning documents and historical archives, site visits and guided tours of the wider area and supported by lectures from experts and academics, revealed valuable insights into the challenges, opportunities and weaknesses of the study area and framed the guidelines of the design approach.

If the city of Stockholm literally consists of islands, the area of Södra Värtan was interpreted by the group metaphorically as an island in perception. Lower than its surroundings due to topographical conditions and with a hard border marked by a dismissed railway, the area is disconnected from the city - despite being only a short distance from the centre - and the nearby green areas, thus contributing to keeping the waterfront out of the social and urban fabric. At the same time, the presence of historically significant structures, the proximity of contemporary creative hubs, social housing, industrial uses and port activities further contribute to the multifaceted identity of the area, which serves as a nexus of contrast and transition. This complex urban fabric, therefore, introduces a set of challenges related to interconnection, integration and balanced coexistence of natural and cultural resources within the context of urban development. On the other hand, the potential impact of sealed and contaminated soil, flooding risks and diverse hazards, water pollution and air quality,

the protection of the natural environment and biodiversity, the safeguarding of food safety and security and other climate change challenges are also considered in the design proposal.

Being aware of the centrality that the port activities have at present and are going to maintain in the future - also due to the increasing number of passengers reaching Stockholm by sea - the renewal project starts with the idea of transforming Södra Värtan from a transit space into a destination place for tourists and local people. The undefined intermediate space opens up to the Baltic Sea, and is transformed into a flexible and multifunctional public space that welcomes new uses to coexist with the old, restores the cohesion with the city, the green areas, and the sea. *Hazarts* incorporates a vision for a neighbourhood where vulnerability to risks and hazards is displayed through art and culture, with a focus on the importance of education and awareness of the many interrelations we depend on to build resilience and adaptation. Thus, the design approach is grounded on the identification, preservation, promotion, integration, and enhancement of the cultural and creative potential of the study area as necessary components of adaptation and resilience. The cultural and artistic dimension is emphasised with the aim of converting the area into an inclusive creative harbour for different cultures to meet, connect, learn, and co-create with respect to humans and nature.

The proposed design encourages walking and cycling over driving and promotes the use of public transport by extending existing lines and creating a transport node through the adaptive reuse of the old station, reinserting this historic building into the urban scene. The remaining heritage assets are integrated into the new development as part of a cultural corridor, which “hugs” the hill of Hjorthagen and acts as a connector, allowing the creative reuse of built heritage to serve as a backbone. This cultural corridor, as it runs through the area to Lidingö, articulates history, cultures, people and knowledge, and in synergy with the public realm, the artists and the new natural hazards research institute (conceived as a floating landmark) offers multiple, diverse and alternative approaches to educate on issues related to climate change hazards, mitigation, adaptation and resilience (e.g. exhibitions, workshops, seminars, video projections, agricultural skills, etc.).

To address the challenges of climate change, the proposal incorporates sustainable strategies based on green-blue adaptive infrastructure that welcomes different forms of change related to water, while strengthening the interfaces between humans, non-human species and nature. The integration of public waterway networks, the construction of wetlands, the promotion of porosity and rainwater harvesting systems achieve the absorption, storage, treatment and management of water, as well as biodiversity and sustainable human and natural ecosystems; furthermore, they create a social, educational, and experiential platform for the community (Figures 1, 2).

Hazarts proposes a culturally sensitive urban planning where green and blue infrastructure and technology transform space into a flexible, adaptable, and multifunctional public space that absorbs disturbances while maintaining its functions. Therefore, it provides a safe place that becomes the breeding ground for the development of cultural and artistic activities to stimulate a new attitude towards change, vulnerability, coexistence, and mutual interdependence.

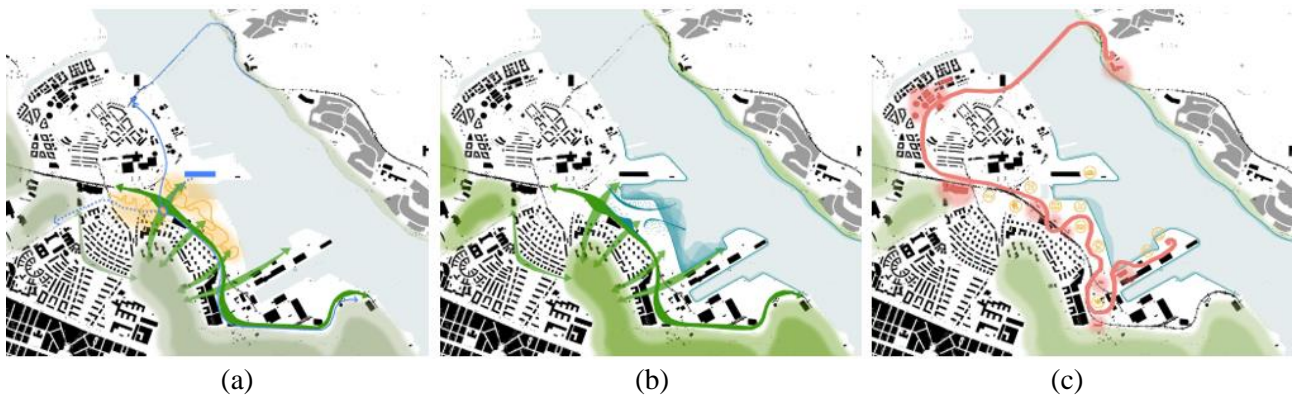


Figure 1. Project Goals: (a) Connections and relations, (b) Green and blue infrastructure, (c) Art and Culture to face risk and hazards



Figure 2. Master plan

5. WHEN RESILIENCE MEETS CREATIVITY: A CONCLUSION

Through a literature and policy review, this paper shows how cultural and creative mediation in all urban practices and policies can gather the requisite knowledge and serve as a lever for cross-sectoral learning and dialogue, inspiring communities, stakeholders, policy makers and governance systems with new, inventive and sustainable solutions to address climate change and the environmental unbalances in contemporary urban areas. Ultimately, by triggering new living experiences, such approaches – it is stated - can bring about the necessary systemic changes to move cities beyond the current impasse and towards a sustainable future on Earth.

However, practice can be quite different from theory. Through a case study analysis of Stockholm's Royal Seaport partial redevelopment, it is pointed out how culture and cultural inheritance can be simplified into instrumental narratives which tend to homogenise the coping mechanisms into a single, technology-driven, and marketable formula, rather than stimulate creative, locally-driven, and

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therefore rich in diversity - which is the premise of resilience in the natural world – innovation/retroinnovation [35] to deal with the environmental crisis. This perspective can offer food for reflection - as in the experience of the design workshop - as a reminder of the substantial gap standing between policy statements, design concept, and actual realisation. The case of Hjorthagen sounds as a warning for any proposal to be aware of how delicate the steps from concept to construction are, especially if the many interests that may instrumentalise the design are considered. Being aware that any evaluation must consider such issues, it can anyway be emphasised that the background and overall aim of the proposed *Hazarts* concept arise from quite a different standpoint. Taking a step back from the dominant ecomodernist paradigm [36] and its off-the-shelf solution of a technological fix, its approach is at the same time more modest and more radical, sustained by the belief that, somehow paradoxically, placing human intervention in a humbler position has higher potential, as a strategy, to steer real systemic change. The project suggests to display human vulnerability and interdependence rather than human power to change the environment, aiming at stimulating a creative renewal of ecological relational thinking. Vulnerability, indeed, has been interpreted as a precondition of resilience from a socio-ecological co-evolutionary perspective, where human and non-human systems are considered as related to each other through a continuous reciprocal action-feedback process [37]. Green/ blue infrastructures are seen as part of this struggle to trigger renovated intercourse with natural processes, which rather than controlled or mimicked through engineered solutions are accompanied in their evolution and cyclical change by human care. The design proposal, through the image of a cultural corridor, conveys an idea of connection through culture, an invitation to develop a place-specific – though built dialogically, speaking to and with alternative worldviews – ecological culture, through an unbinding of individual and collective creativity. The meaning of education, in this context, is of a sort of maieutical, active and interactive approach, in contrast to prescriptive one-way educational systems. Flexibility of public space is here key to enable transformative practices. It contributes to inclusion reduction of inequalities, as it turns waterfront space into a safe place for individual and collective creative expression, fostering intergenerational and intercultural handover in space practice and management. Finally, *Hazarts* hopes to inspire a more reflexive attitude towards tangible and intangible inheritance from past generations, with specific attention to the multiple layering of meanings, leaving the question open to collective discussion about what should be transmitted to the future generations and how. A landscape approach, valuing interrelations rather than isolated landmarks may contribute to deeper, more complex and stratified understandings of the role of material heritage, cultural meanings, and creative practices in shaping the ecologies of the future.

Author Contributions

The present paper is a joint work of the two authors. However, paragraphs 1, 3 and 5 were written by Giulia Luciani, while paragraphs 2 and 4 were written by Natalia Chrysikou.

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Cities are diverse, complex and dynamic systems. How can we plan them in a resilient direction?

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Abstract

The UN-Habitat's definition of urban resilience refers to "...the measurable ability of any urban system, with its inhabitants, to maintain continuity through all shocks and stresses, while positively adapting and transforming toward sustainability. A resilient city assesses, plans and acts to prepare for and respond to hazards – natural and human-made, sudden and slow-onset, expected and unexpected – in order to protect and enhance people's lives, secure development gains, foster an investible environment, and drive positive change."

In this definition we find three key words (or rather three key concepts) that are extremely simple but at the same time particularly meaningful: assess, plan and act. In the belief that developing a resilient and sustainable city requires a roadmap of actions and activities that are both implementable and feasible, yet precise and ambitious in their expected impacts, the paper seeks to explore how we can use the resilience approach as a catalyst for sustainable urban development.

Through this vision cities can be interpreted as 'evolving places' formed by an intertwined set of structures resulting from diverse and competing forces, cultural and natural, whose patterns vary in response to the specific context. The paper proposes three 'meta'-themes to which to refer our design: Integrated Planning, Resilient Infrastructures and Responsive Preparedness.

And so, we can imagine the resilience like a catalyst for sustainable urban development. It ensures development gains are not lost when cities face shocks and urban residents can flourish in a safe environment while addressing major challenges such as climate change and rapid urbanisation.

Keywords: *responsive preparedness; resilient infrastructures; integrated planning; resilience, complexity.*

1. INTRODUCTION

For centuries, cities have been the context within which people's lives connect with a wide range of human activities, including services, government, education, commerce, markets, finance, etc. Today, they are the dominant way of living also by virtue of the complex processes of urbanisation underway. However, the history of cities has not always been a virtuous and happy story; cities have often been the scene of negative events related to phenomena such as overcrowding, unbalanced resource exploitation and factors critical to human health.

Many of these negative characteristics can be attributed to the difficulties in managing cities, which in turn are due to their high level of complexity [1]. Never before have cities been recognisable as a set of interacting entities and exhibit properties and characteristics that seem to multiply the complexity of the individual elements that constitute them.

Understanding the constituent elements, for example in terms of characteristics or dimensions, is not sufficient to understand cities as a whole [2]. The reflections proposed in this paper start from the awareness that cities are a significant example of a complex system and, consequently, the reflections developed towards understanding complexity methods are particularly relevant for studying them [3]. In recent years, the theme of resilience has spread significantly and has, retraced the trajectories of many other terms that preceded it and which then proved to be only partially capable of providing a

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consistent and lasting contribution to interpretation and planning. It is therefore important today to reflect on the specificity of conditions that make the term 'resilience' significantly related to the theme of city planning.

The concept of resilience originates from the study of ecosystems, and its recognition as a characteristic of urban settlement was not immediate; studies related to the calculation of the ecological footprint of the city have highlighted that, compared to a natural ecosystem, urban settlements are characterised by a much more intense metabolism which requires a significant input of energy (currently mostly derived from fossil fuels) and presents a high demand for raw materials to satisfy various human needs. In addition, there is a similarly significant outflow of matter in terms of waste. The city can therefore be studied as a 'resilient urban ecosystem' precisely because it can be described as a complex system of human activities connected with both socioeconomic and biogeophysical processes. [4].

The heterogeneity of definitions of 'resilience' and the complexity of the idea of an 'urban ecosystem' make it particularly appropriate to make an effort of sharing and synthesis among territorial and environmental disciplines, in connection with social and economic ones, which can bring new awareness around a model of urban development oriented towards sustainability.

The concept of resilience has its roots, firstly, in materials engineering and, secondly, in ecological science (but it is often also used in psychology and in numerous other disciplinary branches); its different definitions, as well as their fields of origin and application, are often connected to quite heterogeneous formulations and assumptions, with the result that the term 'resilience' outlines different properties depending on the field of origin and application.

The adaptability of the concept of resilience to different disciplinary contexts results in an articulated series of definitions that can take on different meanings with reference to the scale and complexity of the ecosystem and urban settlement. Holling [5], drawing on a series of research conducted since the 1970s, highlighted three issues that differentiate human ecosystems from other forms of ecosystem organisation: foresight and intentionality, communication, technology. The analysis of these three conditions allowed Holling to construct an interpretative matrix of great interest, functional to framing the characteristics of resilience in ecosystems, economies and institutions.

Statement	Brief Explanation
Multistable states are common in many systems.	Abrupt shifts among a multiplicity of very different stable domains are plausible in regional ecosystems, some economic systems, and some political systems.
Sustainability requires both change and persistence.	We propose that sustainability is maintained by relationships that can be interpreted as a nested set of adaptive cycles arranged as a dynamic hierarchy in space and time.
Functional diversity builds resilience.	Functional groups across size classes of organisms maintain ecosystem resilience.
Emergent behavior emerges from integrated systems.	Linked ecological, economic, and social systems can behave differently from their parts. Integrated systems exhibit emergent behavior if they have strong connectivity between the human and ecological components and if they have key characteristics of nonlinearity and complexity as suggested in the "Rule of Hand."
Is adaptive management an answer?	For linked ecological/social/economic systems, slow variables, multistable behaviors, and stochasticity cause active adaptive management to outperform optimization approaches that seek stable targets.

Table 1 – Selection from the assessments of resilience in ecosystems, economies, and institutions [5]

The characteristics highlighted by Holling, and summarised in Table 1, allow us to fully grasp the meaning of urban complexity in relation to the complexity associated with choosing a resilient approach.

2. THE COMPLEXITY OF THE CONTEMPORARY CITY

The urban system consists of a complex and interconnected network of social, economic, environmental and spatial components that form dynamic relationships and connections within cities and urban areas. These elements contribute to the form, functionality, liveability, and, in general terms, the sustainability of a city.

The population of a city is a dynamic and constantly changing component, constituting a heterogeneous mix of ages, cultures and occupations. In this sense, the built environment defined by architecture, buildings and green and public spaces influences the functionality and liveability of the urban environment. The economic activities of formal and informal sectors drive the financial growth of a city and provide job opportunities. The growth and sustainability of a city's economy are directly influenced by its socio-demographic dynamics and its ability to manage its complexity.

Recent events related to the spatial manifestations of pandemic effects, have highlighted how the social fabric of cities encompasses cultural aspects and social networks that reflect the diversity, richness and uniqueness of urban life. The management and protection of natural resources and the environment within and around a city affect factors such as air quality, water resources, green spaces and biodiversity, which in turn impact the resilience, sustainability and liveability of the city. In this sense, integrated modes of transport and transportation networks within cities ensure mobility and connection through road and rail networks, public transport, bicycles, and pedestrian paths.

A specific consideration must be given to the theme of institutions, local government bodies, administrative frameworks and legal systems that govern cities. Good governance ensures that cities are well-managed and that public services are provided fairly, efficiently, and accessibly. Achieving inclusive, safe, resilient and sustainable cities for all requires local government officials to recognise the interdependence between global goals and local actions and to follow an integrated vision for urban development and resilience building. [6] [7]

This kind of approach requires a paradigm shift in how governance structures are managed not only between national and local governments but also among local governments, communities and private actors. Over the ten years of activity of the Resilient Cities Congress [8], several key governance principles have been identified to guide the way towards a sustainable and resilient future. Among these, creating opportunities to activate constant dialogue between various levels of government, public and private sector actors, representatives from different social sectors and community members is extremely important today.

All these components interact and influence each other within the city ecosystem. They form a complex network of interdependencies and interactions that must be considered in urban territorial planning and policies. Understanding and managing these interactions are fundamental for sustainable urban development and for improving the quality of life, resilience and sustainability of cities.

3. IN SEARCH OF POSSIBLE WORK TRAJECTORIES

The UN-Habitat's definition of urban resilience refers to "...the measurable ability of any urban system, with its inhabitants, to maintain continuity through all shocks and stresses, while positively adapting and transforming toward sustainability. A resilient city assesses, plans and acts to prepare for and respond to hazards – natural and human-made, sudden and slow-onset, expected and unexpected – in order to protect and enhance people's lives, secure development gains, foster an investible environment, and drive positive change."

In these definitions we find three key words (or rather three key concepts) that are extremely simple but at the same time particularly meaningful: assess, plan and act. In the belief that developing a resilient and sustainable city requires a roadmap of actions and activities that are both implementable and feasible, yet precise and ambitious in their expected impacts, the paper seeks to explore how we can use the resilience approach as a catalyst for sustainable urban development.

3.1 Integrated Planning

The history of planning and the strategies adopted by the public sector vary from country to country and are shaped by political contexts and the issues characterising different contexts and historical periods. Initial efforts primarily focused on urban planning to promote the health and safety of urban areas, gradually expanding to the areas surrounding cities experiencing uncontrolled expansion, and subsequently to rural areas experiencing conflicts over different land use needs.

During the 1990s and 2000s, economic development and growth, along with other global challenges, led to negative social and environmental impacts and the emergence, in international policies, of the concept of sustainable development, defined to encompass social, economic and environmental sustainability.

Integrated territorial planning became a tool to contribute to advancing sustainable development goals. This attention, supported by growing environmental awareness regarding natural resource degradation, pollution and challenges posed by climate change, prompted reflection to make planning systems more effective in meeting new needs. This was initially undertaken by European countries, gradually joined by countries from other continents.

Especially since the 1990s, progress in international law, science, technology and governance approaches triggered efforts by countries to revitalise and reformulate their planning systems to better address present opportunities and needs. In particular, two global conventions, the Convention on Biological Diversity (CBD) [9] and the United Nations Framework Convention on Climate Change (UNFCCC) [10], both signed in the early 90's, significantly contributed to directing efforts towards modernising territorial planning systems to incorporate biodiversity and climate change objectives. Both conventions contained goals requiring long-term territorial planning and the need to interact with project scales and different conditions.

Similarly, advances in science and environmental and territorial sensing technologies have significantly expanded knowledge about natural systems and changing environmental conditions, generating new tools for more efficient analysis, monitoring and assessment of environmental conditions supporting territorial planning.

Lastly, awareness has grown around different governance types that contribute to sustainable land, sea and resource use and the importance of good governance principles for decision-making processes, including active and meaningful participation of communities affected by resource use processes. Together, these developments have contributed to stimulating and supporting efforts to modernise planning systems for global and long-term territorial planning, also for biodiversity and climate change. [11]

The distinctive elements that emerge for modern territorial planning differentiate this type of planning from more conventional territorial/urban planning approaches. These are principles and processes that go beyond the typical technical role of the public sector planner oriented towards overseeing and authorising specific development proposals. Key characteristics include a long-term planning horizon divided into short-term (approximately 10-15 years) and medium-term (15-30 years), defining broad visions necessary to adequately address environmental transition-related changes.



Figure 1. - A schematic summary of governance characteristics [11]

Although there is no shared definition of 'integrated territorial planning' another fundamental characteristic common to all experiences is the need for integration between policies and plans at all levels of government and across all sectors at each level. The use of an ecosystem approach is also necessary for effective territorial planning, particularly to reflect the needs for biodiversity and climate change adaptation. The precautionary principle is another central element of territorial planning analysis and decision-making processes; it is essential for addressing the uncertainties and risks that are inevitable when planning for the future, especially for climate change. Finally, territorial planning includes conservation plans of all kinds and also aligns other formal or informal plans that have spatial aspects, including plans for adapting to climate change for building resilient ecosystems. The impacts and transformations generated by human activities on the environment are complex and involve both social and ecological aspects at various scales, generating both changes in social structures and the loss of ecosystem functions. To promote environmentally respectful urban growth, it is necessary to recognise design processes that relate urban, peri-urban and environmental planning, promoting an integrated process that focus on designing alternative urban models more sensitive to the environment (including 'resilient growth', 'low-impact development', 'sustainable cities and communities'). These techniques, increasingly rooted in design disciplines, will be important to spread in all countries, especially in contexts where urbanisation represents a significant share of human settlements.

3.2 Resilient Infrastructures

A second theme of reflection concerns the need to link resilience strategies to an understanding of the vulnerability of infrastructural systems that ensure the functioning of different territorial systems. To improve infrastructure resilience through strengthened governance, it is necessary to understand the value of existing infrastructures, to be able to assess their performance, vulnerability and feasible options to integrate their resilience.

This process also requires building a common understanding of the necessary shift from understanding 'infrastructure resilience' to a project-based approach, based on criteria that can produce 'resilient infrastructures'.

One of the main gaps is the lack of understanding of what it actually means and entails to think about resilient infrastructure in terms of planning, design and implementation strategies. In recent years, through the work carried out by member state delegations, the United Nations Office for Disaster Risk Reduction (UNDRR) has identified some of the main critical issues encountered in the production of resilient infrastructures: among these, the lack of a shared vision of which infrastructures fall within the scope of application; the level of resilience to be foreseen; the definition of minimum levels to ensure the improvement of infrastructure resilience. These elements can vary significantly depending on the country or the infrastructural sector, and therefore the principles for

the preparation of resilient infrastructures must necessarily confront the characteristics assumed by the conception of resilience at the national level, contributing to raising awareness and establishing a common basic understanding, but leaving the specific approach to resilience open and differentiated. The design of resilient infrastructure is generally presented by describing the characteristics of its performance: the ability to prevent, the predisposition to absorb, the capacity to recover and readapt, after the occurrence of traumatic events, in a timely and efficient manner. The experiences highlight that realising resilient infrastructures requires dealing with a multitude of considerations: recognising the changing nature of risks and uncertainties; the increasingly complex nature of multi-risk situations; the need to use transdisciplinary and systemic methods that take into account both the life cycle of the infrastructure and its interdependent and multisectoral nature. [12]

In this context, three different principles emerge that are relevant to the design and management of resilient infrastructures: conscious learning and proactive context, environmental integration, adaptability and capacity for evolution. [13]

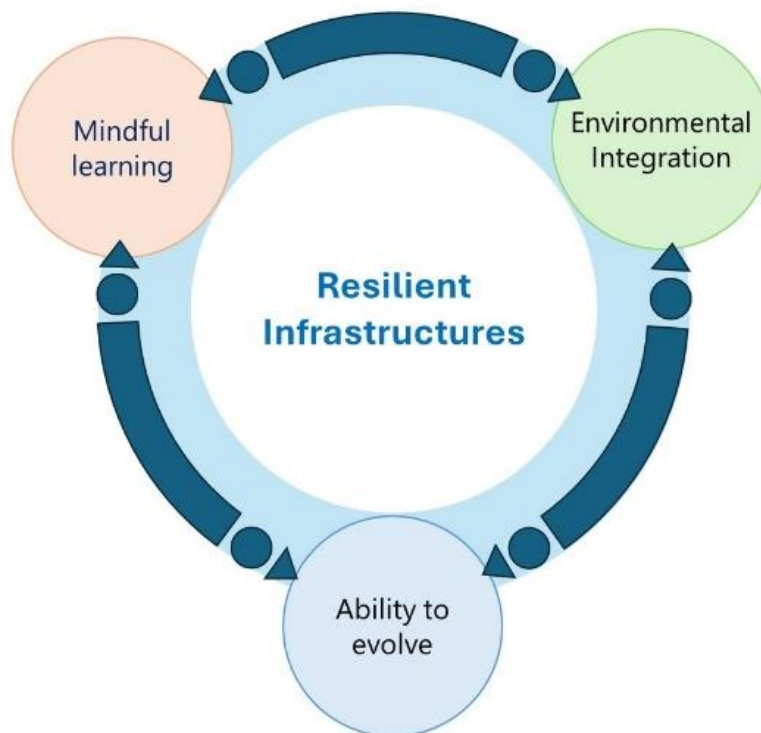


Figure 2. - Resilient Infrastructures, the three constitutive components

Conscious learning and proactive context. As previously observed, the complexity and significant connectivity role of infrastructures make it difficult to understand the impact of resilience in infrastructure projects, making it challenging to prevent and absorb critical situations. Therefore, planners need to actively prepare to understand the extent of potential risks to which infrastructures are exposed in order to quickly detect anomalies and enable decision-makers to learn and develop strategies to optimise infrastructure resilience through disaster mitigation and rapid recovery. Conscious learning aims to improve knowledge about vulnerabilities and can therefore support decision-making processes to enhance resilience and make the best use of integrated knowledge systems in the infrastructure planning, monitoring, recovery and learning lifecycle. The results of continuous learning will serve as feedback to support other principles and should be made available to stakeholders involved in the use and management of infrastructure.

Environmental integration. This principle recognises the importance of working in an integrated manner with the characteristics and elements of the natural environment: biological factors (flora and fauna) and physical factors (land, air, water). Integration should take place with the awareness that infrastructure is exposed to various known and unknown risk factors, and that the nature of risks is constantly evolving. The concept of infrastructure must now necessarily be expanded to include aspects related to the immaterial and virtual dimension, while simultaneously including compensatory aspects aimed at identifying the design of 'grey' infrastructure as an opportunity to rethink and re-qualify compromised or marginal bio-ecological cycles. In this sense, environmental integration aims to identify opportunities to work with the natural environment positively, foreseeing reforestation operations to reduce the speed of rainwater run-off and protect critical infrastructure.

Adaptability and ability to evolve. Adaptive transformation is the ability to change the way infrastructural systems are managed, or to modify the desired outcomes of these systems, in response to changes in the broader context within which they operate. This principle recognises that, in a world facing the evolving risk of climate change, the requirements imposed on our infrastructural systems in the future may be different from those imposed on them today. Creating the ability to operate outside of normal conditions enhances infrastructure resilience by absorbing unforeseen events and changing as necessary to maintain operational/service continuity and flexibility. Ideally, infrastructural systems should be developed with this in mind, encouraging stakeholders to incorporate flexibility into supply chains, delivery methods, organisational structures and operational methods, including early warning, evacuation, etc. However, adaptability must go beyond the design phase, being part of a continuous cycle where the results of continuous learning are implemented as changes in infrastructure, management and relevant information systems.

3.3 Responsive Preparedness

A third theme of reflection concerns the topic of responsive preparedness. This theme has become an integral part of the reference framework regarding the issues of resilient city planning in relation to the impact that the painful and tragic COVID-19 pandemic has had on our lives. In that dramatic context, the importance of prevention planning, preparedness and operational and organisational response became evident as essential elements for a rapid and effective response to any type of risk. Emergency management involves managing risks for communities and the environment and concerns emergency services, recognising that in these situations, every individual and organisation potentially has a role to play. This is a theme addressed from different disciplinary fields and, for some years, has only marginally interested city planning.

Of particular interest around this theme is the work carried out since 2011 on responsive preparedness by the Secretariat of the Convention on Biological Diversity, which in 2019 published an educational report aimed at investigating the close interconnections between effective environmental management, the impacts of climate change and disaster responses.

The underlying idea is that risk preparedness requires a more systematic and comprehensive approach, which in the past has been mainly reactive rather than preventive, focused on post-event actions rather than planning and using the natural characteristics of the landscape to prevent disaster risks. This approach, called Ecosystem-based Disaster Risk Reduction (Eco-DRR), is characterised by risk management that incorporates ecosystem management tools, leading to a more innovative and systemic approach to sustainable risk management [14].

The document produced by the Secretariat of the Convention on Biological Diversity defines Eco-DRR as follows: "Ecosystem-based disaster risk reduction (Eco-DRR) is sustainable management, conservation and restoration of ecosystems to reduce disaster risk, with the aim of achieving sustainable and resilient development." [14]

An approach that includes specific attention to community-based responsive preparedness and to the broader general concept of nature-based solutions as ecosystem approaches that specifically address issues of climate change adaptation and disaster risk reduction. [15] [16]

In practice, this approach refers to nature-based solutions, including ecological restoration, integrated coastal zone management, integrated water resources management, green infrastructure and protected area management. The above-mentioned approaches are complementary and focus on developing holistic and integrated ways to improve the resilience of socio-ecological systems, reduce disaster risk and/or help people adapt to change by using ecosystems and biodiversity sustainably. They often emphasise participatory processes and community involvement, which are crucial for enhancing community resilience, improving adaptive capacity and ensuring that local benefits are realised.

It is a resilient sustainability approach that focuses on developing the capacity to address unforeseen changes, such as the impacts of climate change and disaster risk, and involves managing interactions between people and nature as socio-ecological systems to ensure the continuous and resilient provision of essential ecosystem services that provide adaptation and disaster risk functions.

The research report indicates seven key principles in the application of resilience thinking which are the result of a comprehensive review of the social and ecological factors that enhance the resilience of socio-ecological systems and ecosystem services provided; they are derived from work developed by the Stockholm Resilience Centre in 2014 [17] and are:

1. Maintain diversity and redundancy, for example, by maintaining biological and ecological diversity. Redundancy is the presence of multiple components that can perform the same function, and can provide 'insurance' within a system by allowing some components to compensate for the loss or failure of others.
2. Manage connectivity (the structure and strength with which resources, species or actors disperse, migrate or interact across patches, habitats or social domains in a social-ecological system), e.g. by enhancing landscape connectivity to support biodiversity and ecosystem services that contribute to adaptation and risk reduction.
3. Manage slowly changing variables and feedback (two-way 'connectors' between variables that can either reinforce (positive feedback) or dampen (negative feedback) change).
4. Foster complex adaptive systems thinking by adopting a systems framework approach.
5. Encourage learning such as by exploring different and effective modalities for communications.
6. Broaden participation, such as by dedicating resources to enable effective participation.
7. Promote polycentric governance systems, including through multi-institutional cooperation across scales and cultures.

These principles attempt to address the difficulty that 'hard' or engineered approaches have encountered in attempting to reduce the risk of climate impacts and disasters. The evidence is that these approaches tend to address individual hazards, risking increasing long-term vulnerability by not considering future risks or the interaction of multiple hazards. Due to their permanent and inflexible characteristics, these solutions can also become obsolete and ineffective in the face of unpredictable operational conditions.

Climate change impacts and disaster risks extend beyond political boundaries, and examining problems through an integrated or systemic approach can aid in problem solving across sectors and boundaries. Transboundary cooperation can enable the sharing of costs and benefits of adaptation measures and prevent potentially negative impacts of unilateral adaptation measures. Transboundary cooperation can also provide opportunities for socioeconomic development and the management of issues at appropriate ecosystem scales.

Therefore, there is a growing awareness for the implementation of ecosystem-based or hybrid approaches, as the evidence of their effectiveness and their potential to generate multiple benefits is clear.

4. CONCLUSION

In recent years, efforts of transformation towards sustainable development have focused on the urban dimension, with particular attention to technological aspects - as in the European context the Lisbon Strategy: a knowledge-based economy, or the document EUROPA 2020: A strategy for smart, sustainable and inclusive growth [...]. Given that by 2050 two-thirds of the world's population will be urban citizens [...], cities have been entrusted with a key role in combating climate change and developing new smart technologies to improve the availability of data aimed at defining new services for citizens and optimising dedicated infrastructure. This has led to the realization of ambitious experiments with the aim of increasing citizen participation in improving environmental quality standards and overall quality of life. Despite the European Union directing, also with specific regulations, the implementation of a wide variety of projects and models aimed at making cities smart and sustainable, these have not always been adequate and sufficient to achieve the underlying macro sustainability goals.

This approach, exclusive with respect to the totality of the population and territories, has led to a concentration of resources allocated to the implementation of transformative practices, mainly in urban environments of large cities, without taking into account a changed vision of territories, also represented by dimensions related to culture, art, customs and traditions; a vision that considers the spaces perceived by society as material and immaterial infrastructural references which are manifested through the variety of different organisational and technological models; a vision that considers the lived spaces that represent the experiences of every community, which through their interpretation elaborates the categories of its needs: memories, desires, fantasies [18].

In the last decade, we have been conditioned by a vision of urban development understood as a venue for interconnected technological and digital apparatuses, which sees large cities as the only opportunity for transformation, as they are considered the places where the interests and activities of key change actors converge.

We need to rethink all of this. It is necessary to redefine a model of territorial governance that can respond to the needs of an evolved community that is open to cultural processes and impulses and above all, is aware of environmental threats. Integrating SDG localisation paths into an international networking process does not mean concentrating all material and immaterial resources on large cities but indicates the ability to promote a sustainable transformation of the peculiarities that characterise individual communities.

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Public spaces: new ways of use

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Abstract

The well-being of each individual depends - in addition to the state of physical health - on the possibility of being able to share spaces, moments of sociality, leisure, cultural exchange, capable of constantly renewing the sense of belonging in those places where human beings live and work. Often, however, such places are abandoned in a degradation stratified in time and space, characterised by a dilapidated building stock that should be recovered, valorised and utilised in aggregation facilities and services. In this study we will compare more or less virtuous examples in terms of redevelopment of public urban spaces in order to highlight the gap that exists in the *vision* and *governance* of some Italian territories. The *bad practices* without any planning regulations - certainly not to be repeated - serve as a warning, while the *best practices* described can be used for future redevelopment interventions, to be made effective and close to the real social and environmental needs of the chosen locations. Solutions that remedy problems and critical issues, giving a new meaning and function to public spaces while contributing to people's health, well-being and happiness through a collaborative process that starts from the bottom.

Keywords: *well-being, best practices, participation.*

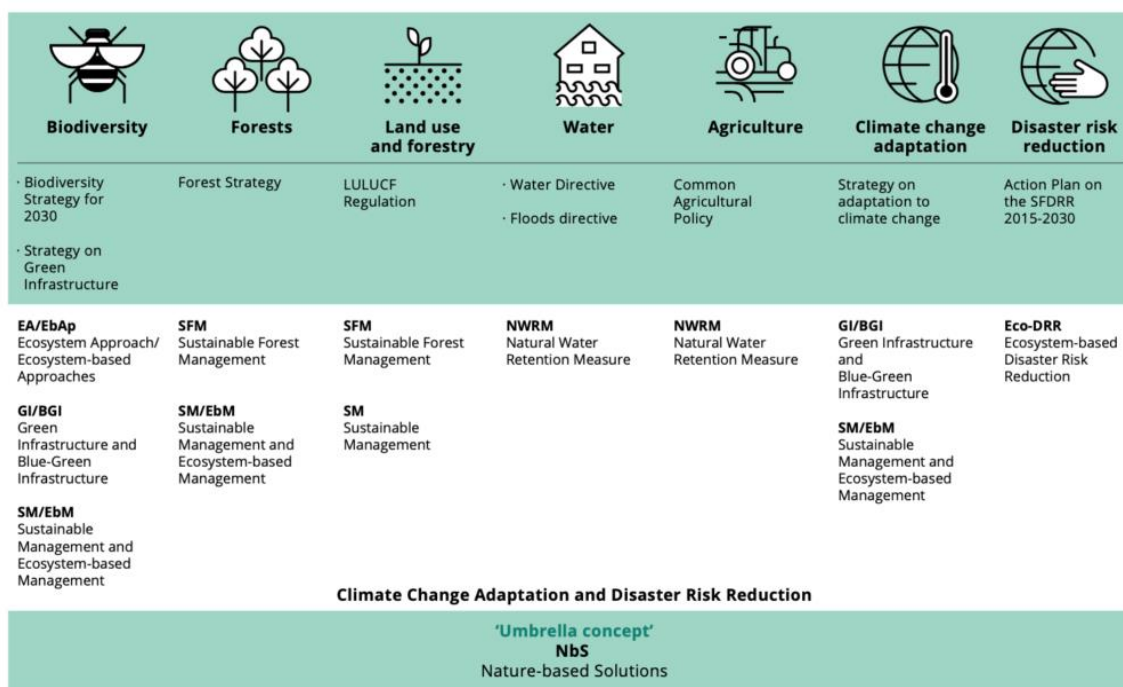
1. INTRODUCTION

Numerous studies on the quality of life in cities show that the behaviour people engage in within public spaces reflect the functions and meanings that define the space itself. In these places, depending on the moment, there is a diversity of moods of the inhabitants - such as dissatisfaction, malaise, restlessness - far removed from the concept of “*feel good*” where the psycho-physical *well-being* of citizens is only guaranteed if they live in cities with resilient and sustainable public urban spaces [6-7]. In recent years, we have witnessed a rediscovery of the role of public space and a growing interest on the part of local governments and the European Union, which are ready to invest economically, and not only, in these areas. The European Union, moreover, recognises that urban areas have a central role to play in combating climate change, as they are the main emitters of carbon dioxide and methane emissions and at the same time have a high fragility and exposure to climate risk. Moreover, cities are already the context in which most of us live, work and study: globally (54%), in Europe (73%) and nationally (75%). For these reasons, it is necessary to focus on strategic actions aimed at containing the consequences - such as floods, inundations, excessive heat waves (adaptation measures) - and reducing the phenomena that cause global warming (mitigation measures). In particular, the granting of economic contributions by the European Community has encouraged redevelopment projects in cities starting with public spaces, considered key elements for the liveability and vitality of inhabited centres as a whole, and lastly - linked to the moment we are living through, characterised by major climate changes that cause floods, inundations, landslides, excessive heat waves, global warming, etc. - the need to give back centrality to urban spaces in order to mitigate the impact of these changes. An effective method for counteracting the adverse effects of a changing climate is the “*technology of nature*” through *Nature-based Solutions* (are actions to protect, sustainably manage and restore natural and modified ecosystems that address societal challenges in an effective and adaptive manner, while providing well-being for humans and benefits for biodiversity) as outlined already in 2000 by the World Conservation Union (IUCN) (Figure 1).

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Our cities offer many possibilities for the implementation of these measures, and a particular role is played by public spaces such as gardens, villas and parks, which are common goods that can be acted upon to build climate resilience, thereby increasing people's well-being and safety. It is therefore important to take care of the cities in which we live, produce, consume and move, so that the goals of Agenda 2030 do not remain unfulfilled: make cities and human settlements inclusive, safe, and sustainable (SDG 11); ensure sustainable patterns of production and consumption (SDG 12); promote action, at all levels, to limit the effects of climate change (SDG 13). The Danish architect Jan Gehl - founding partner of Gehl Architects, a research and urban design consultancy specialising in improving the quality of life in pedestrian - and cyclist-oriented cities based in Copenhagen - states "cities for people" are also "climate-proof cities" since most of the measures, certainly the most effective for climate mitigation and adaptation, are based on the reintroduction of nature into urban areas [5]. Nature that makes cities more liveable, healthy, attractive, comfortable and safe. In this study, two different ways of planning cities are analysed. The first, is a virtuous example that comes to us from the Emilia Romagna Region, with the European project "RepublicMed" aimed at identifying the best methodology to initiate a proper redevelopment of public urban spaces thanks to technical-economic studies and planning strategies useful to identify the inefficiencies of the current national planning tools. Interventions that following phases different - knowledge, identification, adaptation and application of the methodology in the chosen area - whose results are analysed and discussed in various meetings and study days in order to achieve collective and participatory sharing.



Note: CAP, common agricultural policy; LULUCF, Land use, land use change and forestry; SFDRR 2015-2030, Sendai Framework for Disaster Risk Reduction 2015-2030.

Source: EEA.

Figure 1. Nature-based Solutions (Photo by web).

The second case, not very virtuous, certainly questionable in terms of good urban planning practices, concerns the redevelopment project of a municipal green area in the city of Agrigento. The main purpose of *governance* is merely to obtain public funding without considering the negative effect produced, upon completion of the works, on the social, urban and landscape context of the city centre.

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A havoc that unfortunately is repeated to the detriment of the city and its citizens who, in the past, have been deprived of another important green area called Villa Garibaldi - built by the Borboni in 1850, demolished and barbarically destroyed in 1949 - to build of inglorious the multi-storey buildings of the modern era of Agrigento [4].

2. THE CASE STUDY OF EMILIA ROMAGNA: A BEST PRACTICE

The Emilia Romagna Region has always been a pioneer in terms of *stop* soil consumption, urban redevelopment, "care" for cultural heritage and the well-being of the community. Already since the 1970s - before and more than other regions nationwide - it has built its cities by guaranteeing green areas, public spaces and services, livable, accessible neighbourhoods capable of stimulating in the population a sense of belonging, with an always attentive eye on territorial problems. This has enriched the concept of urban quality, ecological and environmental quality and, more recently, that of the effects of climate change in urbanised areas and the consequent risks to people and property [8]. The real challenge of the cities of Romagna was to create public spaces suited to the complexity of economic, social, climatic and landscape problems thanks to the inclusion of vegetation, in order to generate well-being, encourage physical exercise, support slow mobility, improve air quality and the mitigation of high temperatures in the summer period. In this scenario, the actions implemented in the cities of Emilia Romagna through the European project RepublicMed - Retrofitting Public spaces in intelligent MEDiterranean cities- developed in collaboration with the Politecnico di Milano and CNR Ibimet in Bologna - have taken on particular importance. The survey conducted here analysed interventions in the cities of Parma, Rimini and Modena where administrations, professionals, scholars and ordinary citizens, using the REBUS® method (REnovation of public Buildings and Urban Spaces, arise in 2015 as an original awareness and training course on climate change issues in an urban environment based on simulation games, characterised by theoretical lectures, field inspections and intensive design workshops) design high urban resilience neighbourhoods, with particular attention to public open spaces. Specifically, in the city of *Parma*, the Pasubio area in the San Leonardo artisan district on the edge of the railway subject to major urban transformations and a participative process for the recovery of the pavilions of the disused "Manzini" industrial area is redeveloped. For the city of *Rimini*, work is carried out in the weekly market area between Gramsci Square, the Roman amphitheatre, the former bus station car park and the AUSA linear park. Gramsci Square is a car park used for the weekly market. Surrounding it are the areas of the (disused) ex-autostation, and the after-work railway car parks, the CEIS kindergarten, the Roman amphitheatre and the AUSA park. With regard to the city of *Modena*, the Villaggio dell'Artigiano (Craftsman's Village) is redeveloped, a manufacturing district on the city's periphery with a post-war urban layout structured by craftsmen's buildings organised through a regular street grid with orthogonal axes (Figure 2) [10, 11, 12]. The final result achieved by the *stakeholders* was the design of the best performing project in terms of urban quality, landscape and thermal comfort of open spaces. The redevelopment takes place through "nature" - reintroduced into the city, not as a simple label or an aesthetic element, but as a concrete objective towards which to strive and which guides all design actions - applying a model in which urban interventions dialogue with each other and they harmonise. The aim was to create public places for meeting, discussion, comparison, spaces that must be reconquered to ensure social, cultural and democratic development thanks to the re-naturalization of the urban environment, the restitution of the naturalistic and historical identity and of the places, the resilience of the neighborhood system, of the return of public spaces to the community, of participation as a paradigm in the construction of the project and in the management of collective works. A praiseworthy path - to be imitated and replicated in other urban realities - undertaken by far-sighted policies where 'man' is placed at the centre of the cities. Moreover, let us recall that Emilia Romagna is the promoter of the project "Let's put down roots for the future - a tree for every inhabitant" - an initiative that aims to extend the wooded area in the Region through the creation of

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green infrastructures in the cities to restore the natural ecosystem, create new woods and forest plantations near watercourses, upgrade agro-forestry systems, hedges and rows in a context of landscape enhancement and public use of the territory. It follows that the regional project, which includes the planting of 4.5 million new trees, also plays a key role in combating climate change and improving air quality. After all, we know that we can obtain many benefits from trees, some material, some immaterial, but very valuable. We all know the extraordinary versatility of wood or the possibility of obtaining edible fruits from certain species of trees. Less well known, however, are the intangible benefits such as, for example, the possibility of removing CO₂ from the atmosphere to combat the climate crisis, cooling urban areas in times of "heat islands", making the urban and peri-urban landscape more pleasant, or dampening traffic noise. Planting trees and caring for them means giving better living conditions not only to oneself, but also to all other people, both locally and globally. A very clear concept for the cities of the Emilia Romagna Region, unfortunately not understood in other Italian cities such as Agrigento, the second case study that we will cover in the next paragraph.

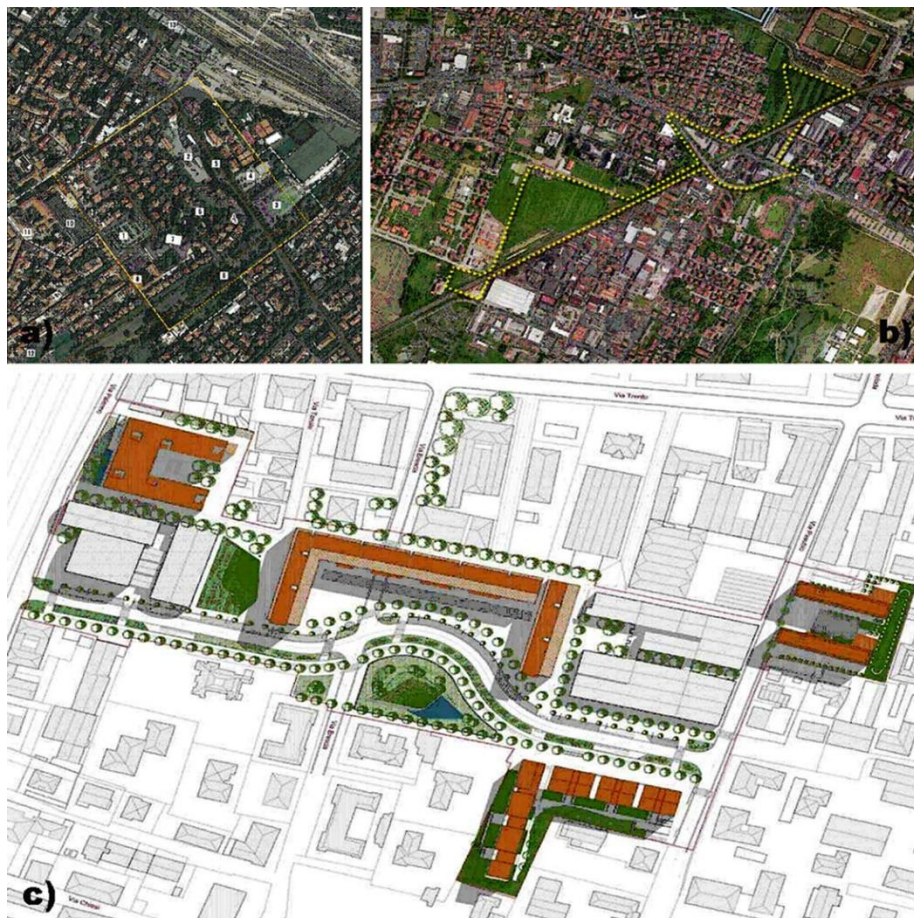


Figure 2. RepublicMed Project: redevelopment interventions.

- Rimini; b) Modena; c) Parma (Photo by web).

3. THE CASE STUDY OF A BAD PLANNING: THE PROJECT OF A GREEN AREA

The term urban redevelopment has been a common expression for some time but its meaning - sometimes - is ambiguous and the definition alone is not enough to understand what an intervention of this magnitude actually consists of. Often it involves putting an abandoned, degraded part of the city back into operation, a complex space, a place of "clashes" and mediations between economic, social and cultural interests that are very different in terms of needs, objectives and ability to influence

urban policies. Local administrators use it to indicate projects with very different characteristics and purposes: renovation of a building, new street furniture in a square, murals in neighbourhoods. Private operators, often together with the administrators themselves, talk about it when they transform public buildings into residential buildings or luxury hotels. Citizens' committees, cultural associations, on the other hand, use this definition when they modify the space in which they act, design a shared living, give new function to the places in which they live by transforming them into spaces of sociality and culture. The most frequent ambiguity is linked to urban policies which define as *urban redevelopment* projects for the renovation and reutilisation of properties or entire neighborhoods - favored by public subsidies - which generate inequalities following *gentrification* processes (process pertaining to urban sociology, which may include the redevelopment and physical change and social composition of marginal urban areas, with often unequal socio-economic consequences). Instead, for good urban redevelopment practice, an *integrated approach* is needed that implements interdisciplinary actions with the involvement of the inhabitants considering three dimensions: the physical, the cultural, the social. And it is precisely starting from this lack of *integrated approach* that we tell what happened in Agrigento for the "so-called" redevelopment project of the *Villa del Sole* to be carried out following a variation to the current urban planning instrument. The Agrigento P.R.G. is from 2009. The Municipal Council, within the framework of the AGENDA URBANA programme - Action 9.3.1 PO FESR 2014-2020, initial amount equal to € 2,100,000.00 subsequently increased to € 3,000,000.00 - proposed a variant to the urban planning instrument for the approval of the final project (first part). The variant, pursuant to Article 19, paragraph 2 of Presidential Decree 327/2001, was favourably voted by the City Council - resolution no. 82 of 26 July 2022 and approved with DDG (Territory and Environment Department) no. 136 of 01.06.2023 - on the basis of the final project only, on which a series of opinions had been rendered by the competent Authorities, including the Superintendence for the BB.CC.AA., which had established precise obligations for the Authority and outlined the characteristics of the subsequent executive project. Contrary to the opinion of the Superintendency, which provided for the preservation and replacement of the greenery, the Municipality of Agrigento divided the final project into two parts and proceeded to draw up the executive project (first part), relating only to the construction of the school building. The area is indicated in the current PRG as sub-area G3 (environmental protection and enhancement - equipped public green areas) and identified in the N.C.E.U. to Fg. 142 parts. 3642.

The green area, located in the city centre, was one of the two largest municipal villas in the city, characterised by a rich tree heritage, which was destroyed to make way for new volumes to be used as a nursery school and kindergarten. The area, over time, has undergone several transformations. Here, in the 17th century, stood a convent for Franciscan monks that belonged to the Diocese of Agrigento, which was transformed into a military district and then barracks in 1872. The building was destroyed in 1943 by Anglo-American bombing during World War II [2 - 3]. For several years, the area remained a place of ruins and rubble until, following the Agrigento landslide on 19 July 1966, the entire area was used to house the tent cities of the disaster victims (Figure 3).



a)



b)



c)

Figure 3. a) “Crispi” Barracks; b) the Barracks are destroyed by the bombings of the Second World War; c) the area is transformed into a tent city (Photo by web).

In 1968, a communal villa called “*Villa del Sole*” was built in that same space and officially opened to the public on 5 August 1973 [4]. Characterized by thick vegetation and a large fountain on several levels - with an adjoining lake - it was enriched in the 70s and 80s with wildlife (peacocks, ostriches, monkeys) and play equipment, becoming a very popular meeting point for families from Agrigento (Figure 4). Today, that green area no longer has greenery [1], almost nothing remains of the lush vegetation that constituted an important part of the city's arboreal heritage (Figure 5). The urban landscape has been brutally impoverished, in order to free up areas for new, intrusive buildings of dubious utility, not least because the city already has unused or underused school buildings. In fact, there are various concerns about the "purpose" of the redevelopment project which, as a matter of practice, should determine a positive impact on the quality of life, on the aesthetic aspect of public space, on the valorisation of urban resources, on the environment and on local economy [1]. In this specific case study, this purpose is unclear, the project would appear to be unsustainable. The survey carried out did not reveal any ISTAT data - indispensable according to urban planning standards - to justify the need, even potential, to build new school facilities for children. The only data relating to sizing are the minimum number (no. 25 children) and the maximum number (no. 28 children) for the nursery; while for the children's center the total number is 60 people (Figure 6) [1]. In addition, research on demographic trends shows that the number of children between the ages of 0 and 6 is decreasing. Numbers that make one think a lot about the project methodology used. On what forecasts, then, was the project based? In proper planning, every intervention in the area is closely linked to the real needs of the community, to the number of people who will use the places and facilities, paying the utmost attention to the surrounding landscape. In the present intervention, on the

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contrary, the priority would seem to be only obtaining funding. And again, two very important aspects must be underlined. The first is that among the project documents there is no agronomic study necessary to identify, before cutting, the type of vegetation and the conditions of the individual trees and this in order to confirm their maintenance, or to plan their replacement with new ones plantings. In the executive project, as drafted, there is no trace of work on the public green, because such work was envisaged in the second section, which had never been drafted or approved as of the date of this writing. The second aspect, no less important, is that on 29 November 2023 the local administration inaugurated the start of the works without all the necessary permits being in place. The project lacks landscape authorisation, in accordance with Regional Law No. 5 of 6 May 2019 and Article 136 of the Cultural Heritage Code. The works project - in the order, verified and validated, then put out to tender and contracted, until the delivery and actual start of works on 28 November 2023 - concerns only the kindergarten. On 20 December 2023, the Superintendence warned the Municipality, suspending the newly opened construction site. Work suspended following reports from local citizens' associations opposed to tree felling. On March 26th, 2024 the construction site reopened and substantial excavations and reinforced concrete castings were carried out within the former green area (Figure 7). At this point, questions arise spontaneous. But, in Agrigento, what rules apply regarding urban planning? Why haven't the laws for planning new public works, for managing urban greenery, for limiting or eliminating the consumption of new land, been applied? Why cut trees? Why erect new buildings? Couldn't existing school structures no longer in use be recovered? At the date of writing of this contribution, the citizens is still awaiting an answer to these questions.



Figure 4. *Villa del Sole* - details of the spaces before the intervention (Photo by web).

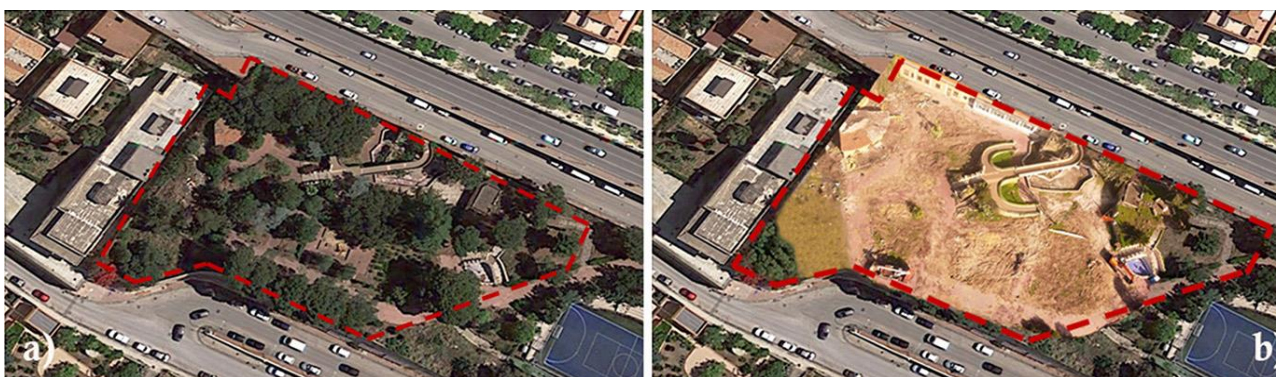


Figure 5. *Villa del Sole*. Panoramic view. a) The area before intervention (Photo by web); b) the red dotted line identifies the area after the trees have been uprooted (photo by C. Lombardo ass. MareAmico). The graphic reworking of the two photos by T. Cilona.

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Figure 6. Project plan: “Construction of a *Villa del Sole* pre-school with adjoining nursery centre”. a) extract prepared T.03, in red the area identified for the construction of the buildings; b) elaborate extract T.04, details of the plans of the new buildings (The project documentation was provided by ‘Codacons’ - association for defense and consumer protection - of Agrigento).



Figure 7. Panoramic view of the area. In photo the excavations work and new concreting are clearly visible (photo by T. Cilona - May 12, 2024).

4. CONCLUSIONS

Sustainable cities must allow everyone to live and inhabit in harmony with nature and the urban landscape, avoiding financial waste, consumption of new land and building speculation to the detriment of the environment [9].

It is necessary to redevelop what already exists, intervening primarily on public buildings - little or badly used - generating new opportunities, as opposed to overbuilding practices which have such a negative impact on the ecosystem.

The case study of Emilia Romagna is emblematic for the sensitivity, interest and vision of the administrations which actively dialogue with all interested parties and coordinate urban redevelopment interventions aiming at the inclusion of greenery - *a tree for every inhabitant* - rather than overbuilding.

For the city of Agrigento - *Capital of Culture for 2025* - unfortunately, this does not happen and new buildings are built instead of trees. For the future of the city, however, we believe that it would be necessary to recover and enhance the properties no longer in use, together with the care, enhancement, conservation and protection of the existing arboreal heritage.

Citizens' use of public open spaces and abandoned buildings, properly rethought and reasoned, would ensure greater liveability. We need a propensity towards *Nature-based Solutions* rather than the use of new volumes, together with a good ability to know how to read and interpret urban contexts.

"...Cities are like books and can be read (...) a city with carefully designed squares and parks creates pleasure for visitors and passers-by, but also for those who live, work and play in the city every day. Everyone should be able to see a tree from their window, sit on a bench near their home with a children's playground or have a park near their home. Well-designed areas and neighbourhoods inspire the people who live in them, while poorly designed and governed cities mistreat their citizens" [13].

But not everyone has an interest and sensitivity for this kind of reading...

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The regeneration of public spaces of the dismissed industrial areas

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Abstract

Public space provides a place for people of different cultures to meet and interact, it is a space where social integration and community cohesion is promoted.

The public spaces regeneration around industrial dismissed areas is a challenge and an opportunity for cities all over the World. These sites, which were once epicentres of industrial activity, are often characterised by environmental degradation and socio-economic problems. However, the regeneration of these spaces offers a chance to transform them into new, vibrant and sustainable places for the community.

The presence of disused industrial spaces can have a significant impact on the surrounding urban fabric, influencing the quality of the built environment and urban infrastructure. The abandoned industrial areas represent a widespread and complex phenomenon both in Italy and in the rest of Europe.

Although widespread throughout the territory, abandoned industrial areas are largely concentrated in the main urban economic centers: in these areas, the crisis of some traditional sectors of industrial production has triggered a progressive degradation, not only on the same production site but also on the immediate built context, eventually affecting the social and economic fabric as well.

This paper aims to carry out an ex-post analysis of some good practices of industrial dismissed area urban regeneration (London, Amsterdam, Rotterdam and Hamburg), focusing on the identification of innovative, sustainable and circular approaches adopted. The aim is to understand how these projects have also had benefits for the surrounding public spaces. The ex-post analysis will be carried out through the recourse to qualitative, quantitative and economic/financial indicators, relating to economic, cultural and environmental project dimensions.

Keywords: *urban regeneration, circular economy, urban spaces, industrial dismissed areas, ex post analysis*

1. INTRODUCTION

Urban spaces play a crucial role in cities, serving as places for meeting, socializing, and cultural activities, as well as green areas that enhance the quality of life for residents. These spaces, which include parks, squares, pedestrian streets, and recreational areas, help promote social cohesion by facilitating interaction among different communities and social groups. Additionally, well-designed urban spaces can foster environmental sustainability by reducing pollution and the urban heat island effect through the presence of trees and vegetation. They also impact the local economy, attracting tourists and stimulating commercial activities. The quality and accessibility of urban spaces are important indicators of the overall city well-being, reflecting the commitment of local administrations to create liveable and inclusive environments for all citizens

Florida (2002) emphasizes how cities with well-designed public spaces attract talent and investment, as such spaces are seen as indicators of a good quality of life [1].

Today, urban regeneration policies should focus on actions to make cities and human settlements inclusive, safe, resilient, and sustainable (Goal 11, Agenda 2030) [2]. According to the New European Bauhaus (NEB), the regeneration of public spaces plays a fundamental role in creating inclusive cities. This document highlights that the design of green areas, parks, and gardens contribute to

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improving air quality, reducing pollution, and mitigating the effects of climate change, such as the urban heat island effect [3]. The integration of natural elements into public spaces promotes biodiversity and the environmental well-being of cities.

Public spaces should be not only practical but also beautiful, creating environments that inspire and enhance the quality of life for citizens. The architecture and design of public spaces are intended to be attractive, promoting social interaction and a sense of community [3]. The NEB places a strong emphasis on inclusivity, ensuring that public spaces are accessible to all citizens, regardless of age, physical abilities, or socioeconomic background. This means designing spaces that are easily accessible and usable by people with disabilities, the elderly, and families with children. Creating inclusive spaces promotes social equity and community participation. In the context of the NEB, public spaces are seen as living laboratories where new solutions to urban challenges are experimented with. Citizen participation is crucial to the success of these initiatives [3]. Involving the community in the design and management of public spaces ensures that these spaces effectively meet local needs and fosters a sense of belonging and “collective responsibility”. Public spaces play a crucial role in reflecting and preserving the cultural identity of local communities. The NEB encourages the enhancement of cultural heritage through the design and management of public spaces, integrating historical and cultural elements that strengthen the sense of identity and historical continuity of cities [3].

1.1 PUBLIC SPACES IN ABANDONED INDUSTRIAL AREAS

The quality of urban spaces near brownfield sites represents a significant challenge and opportunity for urban regeneration. These spaces, often characterised by decay and neglect, can be transformed into viable areas through targeted regeneration interventions. The regeneration of these areas can significantly improve the quality of life for residents by providing new green spaces, recreational areas and public facilities. Well-planned regeneration initiatives can also foster environmental sustainability by reducing the ecological impact of brownfield sites and promoting urban biodiversity. In addition, the transformation of brownfield spaces into attractive locations can stimulate the local economy, creating new job opportunities and attracting investment.

Therefore, the regeneration of urban spaces around brownfield sites is crucial for the sustainable and inclusive development of modern cities.

The regeneration of abandoned industrial areas offers an opportunity to test innovative and technological solutions for urban development [4]. The implementation of smart city technologies, such as sensors for environmental monitoring, advanced energy management systems and smart mobility infrastructure, can transform these areas into models of sustainability and innovation. Furthermore, the integration of digital technologies in the design and management of public spaces improves the efficiency and quality of urban services.

Many abandoned industrial areas are provided of a significant historical and architectural heritage that can be enhanced through their regeneration. Conservation and adaptive reuse of historic industrial buildings not only preserve historical memory and local identity, but also offer unique and attractive spaces for new activities [5]. Projects such as residential lofts, art and cultural spaces, and centres for technology start-ups can coexist harmoniously with the industrial heritage, creating a dynamic mix of uses and functions.

Disused industrial areas, once redeveloped, can become catalysts for economic regeneration [6]. The development of commercial spaces, offices and cultural centres attracts new economic activities and creates jobs, stimulating the local economy. Furthermore, the valorisation of industrial heritage through cultural and industrial tourism can generate new sources of income for the community [6].

1.2 THE ROLE OF THE CIRCULAR ECONOMY FOR THE REGENERATION OF ABANDONED INDUSTRIAL AREAS

The circular economy plays a crucial role in the regeneration of abandoned industrial sites, offering a sustainable model that promotes the reuse of resources, reduces waste and minimises environmental impact [7]. This approach clearly differs from the traditional linear economy, which has led to resource depletion and increased pollution.

A key aspect of the circular economy in urban regeneration is the reuse and recycling of materials. During the demolition and construction of new buildings, materials such as steel, concrete and wood can be recovered and reused, reducing the demand for new resources and the waste generated [7].

Buildings can be adapted for new uses, such as offices, residences, cultural or commercial spaces, preserving the architectural heritage and reducing the need for new construction. Implementing energy-efficient technologies in converted buildings, such as advanced thermal insulation and efficient heating and cooling systems, reduces energy consumption and CO₂ emissions [8].

Sustainable resource management is essential for the circular economy. Systems for recycling and reusing rainwater and grey water can reduce demand for drinking water and improve water management. The integration of renewable energy sources, such as solar panels and wind turbines, helps reduce dependence on fossil fuels and minimise environmental impact.

The creation of sustainable urban ecosystems, through green spaces, biodiversity and the use of Nature Based Solutions (NEB), is another key element. Indeed, the creation of parks, gardens and green roofs not only improves urban aesthetics, but also contributes to biodiversity, air quality and mitigation of the heat island effect. Urban agriculture, with urban gardens and vertical farms, promotes local food production, reduces the carbon footprint of food transport and improves food security [8].

The circular approach also stimulates innovation and creates jobs in local communities, contributing to long-term economic sustainability [7]. Moreover, the quality of life of residents improves through green spaces and sustainable environments, making cities more liveable and resilient.

In conclusion, the circular economy offers an effective and sustainable framework for the regeneration of abandoned industrial sites, helping to create resilient and liveable cities that meet the environmental and social challenges of the 21st century.

1.3 AIMS OF THE PAPER

This paper aims to carry out an ex-post analysis of some good practices of industrial dismissed area urban regeneration, focusing on the identification of innovative, sustainable and circular approaches adopted. The aim is to understand how these projects have also had benefits for the surrounding public spaces. The ex-post analysis will be carried out through the recourse to qualitative, quantitative and economic/financial indicators, relating to economic, cultural and environmental project dimensions.

2. GOOD PRACTICES OF ABANDONED INDUSTRIAL AREAS

The urban regeneration of disused industrial areas represents a complex and multifaceted challenge for modern cities [9]. These spaces, often characterized by decay and abandonment, offer a unique opportunity to rethink and regenerate the urban fabric, transforming them into vibrant and sustainable neighbourhoods. Regeneration interventions aim not only to reclaim valuable land but also to improve residents' quality of life, stimulate economic growth, and promote environmental sustainability. In this context, it is crucial to adopt an integrated approach that involves various sectors of investment, including infrastructure and transport, commercial and residential spaces, and green and cultural areas. In this paragraph, some urban regeneration projects are examined: Greenwich Peninsula (London), Kop van Zuid (Rotterdam), HafenCity (Hamburg) and Zuidas (Amsterdam). These case studies are concrete examples of how cities can tackle these challenges and transform disused industrial areas into dynamic, inclusive and sustainable neighbourhoods and public spaces.

2.1. GREENWICH PENINSULA, LONDRA, UK

The Greenwich Peninsula, located along the River Thames in southeast London, has historically been an industrial area with activities including gas production and chemical manufacturing. By the 1990s, the area was degraded and underutilized, prompting local authorities and private developers to conceive an ambitious regeneration project to transform it into a new sustainable urban neighbourhood [10].

The Greenwich Peninsula regeneration project is one of the largest in Europe, covering an area of 150 hectares. The vision was to create a dynamic and sustainable neighbourhood combining residences, commercial spaces, offices, cultural facilities, and green areas. The project planned for the construction of 15.000 new homes, the creation of 13.000 jobs, and the attraction of millions of visitors each year [10].

This project incorporates circular economy principles through the use of sustainable and recycled materials in the built environment sector. For instance, in the construction of buildings and infrastructure, low-impact recycled materials were used, such as demolition materials from old industrial structures that were recovered and reused.

The buildings in this project were designed to be highly energy-efficient, reducing energy consumption through thermal insulation, LED lighting, and sustainable heating and cooling systems. The entire area is powered by renewable energy sources, including solar panels on the rooftops of buildings and a biomass plant that provides green energy to the entire area.

Additionally, advanced water resource management systems were implemented, including the recycling of greywater and the collection of rainwater for irrigating gardens and green spaces.

Furthermore, the Greenwich Peninsula adopts an integrated waste management system that promotes recycling and waste reduction. The buildings are equipped with infrastructure for separate waste collection and composting. The adoption of sustainable practices has significantly reduced the area's environmental impact. The use of renewable energy, efficient water resource management, and the promotion of biodiversity have contributed to creating a healthier and more sustainable urban environment. A focal point of the project is the O2 Arena, one of London's premier entertainment venues, hosting concerts, sporting events, and shows. The project included the creation of numerous parks and green spaces, such as Central Park and Riverfront Park, which provide recreational areas and improve air quality and biodiversity. These green spaces are designed to be accessible and inclusive, offering meeting and socializing places for residents and visitors. The project features sustainable connections to central London via a dedicated subway line and the Thames Clippers river service, along with extensive cycling paths, bike-sharing stations, and infrastructure for charging electric vehicles.

The Peninsula hosts cultural and artistic spaces, including art galleries, theatres, and creative studios. The Design District is a new area dedicated to creative enterprises, offering flexible and low-cost workspaces for artists and start-ups.

The regeneration of the entire neighbourhood has created an inclusive environment that promotes social cohesion. Public spaces, parks, and cultural facilities offer opportunities for interaction and community participation.

Finally, the regeneration of the Greenwich Peninsula has stimulated the local economy, creating many jobs and attracting new investments. The presence of new commercial and cultural activities has transformed the area into an attractive destination for both residents and tourist [11].

2.2 KOP VAN ZUID, ROTTERDAM, NETHERLANDS

The port area of Kop Van Zuid is located on the south bank of the Nieuwe Maas river in Rotterdam (Netherlands). The area was historically used as a port and industrial zone, but since the 1970s it started to decay, leaving behind vast brownfield and underused areas. At the end of the 1980s, the

city of Rotterdam decided to redevelop this area to revitalise it and create new opportunities for urban development [12].

The regeneration project of Kop Van Zuid aims to transform the area into a vibrant and multifunctional urban district, combining residential, office, commercial, cultural and recreational spaces. The development plan followed an integrated vision that includes improved accessibility, environmental sustainability and social cohesion.

The principles of the circular economy were incorporated into the project through the construction of new buildings and the reuse of existing ones. In fact, recycled and sustainable materials were used for both types of projects.

The buildings in Kop Van Zuid are designed to be highly energy efficient using advanced energy saving technologies such as thermal insulation, LED lighting and sustainable heating and cooling systems.

An efficient rainwater harvesting system has been implemented and grey water recycled for garden irrigation and non-potable use.

With regard to waste management, specific areas have been created within the district for separate waste collection

The Erasmusbrug Bridge, completed in 1996, is one of the symbols of Rotterdam and directly connects Lop Van Zuid with the city centre [12].

The construction of the De Rotterdam building within this district is an example of a sustainable, circular building. It is a multifunctional complex designed by architect Rem Koolhaas, housing offices, flats, a hotel and retail spaces.

The reuse of the Holland America Line building represents a virtuous case of adaptive heritage reuse. Today it has been converted into a luxury hotel.

The Luxor theatre building is the center of the neighbourhood, a venue for theatre performances, concerts and other cultural events, contributing to the vibrant cultural life of the neighbourhood.

The regeneration of Kop Van Zuid has promoted social cohesion by creating inclusive and accessible public spaces such as parks, squares and pedestrian paths.

The use of sustainable practices and green technologies have reduced the environmental impact of the district, which has become an example of sustainable urban development, improving air quality and urban biodiversity.

The regeneration of the district has also stimulated the local economy. Infact, the area has become an important centre of commercial and cultural activity, enhancing Rotterdam's attractiveness as a destination for business and tourism [13].

Kop Van Zuid has become a hub for innovation and creativity, hosting numerous start-ups, technology companies and coworking spaces. This dynamic environment has attracted young professionals and entrepreneurs, contributing to economic growth and urban innovation.

2.3 HAFENCITY, AMBURGO, GERMANY

The Hafencity waterfront regeneration project is one of the largest urban regeneration projects in Europe, located along the Elbe River in the heart of Hamburg, Germany. This project transformed a disused port and industrial area into a modern multifunctional urban district. Its planning began in the 1990s and the area covers approximately 157 hectares, with a wide variety of uses, including residences, offices, commercial and cultural spaces [14].

The vision of the Hafencity project is to create a sustainable, circular district that integrates modern architecture with Hamburg's maritime history. The plan envisaged and the construction of 6.000 new homes for about 14.000 residents and work spaces for more than 45.000 people [14].

The principles of the circular economy were incorporated into the project through the adaptive reuse of many disused historic industrial buildings. Old warehouses were converted into offices, residences and community spaces, reducing the need for new construction and minimising demolition waste.

The HafenCity buildings are designed to be highly energy efficient, using technologies such as thermal insulation, LED lighting and sustainable heating and cooling systems. The area is powered by renewable energy sources, including solar and wind power, to reduce the carbon footprint. There are also buildings that use geothermal systems for heating and cooling. HafenCity has implemented an advanced rainwater management system, including the collection and reuse of rainwater for irrigation and other non-drinking uses.

The project has promoted integrated waste management that encourages recycling and composting. The buildings are equipped with systems for separate collection and treatment of organic waste.

The district's landmark building is the Elbphilharmonie, an auditorium built on top of an old warehouse. This building combines historical architecture with modern design and hosts concerts, cultural events and offers a panoramic view of the city.

Characterising the area are numerous parks and green spaces, such as the Lohsepark and the Magdeburger Hafen. These spaces offer recreational areas and improve air quality and urban biodiversity.

The parks are designed to be resilient to flooding, a necessity given the proximity to the Elbe River. Adjacent to HafenCity, the Speicherstadt is the largest warehouse complex in the world, with historic buildings that have been preserved and converted into museums, office and retail space. This district is a UNESCO World Heritage Site.

In addition, HafenCity also houses the Science Centre, which promotes science education and research on sustainable innovation. This centre is an integral part of the initiative to make HafenCity a model sustainable and technologically advanced neighbourhood.

The regeneration of HafenCity has created inclusive and accessible public spaces such as squares, parks and waterfront promenades that promote social interaction and community cohesion [15].

Affordable housing has been built to ensure socio-economic diversity among residents.

The adoption of sustainable practices and the integration of green technologies have significantly reduced the neighbourhood's environmental impact. HafenCity serves as a model for sustainable urban development, contributing to climate change mitigation, the promotion of urban biodiversity and the creation of numerous jobs.

2.4 ZUIDAS, AMSTERDAM, NETHERLANDS

Zuidas is a business district located in the south of Amsterdam, the Netherlands between the Amstel and Schinkel rivers. Its transformation began in the 1990s, when the area was mainly occupied by warehouses and small industries [16]. The aim of the regeneration project was to create a modern business district that could compete with Europe's leading financial centres. The vision of the Zuidas project is to develop a multifunctional district that combines offices, residences, retail space, cultural facilities and extensive green areas. The development plan envisages the creation of 270.000 square metres of office space, 50.000 square metres of commercial space and 1.000 new homes [16].

The buildings constructed in this district have been designed to be highly energy efficient, using advanced technologies for thermal insulation, lighting, sustainable heating and cooling systems, sustainable materials

The area is equipped with renewable energy infrastructure, including solar panels and wind turbines. A rainwater harvesting system has been piloted to irrigate all green areas in the neighbourhood.

Mahler4 and Symphony are two office complexes located in the heart of Zuidas, characterised by modern and sustainable architecture. These buildings house major international companies and offer flexible and innovative workspaces. Zuidasdok is an infrastructure project that includes the construction of a new railway station to connect the district with the centre of Amsterdam, street improvements and the creation of public spaces, cultural and recreational spaces, including theatres, museums and sports centres. These spaces enrich the cultural life of the district and offer opportunities

for recreation and entertainment. Parks, squares and pedestrian promenades are designed to be places for meeting and socialising.

The district has become an important financial and commercial centre, enhancing Amsterdam’s attractiveness as a business and investment destination, hosting numerous start-ups, technology companies and coworking spaces [17].

3. IDENTIFICATION OF SECTORS AND INDICATORS TO EVALUATE THE SUCCESS OF ABANDONED INDUSTRIAL AREAS REGENERATION PROJECTS

After an ex post analysis of the good practices analysed in the previous section, the sectors of success in which cities have invested the most, for the waterfront regeneration, according to the principles of the circular economy were identified (Tab. 1)

Investment Sector	Zuidas, Amsterdam	Kop van Zuid, Rotterdam	HafenCity, Amburgo	Greenwich Peninsula, Londra
Infrastructure and Transport	Zuidasdok: railway station and roads improved	Erasmusbrug: bridge for enhanced connectivity	New road and rail infrastructure	Jubilee Line, Thames Clippers: improving connectivity
Offices and Commercial Spaces	Office complexes (Mahler4, Symphony)	Modern office complexes	Modern offices and commercial spaces	Modern commercial and office spaces
Residenzial	New housing, including affordable housing	New housing, including affordable housing	New housing, mix of luxury and affordability	15.000 new houses, mix of luxury and affordable prices
Green and recreational spaces	Parks (Beatrixpark, Amstelpark)	Parks and green spaces	Parks (Lohsepark, Magdeburger Hafen)	PARKS (Central Park, Riverfront Park)
Culture and Recreation	Theatres, museums, sports centres	Luxor Theater, Hotel New York	Elbphilharmonie, Science Center	O2 Arena, Design District
Environmental Sustainability	Renewable energy, water management, waste recycling	Renewable energy, water management, waste recycling	Renewable energy, water management, waste recycling	Renewable energy, water management, waste recycling
Social Cohesion	Inclusive public spaces	Inclusive public spaces	Inclusive public spaces	Inclusive public spaces
Innovation and Education	Spaces dedicated to start-ups and emerging technologies	Cultural and innovative spaces	Science Center, educational spaces	Cultural spaces, Design District

Table 1 Investment sectors of the analysed good practices for the waterfront regeneration

Also, from the ex-post analysis of good practices, a number of possible impact indicators were identified, related to the investment sectors identified in the previous table, that could be used to assess and monitoring the success of good urban waterfront regeneration practices.

Investment Sector	Impact Indicators
Infrastructure and Transport	<ul style="list-style-type: none">- % Reduction in average travel time- % Increase in the number of passengers on public transport- % Reduction in private vehicle traffic
Offices and Commercial Spaces	<ul style="list-style-type: none">- No. of new companies established- Office occupancy rate- % Increase in business volume of local companies- No. of new jobs
Residenzial	<ul style="list-style-type: none">- No. of new housing units built- % growth of affordable housing- Housing occupancy rate- % Resident satisfaction
Green and recreational spaces	<ul style="list-style-type: none">- Square metres of green spaces created or redeveloped- No. of visitors to parks and public spaces- % Improvement of air quality- % Increase in urban biodiversity
Culture and Recreation	<ul style="list-style-type: none">- No. of cultural events and participants- % Utilisation of leisure facilities- % Increase in cultural tourism- % Satisfaction of users of cultural facilities
Environmental Sustainability	<ul style="list-style-type: none">- % Reduction of CO2 emissions- % renewable energy used- % of water recycled and reused- Waste recycling rate
Social Cohesion	<ul style="list-style-type: none">- No. of participants in local activities- N- of community initiatives supported- % Reduction in crime rate- No. of participants in local activities
Innovation and Education	<ul style="list-style-type: none">- No. of established start-ups and innovative companies- % Funding and investment in research and development- No. of collaborative research projects- Rate of participation in educational and training programmes

4. CONCLUSION

Public spaces in contemporary cities play a crucial role in fostering social interaction and a sense of community among residents. These places provide opportunities for recreational and cultural, thereby improving the quality of urban life. Additionally, public spaces contribute to the mental and physical health of citizens by offering green areas for relaxation and exercise. They are also important for environmental sustainability, reducing the impact of urbanization and enhancing biodiversity. These areas promote inclusion and equity by providing access for all, regardless of socioeconomic status. Revitalizing disused industrial areas is essential for enhancing the quality of nearby urban spaces. It transforms neglected zones into vibrant, sustainable neighbourhoods, boosts local economies,

promotes social cohesion, and improves the overall livability of the city. The analysis of best practices has demonstrated the importance of an integrated and multidimensional approach to transforming disused industrial areas into sustainable and vibrant neighbourhoods [18]. These projects not only improve infrastructure and connectivity but also promote economic development, social cohesion, and environmental sustainability. The interventions have focused on key sectors such as infrastructure and transport, offices and commercial spaces, residential, green and recreational spaces, culture and leisure, environmental sustainability, social cohesion, and innovation and education. The use of specific impact indicators allows for measuring the effectiveness of interventions and monitoring progress towards the set goals. Indicators such as the reduction in average travel time, the increase in the number of public transport passengers, the creation of new jobs, and the improvement in air quality are fundamental for evaluating the tangible benefits of site and public space regeneration initiatives. The examined projects demonstrate how well-designed urban planning can lead to numerous benefits, including improved quality of life, neighborhood economic growth, environmental impacts, social cohesion, and more. The regeneration of these abandoned areas within cities makes public spaces more inclusive and promotes interaction among different communities [19]. A planning approach that considers all aspects of urban living, from mobility to sustainability, is essential for creating livable and sustainable neighborhoods. Involving residents and local communities in the planning and development process ensures that local needs and preferences are respected. In conclusion, the urban regeneration projects of Zuidas, Kop Van Zuid, Hafencity, and Greenwich Peninsula represent successful models of how disused industrial areas can be transformed into sustainable, inclusive, and thriving neighborhoods.

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How to design flexibility. The challenge of local centralities

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Abstract

Much life of in the city today is immaterial and needs a completely different method of design for actions and physical transformations for the well-being of the settlements.

The best challenge is the theme of local centralities in cities; these are points of accumulation of sociality, of activities surrounding residential life to qualify the daily well-being, but also to support the efficiency and organization of the city as a condition of development.

The common denominator of operations seems to be the word "connect". Connect horizontally by completing the road network and daily services, the continuity of the grid of public spaces. Vertically connect the different scales, in the sense that the centralities have to easily connect to the higher levels of urban benefits. Connect to mobility access nodes of public transport, which take on particular importance. In any place of the immaterial city life, there is a need to strengthen the networks of relationships in multiscale. Therefore, need another design task: "giving meaning to places". Give meaning to the places of primary needs; make sense of the places of connections. They will find must cure the existence of tissues and inhabitants living around and must be treated as a place of civil relations.

Two design imperatives are achieved: to take measures and feasible. Having considered predominantly parts of existing and living cities today, we must think about solutions with the maximum social impact in the shortest possible time, otherwise, citizens will find other ways of satisfying basic needs Only with "tailor-made" measures will adjustments become feasible and credible

Keywords: *urban design, flexibility, local centralities, urban relations, feasibility.*

1.The context and reasons for the problem

The quest for flexibility in urban planning tools today forces us to explore at the same time the strategic side of land governance as well. In fact, in the apparent "city of the eternal present," invisible processes actually flow, and in the seemingly stable life of cities, everything has inexorably changed. Corporate-dimensioned health needs to take the form of neighborhood health homes. It has totally changed the relevance of economic sectors, where platforms, aerospace and medicine have supplanted tourism trade construction. New roles in urban and large-scale logistics emerge. Also changing in parallel are the forms of space occupation that produce empty shells and new locational needs. The invasion of Airbnb, in much of the existing residential, is changing the face of the rental market, the supply in the market, and the profile of possible users. The aforementioned big data in reality is still often reserved only for business operators. The processes of territorialization have changed, in which digitization has expanded the possibility of residence-work distance, with less use of travel and less economic commitment in rentals, forever changing the forms of the compact city. The topical theme since much city life today is immaterial [1] but, invariably, it imposes physical, organizational, and performance actions and transformations for well-being in settlements and overall urban efficiency.

To complicate matters there is also a separation of society [2]. No longer mobile dragnets with a lively social elevator, but in the process of stiffening according to social stratifications. Are elites, the few with other incomes and power; of creative class well-articulated by culture and democracy but

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without power or stages from which to communicate; a new form of people, comprising many subsets with service jobs, highly self-centered, which dialogues in very discordant ways and rivulets with power, each for small exclusive benefits.

With evidence, a completely different method of design is required. However, there remains a conservative way of working according to old mental structures and misunderstood approaches to multidisciplinary. It is now impossible to think of the current state as a degradation of the existing. Reality forces one to abandon the old reassuring but sterile paradigms of a depleting world.

It is exactly up to urban planners to do this work of rediscovery, description and design application. The path that is imposed, and attempted to be clarified here, is developed by holding together processes, pulverized social frameworks and new systems of relationships, with the invention of eventual new urban forms. What profiles will the concrete, material and tangible changes have in the now-built but different city where life flows? What actions even on the new systems of relationships that pervade it?

It is quite clear that average quantities, one size for all, typical of the references with which the 20th-century city developed, is no longer possible. One has to operate in a state of continuous tension where everything is variable and everything goes conflictually between polarization and marginality. The urban planner must abandon the certainties of operating correctly by moving in the mediality of urban events. It is no longer possible to use standards, densities, requirements and transportation models, only from a numerical perspective without being reworked from a performance perspective, producing well-being and settlement quality. The kaleidoscope of needs of peripheral situations requires differentiated and specific physical and social policies as well as knowing how to cultivate the places of endogenous organization and stabilization of bottom-up initiatives. (figure 1)



Figure1. Poster: cultivate the places of endogenous organization and stabilization of bottom-up initiatives

These suburbs, on the other hand, as a custom and design response, still receive renovations of isolated buildings and objects without a social project to use them. The Italian PNRR has attempted much in this regard, with little result. [3].

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Culture requires transformations as a process that is "given space" between the flow of everyday life and in identity places. Instead, we see solemn forms of self-promotion for a few experts or enthusiasts and only self-centered museums.

Roma Capitale and the Metropolitan Cities are not a game of legal entanglements. Instead, they require the concreteness of a new supra-municipal collaborative form, blocked by a fearful anchorage to old institutional arrangements. Rome has a role as a key Italian node in international competition that needs the armor of consistent places and networks of equipment that no one cares about. Only then can they be clothed with laws and powers appropriate and necessary to the task.

At last, it is well understood that the urban planner is not just the manager of no longer stable locational conveniences or the holder of accounts, laws and quibbles, to which he has too often been relegated, even in favor of extraneous processes and a warped market.

Then what should the work of the planner be today? How to expand the role of architecture of urban facts while maintaining and using technical references and disciplinary knowledge? What do projects look like? What are the paradigms of a new design of the city of the future, already present and operating?

2. THE SEARCH FOR AND CONSTRUCTION OF CONNECTIONS.

We need a controllable path of experimentation that simultaneously captures the every day and the presence of the flowing city. The best-proposed challenge seems to be the path of design, or rather invention and regeneration, of local centralities in cities. The theme of attention to the urban environment is manifested and has long been taken care of all over Europe, pioneer Copenhagen [4], with specific profiles in the different cities and related morphologies of places. Rome in its general plan '08 identified 61 of them as 'the driving nodes of local identity from which the processes of qualification and modernization of the suburbs are triggered' [5] and provided design guidelines for them. Unfortunately, simply zoning for green or services in vacant areas and completion roads, are almost useless guides.

After sixteen years and COVID-19, local centralities are points of accumulation of sociality in local areas, of activities on the side of residential life, which qualify the daily life course. They make it necessary to go beyond the quantitative logic of the standard per inhabitant alone, in order to think about the whole of the functions complementary to residence. They must also offer within them adequate lift facilities for urban functions, the engines of the city's basic economy and development, places of leadership and valuable functions. And down to the building scale, where networked urbanizations are quite different from the current ones, energy communities according to integrated, larger-scale systems, the total reconfiguration of building forms and technologies must necessarily be conceived.

Exactly the intermediate dimension between city and building gives them a role of context and sociality, of local life, all to be explored, and at the same time a gateway to the system of necessary and complementary overall urbanity.

The common denominator of the operations, which are pervasive and essentially related to fostering systems of relationships, seems to be the word 'connect', to be used independently of the areas being planned. "Connect" gives consistency to local centralities, meaning to act to link the quality of life and fluidity of the local settlement system, to connect the interfaces of the local system with the outside, and to soften discontinuities in and between neighborhoods. However, it will also serve to improve not only the settlement quality of everyday local life but also to support the efficiency and organization of the city as a condition for development. The action of connecting in different ways is investigated below.

3. CONNECTING HORIZONTALLY

The initial constraint, which has now become a routine, strong push for smart working, has extended the possibility of efficient working encounters to infinite boundaries, enclosing them in the space of every PC. Instead, it has expanded the need for physical space proximity for many functions of individual service (pharmacy, bank, school, services to the person) before finding also distributed form and less habitual, for lack of time or pandering non-systematic movements. An awareness and aspiration for better well-being has been added, implying a demand for neighborliness that was previously almost absent and often satisfied by simply numerical endowments. The multipolar shape of settlements has also increased a conscious need for prosperity in the less barycentric areas of the city, with a generalized demand for better local settlement quality.

Local centrality has a meaning far removed from shortsighted parochialism or the suggestion of villages. Today, it has a precise depth as an agglomeration of sociality whose need, pre-existing but very clear now, is the search for well-being in the surroundings, given by the specificity of the places, the sense of place, the belonging to the place and the communities present, with attention to the signals and aspirations of the inhabitants [6]. The COVID experience strengthened the richness of non-physical relationships and extended geographical horizons on a global scale. The push towards local relations and use of space would therefore be incomprehensible without the other addendum of connections to long networks and the awareness of inclusion in the flowing life of the city and urban relations. These intangible realities account for the well-being generated by the balance of relationships with everyday places and the communities present there [7].

The subject under discussion of local centralities, far from being theoretical, offers no other form of representation than the drawing and physical image of actual use, which are often used in an immiserated manner. In these cases, the major object of design care must become the space between the buildings, the customs with which they are frequented, the forms of empty space and the modes of use permitted by their size and functional specialization.

Living between buildings, using the space between buildings is exactly where proximity is practiced and local centralities are formed. Many already are and many can become so with proper urban design and codification, [8]. Are they public spaces? Not entirely. Are they the open spaces? Not entirely. They are what contains proximity, identity, and sociality. (figure 2).

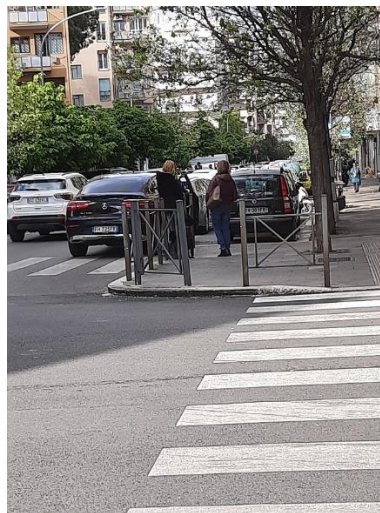


Figure 2. The spaces between buildings are what contains proximity, identity, and sociality. Sidewalk, trees, area 30 and shops, it doesn't take much.

Therefore, it is a question of designing spaces with and between buildings. It is necessary to try to make them appropriate to the relationships that normally take place between humans. Relationships specific to each social context, to be dressed in appropriate spaces and modes of use.

Materials are elementary, often neglected in the design of plans and often relegated to an almost derogatory category of 'street furniture' or misunderstandings of 'sustainability' and 'soft mobility'. Local life (of the fifteen minutes?) takes place as a normal extension of individual residence in these space-objects-uses. They are café tables or places for resting, greenways, compatibility with the passage of cars, pavements with the appropriate section, and the life of local commerce.

It must be a cautious search for the congruous dimension of the project and an ensemble capable of forming specialized networks over time [9].

Another requirement for the design of local centralities is not to deal with the leftovers of the built environment. This must be a unified design between spaces and modes of use, introduced in the plans as early as the 1990s, for example with the land morphology design of the plan of Siena. In other cases, such as Rome's plan'08, it gives an all-building and zoning solution for the 61 areas, chosen a priori, with a special I2 elaboration, indicating areas for urban and local services, for public green spaces, for roads far removed from real needs.[10].

To detail the difference, the simplest representation of the comparison of real examples and the ingredients used here. The proximity spaces in the former Fiera di Roma planned and designed in the participation sessions, are compared with the proximity spaces in the recently investigated European Eco-neighborhoods, created with careful planning to recompose environmental resources and urbanization.

The difference in the allocation of vitality and use identified by citizens and interest groups in the former Fairgrounds with the absence of daily life in the eco-neighborhoods, (figure 3a, 3b) even though they are products of famous architects, is quite obvious. "Various eco-neighborhoods [...] focus their design efforts more on the capacity of the solids to accommodate environmental instances and translate them into effective technical devices, relegating the role and character of voids as a structuring element of the urban form to the background, relegating it to a simple spacing element of volumes." [11]. In short, the issue of urbanity must be a primary concern of those who design spaces and neighborhoods.

The design material must be curved to an integrated system of spatial offerings within which processes of sociality take place. Completing the road network and ease of access to everyday services, to which we must add further fluidity of access with paths for soft mobility, for continuity of the network of public spaces, for coherence with natural morphologies, and with present objects or places of identity. Representation must simultaneously account for the objects and practices that can take place in a place, greatly extending the meaning of intended use.

4. CONNECTING VERTICALLY

The topic of relationships does not end on just one aspect. All local systems and centralities demand mobility to points of agglomeration of higher urban functions and urbanity, which makes vertical connectivity indispensable. A connected hierarchical system is a crucial factor in local life: awareness of the urban, its contemporaneity, belonging to a process and ease of access to a conscious journey. Without significant social economic and workplace development, local life also languishes. Proximity is enjoyed in the knowledge that it is part of a larger cycle.

In this vertical access to higher levels, the quality of the journey counts a lot, which should continue the well-being of proximity. Times, interchanges, modes of transport, timetables and connections must be met not by balancing networks but according to complex, non-mechanical user utility functions.

The need is not to connect nodes of a network but to connect people to places with a service of accessibility, of ease of relationship.

This is a topic of particular attention as the city, also as a result of the immaterial, is now taking the physical form of a multipolar organization. It is due very much to the points of exit of the rail transport network, or to the points of arrival of any means of public transport [12]. Are all attractors of new urbanization and functions also outside the compact city, of the confluence of visitors, workers and commuters, supports for additional profits of the real estate market. The classical residence cost - travel cost - time-distance model is more clearly activated and the processes of territorialization change in the built city. The presence or absence of nodes is crucial in the organization of local centralities exactly for the continuous accompaniment of connections and functions, between local systems and the urban system. A station lost in the countryside is not enough to offer an accessibility service, a vertical connection. The same travel comfort must be guaranteed at every point of the urbanized area, even if it is made by different modes and means of transport.



Figure 3a. Spaces and uses in neighborhood buildings Eco quartier BedZED



Figure 3b. Fill the void between buildings

Local systems lacking the organization of proximity and equal connection are called peripheries and not local centralities.

This dual way of fostering connections and interactions has the power to change the attractiveness of many areas of the city and to reintegrate marginal or peripheral situations into the normal cycle of urban life.

5. CONNECTING AT MOBILITY ACCESS NODES.

Until now, in the mobility nodes spaces and functions do not contemplate connections other than according to a multi-directional swarm, in the function of modal exchange. A concept that does not care about any other. In reality, there is a disordered swarming of many functions around, at different hierarchical levels, with poor degrees of care and no organization.

Therefore, interchanges, public rail transport stations, terminuses, and road penetration connection points are of particular importance. In the search for urbanity from local systems to the polarised densification of urban functions, the need to remain connected to the surrounding space remains. "[...] to arrive at a definition of the station as a driver capable of generating and spreading urbanity because within it, but also in its surroundings, the specific functions of mobility coexist and integrate with those of public space." [13] (figure 4) On the one hand, exchanges must continue to offer efficient systems of relations both with other points in the city and in access to the neighborhood networks that surround it. For these, we still see inhospitable places, often neglected, with hybrid forms of detachment from the context, which deserve urban planning control of the node, exchanges and access to surrounding neighborhoods.

On the other hand, building types, local mobility, station access systems, the age framework of the surrounding populations, schooling needs beyond compulsory education, local or specialized services and agencies such as banks or clinics, can define station functions in neighborhoods.

The space of local centralities and proximity must find a way to flow seamlessly into places of exchange.

In built-up areas, an identifiable and continuous intermediate circuit should be identified that gathers, facilitates and organizes local mobility for access to urban-level nodes and networks, and that optimizes possible integrations between transport alternatives. The role of local routes, formerly suffocated by overlapping and conflicting traffic flows for multiple and ambiguous road use, changes dramatically in meaning if they specialize in uses, and connect with continuity without unresolved gaps and unclear outcomes. They assume an integrating role between the fabrics, characterized by soft mobility, attention to continuous public space, accompaniment and enhancement of the ecological network and cultural heritage. Stations seamlessly enter the life of proximity and give meaning to local centralities. Stations from spaces of passage become places of identity for local communities with a process of integration and adduction into the surrounding fabric.



Figure 4. A station without surroundings and a station designed for the continuation of public space

6. SEVEN POINTS OF CONCLUSION.

To meet the challenge of designing flexibly using the case study of local centralities, it is clear from what has been considered so far that the profile of design action and the use of traditional urban planning content and tools changes completely. It should not be kept as the main objective, to provide prosperity and create local urban quality, that of 'accommodation' or 'regeneration'. It is to be followed that of building places for a balance of interactions and human relations in the flow of everyday life, of which hitherto unexpressed needs must be intercepted and satisfied, which are also the result of the new intangible living conditions of the inhabitants [14].

One* Obviously, one should not think of this planning of local centralities as a grand design of urban arrangement that rests on the city. Experience teaches us that places are formed for individual objects, for individual interventions and pieces of infrastructure linked to the often different administrative procedures, to the behavior of the actors and players present, depending on financial bargains and the convenience of profits. The pressures of citizenship are also fluctuating.

The area defined as strategic by Rome's plan, Pietralata/Tiburtina, is covered by no less than seven plans and major implementation projects such as the Tiburtina Station and the Pietralata business district. In addition, there are 4 completion implementation plans, 3 implementation plans under

approval and 1 public program, each revised and updated with variants replicated three to seven times [15]. Reality has taught us that individual interventions or public works such as a pedestrian walkway, a car park, or a road modification, are contained in implementation plans of different origins and duration.

The contributions of each one do not accumulate to the point of identifying an organic design of interventions and works but leave traces of fragments that nonetheless find unexpected coherence, or bad outcomes, given by daily uses and frequentations, and are inserted into the system of proximity. Perhaps, after some time, they will give rise to a unitary entity, rarely fully thought out as envisaged in the plans.

Two* Two design imperatives impose themselves here: measure and feasible.

Often in implementation plans for designing an urban area of normal complexity and with multi-level links, plan construction and representation tend to treat all the transformations necessary to the elements enclosed within the perimeter as fundamental components of the design, as if they all had to be realized together. Reality does not proceed in this way and many plans, the core intervention for which it was drawn up, for which actors and funding were also ready, remains tied to the interests of those who have to implement it, public or private, with indefinite and unfinished timescales. An example of this in Rome is the plan for Giustiniano Imperatore Avenue [16]. In this, having realized the building in compartment A dictated by the emergency, and a hotel that was never completed, the rest remained unimplemented, or could simply be implemented with the general plan regulations. Too many times have we seen phantasmagorical interchanges that have remained unimplemented for decades and phantasmagorical school conversions and completions that have remained abandoned.

Why this waste and overdesign? Much of the urban disorder can be related to these generous efforts of imagination not immediately linked to concrete actions.

Having mainly considered parts of cities existing and living today, solutions with the greatest social impact must be thought of in the shortest possible time. Waiting for implementation plans or variants has often made the effort futile: in the meantime, citizens have found other ways to satisfy their basic needs. Only with interventions 'tailored' to the moment, even changes or adjustments become feasible and credible.

Therefore, the grand design of areas in urban form must remain firmly in place, but with a sense of overall orchestration of operations, policy, of strategy, to maintain the flexibility and adaptability of individual projects to the variability of reality over time. Instead, we are left with a faux dirigisme that is widespread in urban planning language and rarely real in processes. The immediate fallout is that the traditional plan, of whatever scale, soon becomes obsolete. Secondly, the rigid definition of the perimeter of a traditional plan falls away. What is the perimeter of a local centrality if not its uses? And what are the transformations that enable them? The theme must take the form of a series of projects and works, even non-contiguous ones, leading to improvement according to an overall design option, suggested by the design in urban form.

Three* Thus another design task is imposed: 'making sense of places'.

Making sense of the places of connections. The nodes so far exist each with self-centered logic, all exactly inhospitable, with no attention to intermodality. They must not be impervious to the existence of living tissue and inhabitants in their surroundings and must be treated as a place of civilized relations.

Giving meaning to the places of primary needs. In the neighborhoods, in the suburbs, in the smaller centers, the places present for everyone's basic needs must be given a new appropriate and relevant added value as components of settlement quality. [17] Instead, the current poor conditions need physical additions and expansion of functions, good 'connections' in the system to become attractive, to become places in the city, both neighborhood and urban level. Everything should be measured in performance and not in object endowments, as BES variables are now beginning to propose [18].

Four* It is evident that the spatial model of the standards completely changes the references, that the categories of uses need many precise specifications. Measurements in square meters of available areas are to be retained as an orientation of dimensions, but they take on or can take on a whole other form in the areas and also in the built-up area, a whole other framework of possible uses specific to the social frameworks inhabiting the places. It is designed with a huge new abacus of functions, now with almost no difference between public and private, with a network of small functions that maintain everyday life. Green areas must also be immediately usable with continuity, identify and offer planned different ways of use. The measure of quality is not size but performance, continuous and balanced management, integration in space, morphology, and relationship flows.

Five* In reality, this need for points of sociability and a usable system of proximity, the result of the expansion of immaterial relations, is made up of small things but has the power to change the structure of the city. Many of the work actions, prompted by the wide possibilities of connections and networks, have moved out of the dimension of urban life and into workers' homes. Many others, in selective forms, have remained and grown on the urban and metropolitan or territorial scale, still requiring the flow of urban life and mobility as a service. One must abandon the idea of the local as a residue almost on a furniture scale, to admit that the city has a new, additional scale of urban design, that of local systems and centralities.

Six* The importance of public transport stations and terminals as an important interface between two hierarchical levels: local and urban/territorial is emphasized. Together with the space, accessibility maps should be designed, taking into account the points lapped by the urban system, in order to provide locally connected mobility towards gateways to the city.

In built-up areas, an identifiable and continuous intermediate circuit should be identified, which gathers facilitates and organizes local mobility for access to urban-level nodes and networks. The role of local routes, previously suffocated by overlapping and conflicting traffic flows due to the multiple and ambiguous roles of roads, finds forms of specialization and integration. They take on the role of connection between fabrics, between islands, characterized by all possible integrations with soft mobility and pedestrian mobility, attention to continuous public space, accompaniment of the ecological network and usable greenery, attention to places of history and identity. Everything is drawn from the actual design of today's built city, or researched in the planned new islands.

Seven* A project with such content forces a change in the investment model. Targeted and selected local mobility that is efficient and easy to stop at urban nodes implies a change in the direction of investment towards commuter transport and public transport in general. A major stumbling block is coordination with network or utility operators and corporate governance, which should also meet the territorial strategy. Different companies in the city, belonging to different institutional levels, with different interests superordinate to the municipal one, each have their own development policy, which is not always coordinated or integrated with the overall city government policy, except in terms of pricing research in the catchment areas. Finally, yet importantly, it would be necessary to have a precise cross-reference of interventions on technological infrastructures and urbanization for consistency between business and the immaterial city.

Just as much coordination is needed in municipal budgets where each of the small local interventions is allocated to different self-defined competencies or different budget items and with different spending methods. They would require coordination through either integrated programs or robust internal coordination.

The material image of the flow and being between people in places is the result of a complicated equilibrium construction of interactions. The urban planner must enhance the ability to prefigure the effects of a design, while also having technical knowledge that helps to see actions proportionate to needs as far as necessary.

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New references to move towards urban regeneration models based on the systemic approach: case of Estero San José, Los Cabos, BCS, Mexico.

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Extended abstract

Talking about public spaces for dynamic urban regeneration in coastal Mexican cities, leads us pose inexorable challenges of a theoretical, methodological and environmental urban planning regarding the implications of sustainability concept and the role of the traditional policy of conservation of natural areas. The environment is subject to multiple pressure factors that threaten the integrity of the ecological processes and determine the urban environmental quality of tourism cities.

The paper addresses the importance of reassessing the role of the conservation of natural areas in the processes of urban regeneration as a premise to move towards scenarios of socio-environmental sustainability in coastal cities. Based on innovative theoretical contributions in the conceptualization of urban sustainability, as related to collective local awareness, the recognition of the socio-environmental value of the territory, sectoral and political administrative schemes, demands a comprehensive, inclusive and perfectible territorialized management.

From this perspective, the scope of the traditional biodiversity conservation policy is analyzed through decrees for the protection of natural areas that seem alien to the intense urban pressures and land occupation coastal cities. New methodologies are explored for the integral territorial analysis of a multidimensional and multiscale nature. All these apply to a concrete experience of the challenges posed by the regeneration of the Estero San José, a strategic area for the Sustainability of the City of Los Cabos, towards a renewed integral vision to the fulfillment of the SDGs.

Estero San José del Cabo, BCS, is the only coastal freshwater lagoon in the State of Baja California Sur, Mexico separated from the sea by a sandy bar. It is an estuarine wetland (coastal oasis) of high biological biodiversity in relation to its size and one of the most threatened by tourism development. Since 1994, it has been declared as State Ecological Reserve, a category Area subject to Ecological Conservation; it has an updated management program in 2004; it is also categorized since 2009 as a Wetland of International Importance by Ramsar Convention, "Riparian System of the San José del Cabo Basin and Estuary". It is an Area of importance for the conservation of birds at the national level because it contains a population of a threatened, endangered or vulnerable species and has been recategorized internationally for containing the most important population of a critically endangered bird species worldwide, "Mascarita Peninsular" (*Geothlypis beldingi*).

Despite existing legal framework for the protection of biodiversity, and despite that Estero San José del Cabo represents a strategic public space for the development of the city, the processes of land occupation in the immediate environment, both for productive activities upstream, and by the direct and indirect impacts of urbanization and beach management, demand innovative proposals. In particular, innovative proposals have to ensure the preservation of the hitherto invaluable ecosystem services provided by coastal ecosystems to advance flexible, resilient and proximity public spaces for dynamic urban regeneration.

Keywords: *Urban sustainability; natural protected areas; territorial integrated approach; coastal cities.*

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History, plans and projects for public space regeneration: the role of the Walls

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Abstract

The new urban issue proposes a concept of 'periphery', no longer understood as a physical distance in opposition to central areas, but as a "transversal condition that includes all those more densely populated areas, where phenomena of degradation, marginality, social discomfort, insecurity and poverty are detectable" These deep changes, result of metropolisation processes lead to significant changes on the meaning of issues related to urban planning, landscape and environment and recall the urgency of implementing policies, strategies, procedures and tools that provide integrated solutions to the instances of environmental, social, cultural and economic regeneration of the city. The research 'Italy and China. Historic infrastructure and ecological networks for an integrated urban regeneration strategy', by the PDTA of Sapienza University of Rome, analysed the relevance of historical-environmental components as reference strategies to trigger urban regeneration interventions dealt with the theme of marginality, integration between different functions and uses of public space and generating unexpected and inter-scalar synergies. Public spaces marked by the presence of linear historical permanences (walls, aqueducts) are characterised by a static/dynamic dual aspect of marginality and centrality: marginality because although maintaining an intrinsic, static, value of memory, they often suffer from neglect and degradation; centrality because the dynamic dimension of the spatial trend characterises their signs as a true 'skeleton' in constant dialogue with urban environment.

Keywords: *Cultural heritage; historic infrastructure; marginal areas; public spaces; urban regeneration.*

1. A NETWORK OF HISTORICAL AND ENVIRONMENTAL NETWORKS FOR REGENERATING THE CONTEMPORARY CITY.

Processes of metropolisation, which have affected Italian and European cities in recent decades, have induced significant transformations in territorial arrangements, just as they have changed the meaning of issues related to town planning, environment and landscape. As a result of these processes, the contemporary city, connoted by a territorially unlimited dimension, is still strongly characterised by the presence of signs of its past (monuments, but also walls, routes, aqueducts, etc.) but presents aspects of strong heterogeneity and fragmentation of the tissues, as well as a structural lack of public spaces. As a result, localised conditions of marginality, social, economic and cultural, and environmental fragility are created, affecting not only the outermost urban areas but also central areas, and fuelling a profound sense of insecurity, often making the identity ties between settled communities and the territory fragile [1].

Furthermore, the new urban question proposes a concept of the 'periphery', no longer understood as a physical distance in contrast to the central areas, but as a 'transversal condition that includes all those more densely populated areas, where phenomena of degradation, marginality, social discomfort, insecurity and poverty are detectable' [2]. These radical changes as a result of the processes of metropolisation [3,4,5] lead to significant changes in the meaning of issues related to urban planning, landscape and the environment and recall the urgency of implementing policies, strategies, procedures and tools that provide integrated solutions to the instances of environmental, social, cultural and economic regeneration of the city [6].

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Starting from the structuring character of permanences allows the construction of a network of diversified public spaces capable of reconstituting the relationships between cities and the permanences themselves, in architectural as well as social terms, reconfiguring inhomogeneous and fragmented areas to implement a broader regeneration of the urban form. It also allows for the initiation of new, integrated and inter-scalar strategies of public governance that play an effective directing role aimed at initiating processes of urban regeneration and territorial rebalancing[7].

Regeneration becomes a reference strategy, not only for urban planning, but also for social inclusion and local economic development[8], which assumes cultural heritage as the load-bearing framework in the definition of a new and more balanced territorial arrangement based on a system of networks, both historical and environmental, interactive and integrated, which becomes the framework of coherence of the strategic choices of a contemporary city regeneration process. A process that has as its main objective the priority of the protection and enhancement of cultural heritage common goods, on which to re-found the quality of the urban environment, the historical and cultural identity of communities and the very sense of the collective use of spaces.

In recent years, the new interest in strategies for the valorisation of cultural heritage in the broader sphere of urban regeneration, also in relation to the environment and landscape, has highlighted the convergence of many researches and experiences conducted at national and international level [9]. Researches and experiences that call the attention of a multiplicity of knowledge, and that have produced new points of view, in any case characterised by the tendency to overcome traditional approaches, linked to the concepts of separation and opposition between protection and transformation, in favour of a dimension connoted in terms of integration, interscalarity, interdisciplinarity, iterativity, which restores and is well suited to the characteristics of regeneration strategies [10].

From this perspective, the research '*Italy and China. Historical infrastructures and ecological networks for an integrated urban regeneration strategy*', by the Department of Planning Design and Architectural Technology (PDTA) of the Sapienza University of Rome, has analysed the significance of the historical-environmental components as reference strategies to activate urban regeneration interventions, addressing the issue of marginality, integration between different functions and uses of public space, and generating unexpected and inter-scalar synergies [11].

In the research, historical and environmental networks take on the 'sign' of invariants: naturalistic and anthropic, landscape and historical-documentary permanences and persistences become structuring and structural connotations to configure ecological, green and blue networks connecting components with different levels of naturalness; networks on which to build actions for the regeneration of landscape arrangements in their different structuring, characterising and detailed natural and anthropic components; networks for the valorisation of historical-documentary-architectural emergencies, architectural landmarks, historical paths and routes; morphological networks for the reconfiguration of open spaces, residual and disused spaces, fabrics, marginal constructions.

The methodological approach proposed by the research, starting from a contextualisation of the theme in the contemporary city, allows the regeneration processes to be addressed/pointed to the network of linear permanences (and more generally to a central role of cultural heritage). This contributes to reinforcing the identity ties between settled communities and territories (at the basis of every regeneration process), allowing at the same time a dilation (temporal, spatial and above all of meaning) of the value of the place and a progressive increase of contextualisation from permanence in the surrounding environment. Starting from the structuring character of permanences makes it possible to build a network of diversified public spaces capable of reconstituting relationships between the city and the permanences themselves, in architectural as well as social terms, reconfiguring inhomogeneous and fragmented areas to implement a broader regeneration of the urban form [12]. Permanences, from being marginal elements, become transversal threshold places in urban

environments where to build policies and transformation projects shared between public and private stakeholders, between institutions and citizens and, in particular, to play a leading role based on the awareness of the collective needs and symbolic value of cultural heritage.

2. THE CASE STUDY OF ROME, THE WALLS STRATEGIC PLANNING AREA AND THE WALL PARK

In Rome, the New PRG has represented the framework within which to carry out significant experimentation regarding regeneration of the historical heritage in general and, in particular, of certain distinctive identity signs of historical urban landscape. Among these, the case of the Walls is one of the most interesting because of the opportunities that can be created to reconfigure and re-functionalize them, transforming ‘margins’ of the historic city into a system of public spaces of interface and interrelation at the urban scale as well as at the local scale, also connected to a strong touristic and cultural vocation, participating in the definition of a new urban identity.

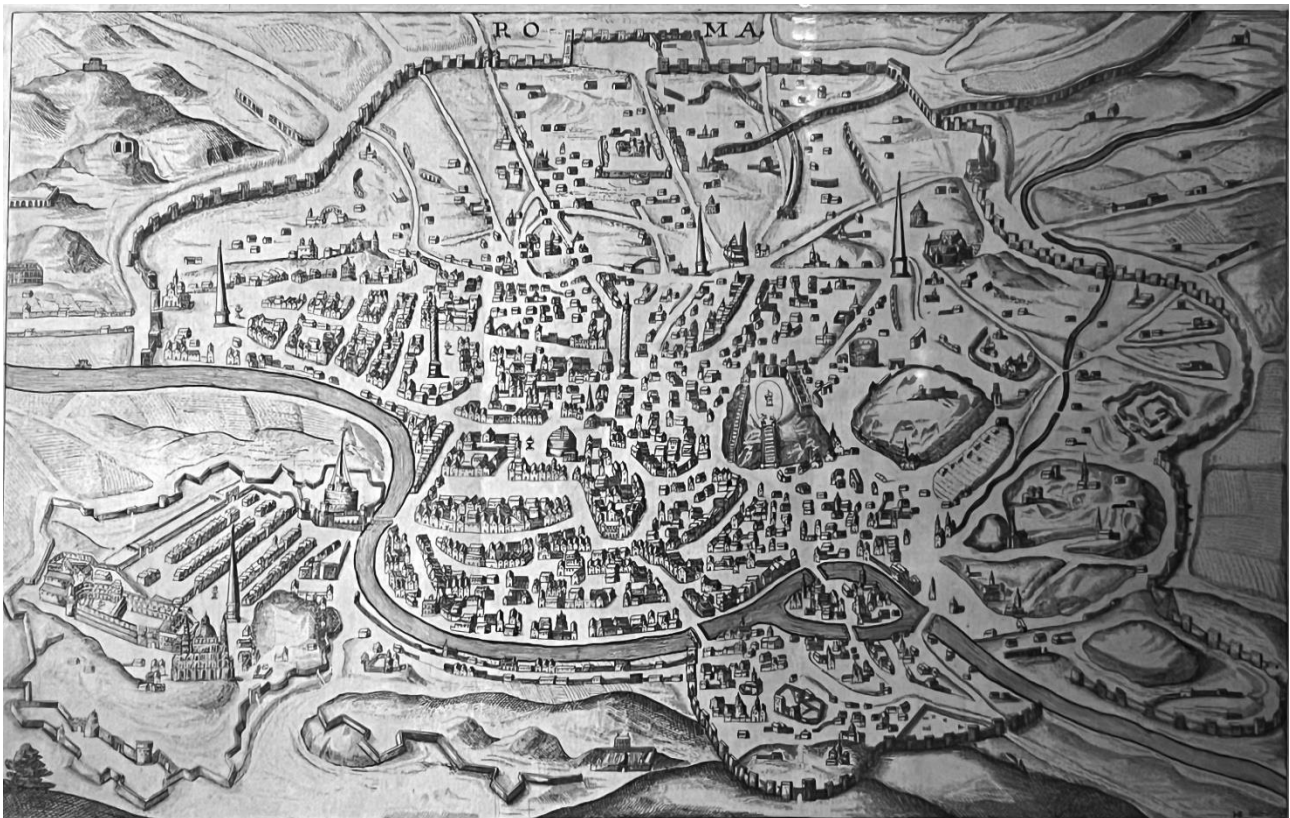


Figure 1. Map of Rome by J.L. Gottfried, 1632 (Author's property)

The Aurelian Walls, built in 270-275 A.D. by Emperor Aurelian and elevated by Honorius at the beginning of the Vth century A.D., are still one of the city's most impressive monuments and constitute the largest and best preserved fortification in the classical world. Today, they form a unique archaeological, historical and cultural system, a decisive urban infrastructure for the city's design and identity. They developed for about 19 km around the ancient city (about 13 km remain intact) with a brick structure, about 7 metres high and 3.5 metres wide, with square towers every 100 Roman feet (mt. 29.60); gates flanked by semicircular towers opened at the main streets. In their course they incorporated some important pre-existences such as the Porta Maggiore, the Castrense Amphitheatre, Piramide Cestia, and Castro Pretorio, maintaining their mark and role until the 19th century, even though they contained a much smaller and more concentrated settlement in the bend of the Tiber than the Roman city: some gates were modernised, some passages were introduced to make way for the

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new roads (Figure 1.). The city walls still intact and largely walkable today constitute a unique heritage, an identifying sign of the city of Rome which, however, apart from a few individual episodes, has not been integrated with the consolidated urban system and is often not recognised as a resource but as a limit, an obstacle, often impassable, in the texture of relations of the contemporary city. Rome's new PRG (approved in 2008) has recognised in the Aurelian Walls one of the five Strategic Planning Areas, five structuring territorial situations for the requalification of the entire urban organism: 'signs' (natural or anthropic, completely or partially preserved) that have marked the city's development and its transformation plans over time, starting from the assumption 'that there can be no authentic and lasting conservation that does not entail innovative tension, at least in making sense of things' [13].

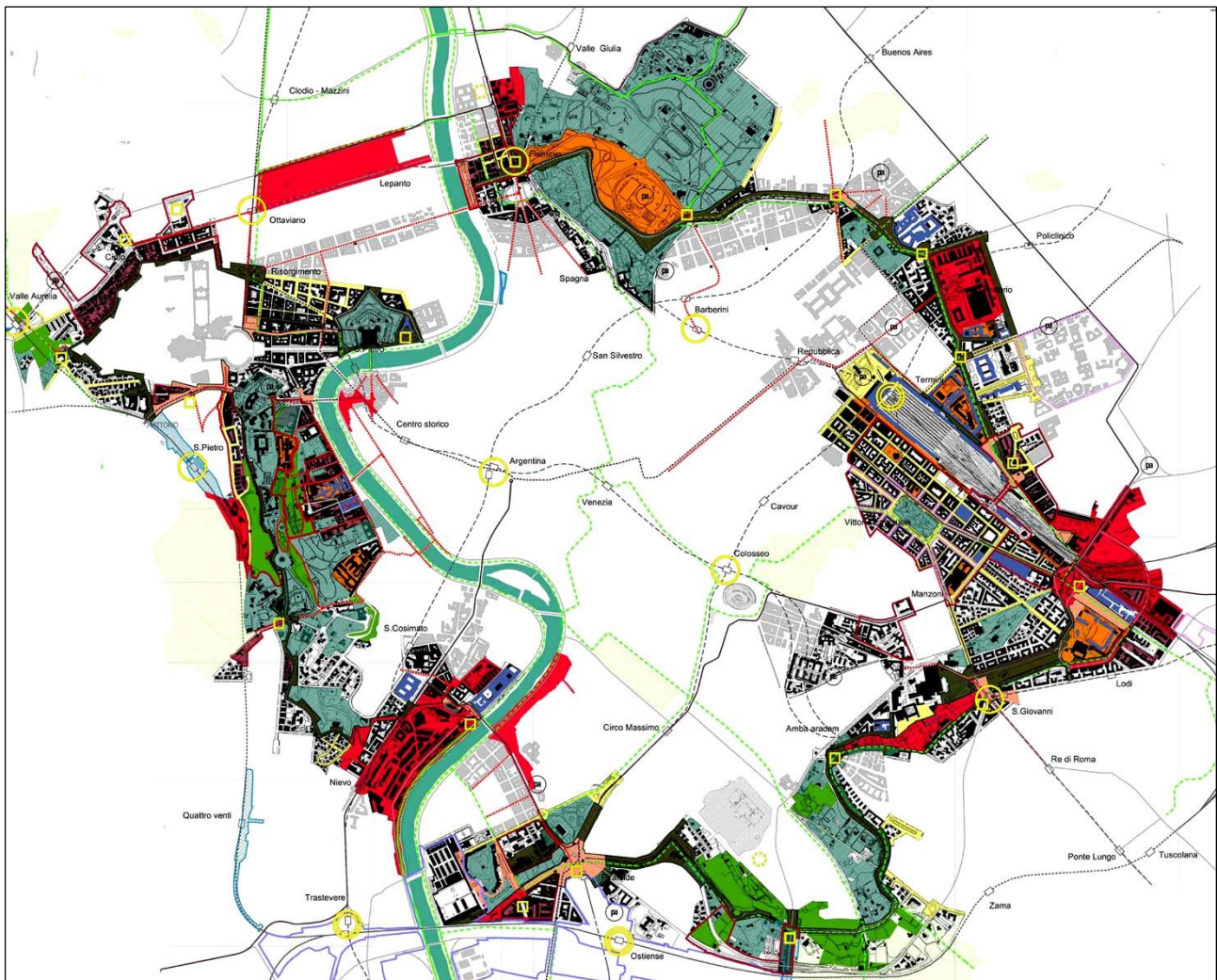


Figure 2. Strategic Planning Walls Ambit, (Author's elaboration on Elaboration I6.2 Objectives, scale 1:10,000, http://www.urbanistica.comune.roma.it/images/uo_urban/prg_adottato/i6_02.pdf)

The Ambits 'include the parts of the City to which the Plan attributes a strategic role' [n], great traces of urban morphology to be valorised according to a framework of coherence and structuring relationships to which general and specific objectives correspond. The Ambit of Walls is made up of the Aurelian, Vatican and Gianicolensi Walls, and is marked by a sequence of gates, towers, bastions, located along the route marked by some important crossings at the consular roads (Figure 2). The city walls represent a fundamental identity component of the city and of the historic territory [14], a sign that requires an overall strategic project of renovation and valorisation, an 'urban structure

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of great proportions, capable of constituting a load-bearing framework that reinterprets the historic city itself in the systems of relations between it and the emerging urban configurations' [15] in continuity and coherence with the structural character attributed to the construction of the overall historic-environmental system.

The lines of intervention prefigured by the strategic planning framework of the PRG [16], refer to the construction of an integrated Linear Park of the Walls.

The integrated linear park is, in fact, constituted by the 'artefact' of the Walls and the spaces of its enclave (open spaces, green areas, services, etc.) following a flexible perimeter that privileges the linear continuity corresponding to an idea of overall unity that the Walls themselves give back. The Park is configured as a true public opera project characterised by identity and comprehensiveness. A project that must above all ensure the reconfiguration of a continuous system of public green spaces that articulates the walkability of the entire walled pathway and the re-functioning of the walls and related volumes for cultural and service activities.

From the point of view of 'planning by doing' [17], understood as an approach characterised by experimentation and processuality, aimed at bringing extraordinary procedures back into the Plan's reference contexts (an example of this is the Urban Project as defined in the PRG regulations), the design of the Park involves both already defined parts such as the area between Porta Metronia and Porta Latina (opened in 2009), Porta San Paolo - Via Giotto - Via Guerrieri (2013) and the Gardens along Via Carlo Felice (2020), as well as areas yet to be redeveloped (at Via delle Fornaci, Porta San Paolo and Porta Maggiore - San Lorenzo) [18].

The realisations of the single parts of the Park highlight its enormous potential in terms of preserving historical artefacts, of environmental regeneration and revitalisation within the urban contexts through which it passes, also opening up to new forms of sustainable mobility and collective use of spaces. At the same time, significant scenarios open up for the start-up of potential interventions in the vicinity of the Walls according to an idea of a 'planning conscious of the history of places and attentive to the values of contexts' [19].

3. THE CASE STUDY OF PADUA AND THE LONG WAY TO CREATE THE PARK OF THE WALLS

The case of the Parco delle Mura e delle Acque in Padua proposes an alternative approach to the theme of the regeneration of historical infrastructures.

The proposed way to proceed towards a shared and participatory process towards the construction of a project centred on public space and promotion of innovative uses that are compatible and sustainable with the historical-cultural value of the permanences [20].

The city walls of Padua represent an important documentary evidence of a fortification work of military engineering from the 16th century that has come down to our days, the first one built to defend a large city on the plains, due to the considerable size of the development of the perimeter walls (11,030 km, nineteen bastions and six surviving gates of the original eight) in a complex system composed of historical canals, roads and military areas inside and outside the walls for a total of approximately 1,100,000 square metres. 500,000 sqm.

Luigi Piccinato, in the 1954 PRG of Padua, had already understood the importance of the 16th-century walls and the canal-river system connected to them as an exceptional resource [21], and had drawn a green ring along the esplanade that was never realised, however, due to the strong pressures of settlement. Perhaps the most outstanding example is the construction of the hospital above the walls and the drainage of the Jesuit-San Massimo canal behind the Giustiniano hospital.

We have to wait until the mid-1980s until the idea that the 16th-century walls constitute an enormous resource to be valorised takes hold. In the long process of establishing the Park of the Walls and Waters, the Walls Committee played a fundamental role. The association was founded in 1977 on the

initiative of a group of academics, preservation organisations and simple enthusiasts, with the aim of studying, disseminating knowledge, safeguarding and enhancing the walls of Padua.

The Walls Park project has been pursued since 1986 by the Walls Committee through a design process shared with associations, the IUAV and with the support of the Region, Province and Municipality. The basic idea starts from considering the ramparts as a single system, going beyond the logic of restoration for the purposes of pure conservation. The Project defines a complex system of interrelation between the different values inherent in the nature of the park itself (historical-cultural, architectural, landscape, naturalistic, artistic) articulating differentiated levels of services (public spaces, functions, etc.).

In 2020, also on the initiative of the Walls Committee, the experimentation of a diffuse multimedia museum, MURA VIVE, was carried out, consisting of narrative environmental installations and didactic stations, which envisages diversified and interactive modes of use [22].



Figure 3. home page Mura Vive Padova project, multimedia storytelling museum (<https://www.muravivepadova.it/mura/lemura.html>)

At the same time, thanks to the interest aroused by the MURAVIVE initiative, a group of professors from the IUAV University of Venice and the ICEA and DEI departments of the University of Padua promoted and implemented a project financed with ESF European funds, called PAMU - Multimedia Park of the Walls of Padua, a website dedicated to the knowledge and virtual visit of the Walls complex.



Figure 4. Home page of the Padua Walls Multimedia Park website (<http://www.parcomurapadova.it/#parco>)

In the same years the Land Use Plan of the municipality of Padua, approved in 2014, in line with what is indicated by the Ptcp, precisely because of its circular and continuous shape around the historic centre, assumes the ‘Park of the Walls’ as a strategic hinge and junction between the system of large urban parks and the plot of the ecological network and green and blue infrastructures at the territorial scale. The plan brings into play new forms of planning capable of reinterpreting the identity of places without erasing their historical contextual value, with the aim of restoring ‘the role of contact between the historic centre and the suburbs and of symbol of the union between the different parts of the city’ [23].

The case of Padua allows a reflection on the experiences of ‘regeneration from below’ and on the objective difficulty of launching effective policies for the regeneration of the historical and cultural heritage: if the contemporary city is a complex of articulated, discontinuous and specialised situations [24], the historical infrastructures can play an important role in the construction of projects and paths of social innovation and of integrated and shared management, leading to a gradual process of re-appropriation and re-signification of related urban spaces, at the same time allowing to work on the aspatial dimension and to reconfigure social texture and symbolic values of the territory [25]. Furthermore, regeneration processes have by their very nature a character of complexity and overlapping’ and a “design attitude” (Ingallina 2004) aimed at “measuring oneself against a polyvalent and polysemantic concept of the city” and in which it must be possible to combine different modes of intervention [26].

4. CONCLUSION

In Europe, and even more so in the Italian context, urban regeneration strategies must be confronted with the preservation and transformation of the historical heritage, opening up the possibility to create new synergies between the transformation project and the recovery of identity and historical landscape values, especially for that historical heritage of a linear nature (historical infrastructures) that by its very nature is strongly linked to landscape (in the extensive definition given by the European Landscape Convention) (heritage approach to landscape, [27]). This theme today takes on a strategic and political reference [28] (national, international and community)[29, 30, 31] that is however matched by a plurality of analytical-interpretative and design methodological approaches, both due to the specificity of the geographic-territorial, socio-economic contexts and the relative regulatory frameworks, and due to a convergence, which registers the involvement of different disciplines such as ecology, sociology, history and technology.

The debate was initiated in the 1960s, with the first Gubbio Paper for the Preservation and Rehabilitation of Historic Centres [32], which affirmed the extension of the value of history ‘from the object to the context’, and laid the foundations to define a new approach for the conservation of historical heritage, albeit in a static and not yet processual form. The subsequent Gubbio Charter of 1990 [33] introduces the concept of ‘historical territory’ and proposes the global extension of the principle of conservation, as the true locus of innovation: in this perspective it proposes the passage from ‘conservation’ to ‘conscious transformation’, aimed at the recovery, valorisation, and fruition of the historical cultural heritage.

At the same time, Urban Planning has shown a progressive interest in the role of the cultural heritage not only in terms of conservation but as a strategic component of a heritage-led redevelopment [34] focusing on those parts of the contemporary city characterised by the presence of historical permanences and naturalistic components that constitute structural references for the definition of network systems, historical infrastructures and ecological networks, through a strategy of physical and social reconnection and of triggering new economies aimed at culture and tourism, starting from the awareness of the profound link between the quality of urban contexts and the opportunities for socio-economic development.

This new complex approach to regeneration has allowed for a dilation (temporal, spatial, and above all of meaning) of the historic asset and a progressive broadening of the different disciplinary fronts and approaches related to them. This has led to an evolution of the focus of attention from the monument to its surroundings, to the historic fabric, to the existing city, and to the historic networks that extend across the territory, starting with the urban network that connotes our cities and territories [35].

Dealing today with the issue of the regeneration of territories with high historical infrastructure (walls, aqueducts, routes, etc.) implies a change of approach, methodological and cultural towards a new conception of history: from a “static” merely regulatory logic to a “dynamic” structural-strategic systemic, and processual logic capable of combining in an integrated and interscalar way, the value of preservation with the instances of transformation of these territories.

The aim is to trigger real “processes of consolidation and enhancement of the forma urbis (...) more aware of the history of the places and attentive to the values of the contexts” [36] so that they can actively contribute to the processes of regeneration of the contemporary city: It is thus defined that desired change of sensitivity towards the “past” that starts from the “present” and is intended to define the “future” arrangement of the places through the regeneration of the historical urban heritage.

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Managed Retreat: Possible testing grounds for architectural and urban design

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Abstract

This paper presents a joint research seminar held at the Politecnico di Milano on November 28th, 2023. M. Bradbury, who was in Milan for four months with a NEST fellowship, and C. Pallini collaborated on the seminar, with the contribution of A. Korolija, and E. Margione. The seminar was structured into two sections. The first explored case studies from New Zealand and the Netherlands, offering valuable insights into their climate change resilience strategies. The second section focused on Italy, particularly the Pontine Plain, facing numerous climate-related challenges. Some critical issues were identified during the seminar, such as integrating engineering and landscape design and evaluating alternative scenarios, which are pivotal in climate change resilience. The seminar also underscored the necessity of studying the effects of climate transition on towns, cities, and regions, which presents significant challenges to architectural and urban design across various scales.

Keywords: *climate change; managed retreat; public space; architectural and urban design.*

1. INTRODUCTION

The devastating impacts of climate change, including a surge in flooding incidents, have long been a global concern. In 2023, these concerns were starkly realised as floods wreaked havoc worldwide. New Zealand, for instance, was struck by a catastrophic flood over the Anniversary Weekend in Tamaki Makaurau. Italy, too, was not spared, experiencing two major floods, one in the Emilia-Romagna region in May and another in Tuscany in November. These catastrophic events led to staggering economic losses and numerous casualties, highlighting the urgent need for effective climate change resilience strategies [1]. Against this backdrop, in 2023, the Politecnico di Milano and the Unitec Institute of Technology initiated a joint research project. This was made possible by the NEST funding scheme, a four-month research project run by Matthew Bradbury and Cristina Pallini. The Pontine Plain was chosen as a case study to explore how a managed retreat strategy might help protect towns and cities and productive rural areas. The region extends southeast of Rome between the Volscian Mountains and the Tyrrhenian Sea; it was once a vast wetland, subject to many reclamation attempts since the Roman times until it became a flagship scheme for Mussolini in the 1920s. In 1935, the wetlands were drained, and three new towns were built (Latina, Sabaudia and Pontinia) along with eighteen rural villages and over three thousand farms. Ever since the Pontine Plain has been an experimental modernist landscape, yet, over recent years, the effects of climate change have become more evident. Heavy rainfall in 2018 flooded both Pontina and the surrounding countryside. Heavy rain in March 2021 caused more flooding. A tornado destroyed greenhouses and farms between Sabaudia, Pontinia and San Felice Circeo in September 2022. These events strain the Consorzio di Bonifica del Lazio Sud Ovest drainage canals and pumping station network. Indeed, shortly after the floods of 2019, the local newspaper called for a 'second bonifica', a second reclamation... just as the old project drained the wetland, the future project should prevent future flooding.

The project started with a visit to the Pontine Plain, understanding the region's unique morphology directly, a transect from the Tyrrhenian Sea, the dune, the reclaimed wetland, and the Volscian

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Mountains. We consulted with key stakeholders, most notably the Consorzio di Bonifica Lazio Sud Ovest. We planned the seminar by the end of the research period, with the primary objective of investigating strategies for enhancing resilience to climate change, specifically focusing on managed retreat and nature-based solutions. The idea was to explore how these strategies can contribute to developing urban resilience in Italy, particularly in the face of future flooding events. Managed retreat is a strategic response to the effects of climate change that plans the relocation of buildings, infrastructure, and people away from at-risk areas [2]. Nature-based solutions encompass techniques drawn from a study of ecological systems such as wetlands. These solutions can then protect, restore, and sustainably manage the ecosystems [3, 4, 5, 6, 7, 8]. The combination of managed retreat and nature-based solutions may help reduce the vulnerability of citizens to the impact of climate change while enhancing existing ecosystem services and biodiversity. The potential of these strategies to reshape the future of architectural and urban design is immense, inspiring a new era of innovation and resilience in the field.



Figure 1. Aerial views of the flooded areas in Emilia Romagna (left <https://www.ilfattoquotidiano.it/2023/05/03/alluvione-in-emilia-romagna-le-immagini-girate-dallalto-con-il-drone/7148951/>) and Tuscany (right, photo Giunta Regionale Toscana)

2. MANAGED RETREAT IN AOTEAROA / NEW ZEALAND

Matthew Bradbury discussed the impact that the idea of managed retreat and nature-based solutions (NbS), has had in Aotearoa, starting with the response to a natural disaster: the Christchurch earthquake of 22 February 2011. This 6.3 size earthquake caused the deaths of 185 people and the destruction of 3500 houses, mainly in the area alongside the Ōtākaro /Avon River, about 1000 ha. To assuage the owners of the damaged houses, the government bought buildings and properties, then demolished and removed up to 8000 homes.

This has been an important precedent in Aotearoa/New Zealand for how the managed retreat process might work for climate change driven events such as the Anniversary Day floods.



Figure 2. Anniversary Day Flooding Tamaki Makaurau /Auckland
(<https://www.youtube.com/watch?app=desktop&v=f4j08NDyNtw>)

The increase in flooding around Aotearoa/New Zealand also pointed to the gap in policy due to lack of an appropriate strategy, the absence of council accountability, and a national planning framework. This has led to the writing of the Report of the Expert Working Group on *Managed Retreat: A Proposed System for Te Hekenga Rauora / Planned Relocation* [9]. This report also pointed to how the current legal authorities and the prevailing land planning system are inadequate to support the effective implementation of Managed Retreat, which implies a significant preplanning phase. Local governments find implementation of such planning challenging for several reasons, including cultural considerations around Māori land. Managed retreat processes are costly, and communities may prefer short-term solutions. The panel makes several recommendations. Firstly, there would be an acknowledgement of Māori rights and interests, then identifying risks using a regional-level risk guide, incorporating both top-down national direction and bottom-up community involvement. Regarding policy direction, the panel recommends formulating a Local Adaptation Plan (LAP) through a new committee comprising iwi, council, and crown representatives. This committee will select the appropriate MR actions for implementation, monitoring, and review. Matthew Bradbury concluded his review by discussed the main ways in which NbS reduced the risk to flood hazards through preserving and allowing room for natural river and floodplain systems and using wetlands to reduce or delay floods by trapping and storing surface runoff [10]. Matthew cited three example of ecological restoration, the Hōteio River restoration, the Waimea Inlet Coastal Wetland Restoration near Whakatū /Nelson , and the Wairio wetlands Lake Wairarapa, that could be used as models for building resilience to the effect of climate change induced events, in particular urban flooding. Dr John Reid, Climate Change Representative for Ngai Tahu, Otautahi/Christchurch Aotearoa/New Zealand, discussed the resurgence of a Māori deltaic culture in urban design. Dr Reid began by describing the pre-Pakeha culture of Ngāi Tūāhuriri in Otautahi/Christchurch, living in a delta. “Ōtautahi was an area flourishing with life: high in mauri. Back then, it was possible to travel in a mōkihi (a canoe woven from flax) from Kaiapoi to Taumutu. And the wisdom of how best to live on the delta is still held by Ngāi Tūāhuriri today.” [11].

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However, with Pakeha colonisation in the 19th century and the founding of Christchurch in 1848 the deltaic wetlands began to be drained, and a new city was constructed. Ngāi Tūāhuriri were doubly dispossessed of their land through contacts with European settlers and when the rich ecology of islands, wetlands, and rivers were destroyed through reclamation. Dr Reid discussed the implications of the Christchurch earthquake. Damage to buildings through seismic shaking and liquefaction occurred in the areas that had originally been streams and wetlands. In a way, the return of the indigenous landscape in the earthquake foretells what the shape of the city might be with the impact of Climate change and, in particular sea level rise and fluvial flooding.

In a subsequent paper Dr Reid discussed the way in which Climate change presents significant adaptation challenges that pose considerable risks to property, the built environment, and social well-being [12]. This is particularly concerning for Ngāi Tūāhuriri communities, as their homes are in vulnerable areas. The survival of Ngāi Tūāhuriri also depends on sustainable ecosystems. Without effective mitigation and adaptation strategies, the combined impacts of climate change, flood control measures, and intensive agriculture will have cumulative detrimental effects. In the Rokohouia Delta, a significant location in Aotearoa (New Zealand), the whenua of Ngāi Tūāhuriri, the region's indigenous people, employ strategies deeply rooted in their understanding of the interdependencies between humans and ecosystems [13]. Nature-based solutions (NbS), closely aligned with indigenous thinking, are pivotal in mitigating hydro-meteorological risks associated with climate change impacts. Initially, the study explored how indigenous-informed approaches to NbS could lessen climate change risks. However, it revealed additional dimensions. Beyond risk reduction, NbS holds crucial potential for cultural revitalisation and decolonisation. The regeneration of mahinga kai (wild food gathering areas) becomes a powerful tool for addressing long-standing Ngāi Tūāhuriri grievances. These grievances stem from destroying deltaic ecosystems, integral to Ngāi Tūāhuriri culture. NbS doesn't operate in isolation. It complements conventional infrastructure in responding to hydro-meteorological risks. Integrating NbS into decision-making processes enhances social cohesion and promotes ecological consciousness. Dr. Reid finally argued that indigenous knowledge can significantly inform infrastructure choices.

3. THE DUTCH EXPERIENCE

The discussion of how MR and NbS may be integrated was initiated by Anne Loes Nillesen - Professor of Urban Design at TU Delft (Department of Urbanism) who discussed the impact of climate change on the Netherlands, a country with a hyper-engineered landscape. Its low-lying areas were shaped by water and made habitable using terps, dykes, dams, and reclamations, while the peat and clay soils were used for farming and turf production, leaving the higher sections to urbanisation [14]. In some aspects, the Polder landscape can be compared to the Pontine Plain. Nillesen argued that climate change poses system-level challenges and calls for an integrated system approach focusing on soil and water systems, ecological systems, material flows, and logistical networks. Professor Nillesen presented several research-by-design studies from the Netherlands that explore future perspectives for coastal protection, adaptation to more extreme rainfall, deteriorating water quality and subsidence (including MR) for urban and rural areas. Professor Nillesen emphasised the importance of considering the social dimension and reaching a broad consensus when developing strategies to improve urban areas. Professor Nillesen highlighted the importance of collecting and interpreting data, as well as working with local stakeholders in the research and design process. As designers, Professor Nillesen argued, it is crucial to allow for various development perspectives over time in your designs: "We have to know the mechanism, yet our designs should always entail a spatial narrative." [15]

The second Dutch speaker was Remco van der Togt, Senior Landscape Architect with Strootman Landschapsarchitecten and guest lecturer at the Academy of Architecture Amsterdam [16], who discussed space and dynamics: a new Dutch approach to water and climate project in the Netherlands.

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From being renowned for their fight against water using engineering, hard materials, and machines, Dutch designers and engineers have revolutionised their approach to water and water safety. The need to “give space to water” has become clear since the 1986 Plan Ooievaar [17]. More recently, the government launched the *Room for the River Plan* (Dutch: *Ruimte voor de Rivier*, 2006-2015) addressing flood protection and the improvement of environmental conditions in the areas surrounding the Rhine, the Meuse, the Waal, and the IJssel. Although the project area is in the Netherlands, its impact extends upstream into Germany, France, and Belgium [18]. *De-poldering Noordwaard* was the largest and most complex scheme of the *Room for the River* programme: about 28 miles of new levees were constructed: high and low, wide, and narrow. And dozens of new bridges, pumping stations and mounds were built. Natural processes are being used, instead of fought against, and water is given space instead of being kept out. Van Der Togt emphasised the importance of thinking out of the box, not fearing loss but believing in gaining something else. He stressed the role that Dutch landscape architects play in addressing current and future water challenges and explored the approaches employed in managing dynamic coastal and fluvial environments by comparing the Netherlands with the Pontine region. Through compelling examples, such as *Room for the River*, and the *Climate adaptation vision for the Wadden Sea coast in the 21st century*, the presentation illustrates an emerging practice that navigates climate challenges, including managed retreat strategies. An increased awareness of the interconnected nature of the problem calls for an increased need to break through traditional disciplinary separations, especially the interweaving of nature and technical know-how, working with hydraulic engineers and landscape architects to understand which buttons to push (water safety, spatial quality, etc.). The result may be a robust, ‘readable’ water landscape for nature to thrive, and for people to live and recreate in, a contemporary take on the century-old pattern of levees and creeks.



Figure 3. De-poldering Noordwaard. Right: view of the Fort Steurgat (1881-1882) (<https://iflaeurope.eu/index.php/site/project/de-poldering-noordwaard-biesbosch-the-netherlands>)

4. ITALY, AND THE PONTINE FOCUS

Dr Aleksa Korolija [19] and Dr Emanuela Margione [20] from Department ABC, Politecnico di Milano, talked about the reclamation projects of the Pontine Plane through historical maps. They described how some maps of the Pontine Plain pre-date the invention of topography as a disciplinary field; hence, pre-XIX century maps identify the marshes as a uniform area where no human activities are present. The only plausible reason to map the marshes was that of future reclamation. The speakers argue that this provides a modern researcher with maps of the reclamation attempts depicting a section crossing the plain for the first time and grafting onto the main built points, such as the watching towers and the scattered and poor bridges. Whether totally or partially implemented, the numerous reclamation schemes for the Pontine Marshes have accumulated a considerable mass of

data on each water body's physiology and the waters' origin to be re-routed [21]. Moreover, these schemes had already resulted in a wealth of waterworks and canals, repeatedly altering the natural order of the region: a good paradigm of the fragmented landscape which the Fascist regime wanted to make as homogeneous as possible. In this sense, the history of the Pontine Plain may be understood as a repository of projects, until “integral reclamation” was eventually accomplished in 1935. The conflict between the new towns established by Mussolini (Latina, Sabaudia and Pontinia) and the reclaimed countryside surrounding them made itself felt already after the Second World War when the whole region was subject to development plans by Cassa del Mezzogiorno (Development Fund for the South of Italy).



Figure 4. ONC, General map of the Pontine Plain showing canals for external and high waters and low waters, drainage and irrigation systems, new towns and villages, December 1934. [21]

4.1 Present condition and future challenges

While local experts emphasise the deterioration of water quality and the rise of conflicting water demands for urban uses and agriculture, climate change's effects are becoming more evident. It may suffice to recall the tornado of 29 September 2022, which destroyed greenhouses and farms in the area between Sabaudia, Pontinia, and San Felice Circeo, or the heavy rainfall of March 2021, which caused flooding in several areas, straining the Reclamation Authority's network of drainage canals. At the seminar, Dr. Natalino Corbo, Direttore Generale del Consorzio di Bonifica del Lazio Sud Ovest, spoke about water shortage problems due to reduced rainfall and consequent lower water levels in surface water and central canals. To support the irrigation of the Pontine Plain the Consortium prepared the project “Sistema Integrato Ufente-Selcella-Linea Pio VI,” which includes two closely connected interventions: a weir/traverse on the Ufente River that will create a reservoir of

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approximately 700,000 m³, to serve the collective pressure irrigation system and emergency irrigation; an intake structure with a lifting station in the Selcella canal at Migliara 49 left, and a new pressure pipeline which, after crossing the Appian Way, will transfer the flows into the Linea Pio VI canal. This project, showing a traditional engineering approach to the effects of climate change, will be implemented in 12 months and is of fundamental importance for Pontine farmers. A category particularly affected by climate change.

Stefano Conversi, PhD Candidate, Department of Civil and Environmental Engineering (DICA), Polimi, presented GIS mapping of the Pontine Plain. A landcover map shows the prevalent agrarian nature of the region both on the dune and the reclaimed wetland. The Digital Terrain model reveals the topography underneath what seems like an overwhelming flat topography. The blue colour on the DTM shows the area below sea level demonstrating the region's vulnerability to the effect of increasing pluvial and fluvial flooding. The mapping of the natural overland flood path and the artificial drainage system built by the Consorzio di Bonifica is equally revealing of both the natural flows into the areas below sea level, the so-called 'bathtub' and artificial drainage system in this area, including the pumping infrastructure at Mazzochio. The last map shows the extent and severity of future flooding.

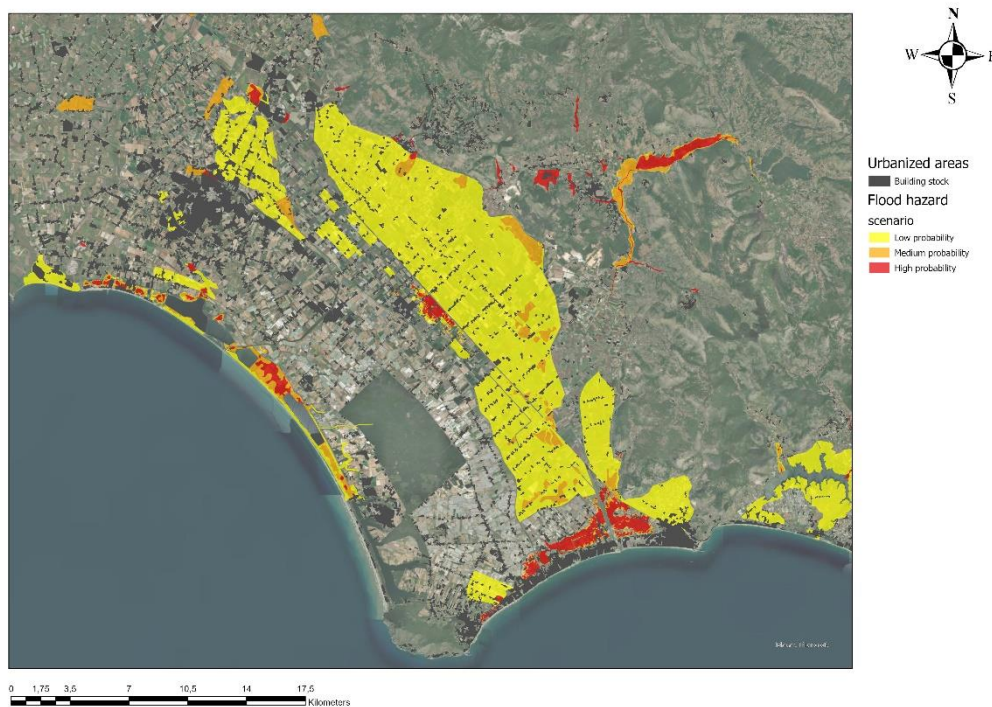


Figure 5: Agro Pontino: Flood hazard map.

Lucia Castellani – PhD Candidate, Department of Civil and Environmental Engineering (DICA), Polimi presented her sea water level rise mapping due to climate change on the Tyrrhenian coast, considering an intermediate climate change scenario from 2050 to 2100. To carry out this analysis, Dr Castellani requested a Digital Terrain Model of the Pontine coastline from the Italian Ministry of Environment, based on which she eventually analysed the current sea level rise considering the mean sea level and the contribution of high tide and storm surge. To conclude, she presented what would be the worst case of high tide and storm surges in 2050 and 2100 and highlighted the potentially submerged areas through ArcGISPro mapping.

Mario Giannini, PhD Candidate Department of Civil, Constructional and Environmental Engineering (DICEA), Università Sapienza, Roma spoke about different approaches to mitigate the probable

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effects of Climate Change on the Pontine Plain [22]. Extreme events, such as those in 2018, demonstrate the vulnerability of coastal areas. When a large quantity of water reaches the ground quickly, the current drainage systems cannot convey water to the sea. In addition to the flooding, the same areas are increasingly subject to long periods of drought with consequent intrusion of saltwater into the aquifers and a reduction of freshwater for irrigation use. For these reasons, it is very important to understand the future scenarios due to climate change, to develop systems capable of mitigating and defending these areas from possible floods or droughts. These last three researchers mapped the underlying landscape and infrastructure of the Pontine Plain and, more significantly, the effects of sea level rise and fluvial flooding to highlight the future effects of climate change.

CONCLUSION

The seminar raised a wide-ranging discussion, first and foremost about urban design challenges in a changing climate. The designer's role is often restricted to the essential but limited task of optimally embedding technical interventions.

However, the Aotearoa /New Zealand examples demonstrate how intertwined managed retreat, NbS, and reclamation of indigenous rights can become. The instance of Christchurch serves as one example of how managed retreat, as a response to a natural disaster, might be enacted, the relocation of affected citizens through the paid removal of damaged housing. At the same time, the remaining land has been re-designed as a proactive flood control system using NbS to help protect the city from future flooding, both fluvial and sea level rise. The return of the pre-colonial landscape also offers a potential redress to Ngāi Tūāhuriri. In Dutch experience, we may include considering spatial quality in the regional flood risk management strategy development. The fundamental principle of this approach is the inclusion of a range of interchangeable (effective) flood risk reduction interventions at varying locations so that the criterion of spatial quality can become decisive in flood risk management strategy development.

In parallel, EU policies are targeting long-term strategies to increase the overall quality of the living environment, encompassing the built and the un-built (Towards a shared culture of architecture. Investing in a high-quality living environment for everyone, EU work programme for culture 2019-2022). According to this document, the living environment should empower the legacies of past societies to become part of future collective projections. For architects and designers, this is a call to leave behind self-referential gestures and embrace a thorough understanding of the relationships between identity features, resilience, and transformation scenarios. Moreover, a comprehensive, culture-centred approach to designing the places to live represents a common challenge for different lines of work and expertise. Dutch scholars and practitioners are leading the way in exploring how the climate transition affects towns, cities, and regions, developing design principles and strategies at different scale levels.

Along this line of thought, we could take from the Aotearoa/New Zealand practical solutions for managed retreat and from the Dutch scholars the notion of “technical landscape”, as specific fields of expertise aimed at mitigating the effects of climate change.

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Sustainable strategies for social and environmental regeneration: an emblematic case study

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Abstract

The sustainable approach to urban renewal is increasingly pressing. Furthermore, for the large cities of Eastern Europe, mainly after 1989, when the territorial re-industrialization and the economic restructuring, led to migration flows and development of city into the surrounding.

Particularly the experience of Budapest is characterized by an urban context typical of Central and Eastern Europe, where is strong the interaction with the housing policy; the urban regeneration was at first restricted to the physical restoration, and only later on involved the social and environmental aspect (Fayman at al 2008; Keresztély, Scott, 2012). The local policies together with the global situation (e.g. the financial crisis) have contributed to shape the Budapest urban quarters that cannot be largely regarded as homogeneous areas (Földi, Kovacs, 2014).

The paper aims at adding a point of view on the case of urban transformation underway in Budapest. At first explores the evolution of the city structure; briefly illustrates the fragmented policies that led to public spaces and housing heterogeneity; by investigation on the new strategic approach to development, and its awareness on social sustainability, describes a social pilot project; finally explores the recent innovative vision for Budapest 2030.

Keywords: urban regeneration, public spaces, sustainability, Budapest 2030, climate change adaptation

1. INTRODUCTION

The sustainable approach to urban renewal is increasingly pressing; given the progressive depletion of energy resources and the need to limit both the environmental impacts and the land use to protect the environment [1,2,3]. In this scenario, the large cities of Eastern Europe, mainly after 1989, had to face the problems of the re-industrialization of the territory and of economic restructuring, all that led to migration flows and the expansion of city into the surrounding countryside [4,5,6]. In particular, the post-socialist countries are passed from an almost well-functioning planning structure to a system with no public coordination where the market actors could almost determine the plan of the city [7,8]. There was a transition from a system highly directed and protected, to one based on international trade, competition and free markets, with the breakdown of the state-led industries. Moreover, the fragmentation of public administration, due to the decentralization, produced new political importance and broader administrative responsibilities for the local governments. The so-called “neoliberal” policies prevail due to the disappeared of the socialism state, which left the ideological vacuum, together with the adaptation to “western” ideas. In this framework it is necessary to consider also the financial crisis and the structural adjustments to enter EU [7,8,9]. Also the brownfields development, in post-socialist countries, has distinctive factors like the military ones that are considered as memento of military sector restructuring [10] or the great amount of rural brownfields as a consequence of downfall of socialist agricultural cooperatives; however the industrial brownfields, still remain the main trouble to overcome in urban environment [11,12,13,14].

Actually, the main transformations of post-socialist cities during the recent twenty years are linked to the city centre and associated to the competition between citizens, investors and developers. In

particular the process of revitalization of the central area of Budapest seems to concern three principal kinds of stakeholders, such as inhabitants, investors and politicians [15].

Particularly, the experience of Budapest is characterized by: an urban context typical of Central and Eastern Europe, where is strong the interaction with the housing policy; the urban regeneration which was at first restricted to the physical restoration, only later on involved the social and environmental aspect [16].

Starting from these premises, the paper will show the case of urban transformation underway in Budapest, the most cosmopolitan and open among the capitals of Central-Eastern Europe, which like other socialist city has undergone great changes, overwhelmed by the market economy and by the values of consumer society.

The rational socialist planning for over 40 years had run the city according to a strict separation of centralized functions, in just ten years has assumed the characteristics of global society, with a new economy and major transformations regarding the organization, the structure and the urban space. The paper will illustrate: the different phases of development; the process of urban regeneration; the transformation expected for Budapest 2030. The conclusion will focus on the first observations concerning the main questions described and on the challenges for the 2030.

2. HISTORY OF THE PLACE

Budapest is the seventh largest city in Europe, created in 1873 with the union of three towns, Buda, Pest and Óbuda, situated on the two sides of the Danube (Figs. 1,2). The city is separate in 23 independent municipal districts, while the agglomerated territory counts 2.4 million population and 104 local municipal councils.

The decrease in urban population started from the 80s, in the 1990s was intensified by suburbanisation, meanwhile the city centre's residents are ageing and decreasing (in the beginning of the 90s the city lost 12% of its population, the periphery gained 16%).

The aggregate employment growth is less than 10% in the period from 1993 to 2011, and the urban performance is weakest among all the major Central and Eastern European cities (except Bucharest). The limited performances are due to an infrastructure deficit, that Budapest is trying to overcome with different projects (transport, etc.), and even if in delay compared to EU competitors there are signals of improvement related to relevant projects.

Nevertheless, Budapest is a strong outsourcing centre however is poor regarding financial services, productivity and foreign investment.

The main part of buildings dates 19th century, while during the interwar period the building constructions were limited, the first housing estates for workers were very poor and prefabricated (from 1960 a peak in 1970). After the political transition, it started a strong involvement of investors from west, south and north of Europe.

At the end of the soviet influence, the administrative decentralization and privatization have encouraged the inflow of foreign capital in the operations of redevelopment and new construction.¹⁷ Such transformation is achieved also through a range of urban projects and financial resources aimed at redesigning the identity of the places linked to the Danube. [17,18]

In the last few years, because of privatisation and European integration, the structure of the city is in continuing development.

As mentioned before, the main part of the buildings of Budapest dates at the end of 19th century, a residential neighbourhood raised around the city centre with buildings of 3-5 floors and inner courtyards (first phase). In this ring, there are also political buildings (Parliament) and cultural institutions (the Opera and museums). At the end of the century, in occasion of the Millennium international exhibition it started the first underground line of the European continent, and to close the city centre were set up Art nouveau buildings.

The second main phase of the development of the agglomeration occurred between the two World Wars, with the great development of industrial sector. In the third phase (socialist state) occurred the main transformations with the policies that push towards industrialisation and the huge migration towards the capital. Finally, in the fourth phase, after political changes of 1989 and 1990, the suburbanisation has a rapid acceleration, so activating a new period in the development of the suburban ring around Budapest [20].

After the political transition and the opening of housing and real estate market, a strong building activity was started in Budapest, in which investors from Southern, Western and Northern Europe were involved. Moreover, even if the central municipality of Budapest declared its political aim to contrast urban sprawl, it is a matter of fact that did not undertaken effective efforts and the suburbanisation has continued to attract part of urban development [20].

The system of privatization of housing, together with the fragmented structure of local government, caused considerable differences in the districts and neighbourhoods regarding the opportunities for urban renewal.

3. THE URBAN DEVELOPMENT STRATEGIES

In Hungary, the urban renewal is a multifaceted notion mainly used for physical regeneration, while the non-material aspects (social, cultural, etc.) are not entirely conceptualised. Only in recent times was introduced the social renewal, in addition to physical one, for the projects aimed at the social and cultural renewal of some neighbourhoods.

The expression “városrehabilitáció” is applied for diverse forms of programmes: entirely private real estate investments in former industrial plants (XIIIth district), the demolition of buildings in historical districts and reconstruction of new ones, more inclusive programmes aimed at the regeneration of an entire neighbourhood (IXth district). Moreover, the significance of “renewal” and “gentrification” are sometimes confused. Formerly gentrification was believed as a good event caused by “modernisation” of deprived urban areas, only recently it is realized that it could be negative [1].

The Municipality of Budapest and its districts have elaborated a number of strategic urban development documents, and all the districts have set up their strategies and rules of urban development.

Nonetheless, the overlapping of competencies and the competition between and within municipalities, especially in light of their endeavour to obtain EU financing hinders all kinds of cooperative planning in the capital.

In Budapest, the urban renewal of central districts has been a political aim only in the 1980s. Some plots had been designated and rehabilitated in the VIIth district and a more complex rehabilitation plan was prepared for the IXth district (middle Ferencváros). These were the first examples of urban renewal that, instead of demolishing run-down buildings replacing them with the construction of prefabricated ones, wished to concentrate on the renewal of existing housing. Following the political transition, urban renewal almost entirely disappeared once again from urban policies.



Figs. 1,2 Budapest, views of the city from the Danubio riverfront (Source: Marichela Sepe's Archive)

Privatisation of housing made the process extremely difficult, as it deprived municipalities of a key tool in terms of renewal, i.e. the property of buildings. Only one rehabilitation programme was launched during the first years of the 1990s, that of middle Ferencváros (Fig. 3). Based on plans prepared prior to 1990, the neighbourhood had already been designated as an area for urban rehabilitation that provided grounds for the local government to obtain exemption from the obligation of privatisation of dwellings.

In that period, in the city a legal framework of urban regeneration was almost absent, and the legal and financial framework of urban renewal was elaborated gradually with the Law on Condominium in 1994, and the official program of urban revitalization in 1996. The launch and implementation of renewal programs involved at first a group that included two districts rather decadent: Ferencváros (District IX) and Józsefváros (District VIII). These two districts were among the first to formulate clear strategies in 1990. The largest part of the housing stock was owned by the state so allowing intervention of local government. There were brownfields that allowed interventions on a large scale, and were established special agencies, for the revitalization based on Private Public Partnership (e.g. the SEM for IX Ferencváros, Rev 8 Józsefváros), that in 1990 had the responsibility of coordinating the process of regeneration in certain sectors of their respective districts. Through these companies, the local government was able to keep an active control on the renovation of old housing stock, while private entrepreneurs have had limited opportunity to enter into the recovery of these neighbourhoods. In the second group of districts it was organized less systematically the process of revitalization, in some way supported by local government measures. This approach is defined as a strategy of "limited support for urban revitalization"]19,20].

Among these neighbourhoods some examples might be identified, such as the "Theatre District" (District VI) where the enhancement has been realized in an integrated way by using the development of local infrastructure (reconstruction of the roadway, development of pedestrian areas, etc.) together with the development of cultural institutions, to increase the attractiveness of the district. In the district, "Middle-Terézváros" (District VI) a public program for the restructuring and conversion of loft was initiated. Furthermore in the "district of the Bar" (District IX) the growing flow of tourists and the growing demand for food services have encouraged the development of an area of bars and restaurants. Similarly, the local authorities of the District VI have supported the private initiatives with additional investments such as the restructuring of the road, the pedestrianization, etc. The examples mostly regard quarters for long time occupied by middle-class, with families mainly older, the buildings are normally renewed by local condominiums, and from outside the private investors play a limited role in the process, for example through sporadic housing projects of new construction. The behaviour of other districts in the city centre on the subject of urban renewal has been passive, relying upon market forces; this kind of strategy of local government - called approach "hands off"²⁰ - relates to the "Southern City Area" (District V), where the local government has developed retail and businesses instead of renovate the residential buildings. Since such renovation of housing is difficult because the vast majority of public housing has become privatized, soon after the regime change. This approach is typical of the districts where the social status of residents is traditionally high, and where the renovation of buildings is a process of self-generation because of the dominance of privately owned apartments and of a relatively high demand of these apartments on the market. The situation of the District VII (Erzsébetváros), in which is located the "Jewish quarter" despite seems to have good opportunities intervention was characterized by an "hands off". The local government here has followed a policy of *laissez faire*, very liberal, providing great opportunities for private investors.

The first strategic document entitled the Urban Rehabilitation Programme of Budapest was prepared, and adopted by the Budapest Municipality in 1997. The objective of the programme was "to help neighbourhoods to maintain and improve their urban values in order to develop their economic potentials and to fulfil their urban functions within the city". In the same year, the Fund for urban

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renewal of the Budapest Municipality was extended, in order to finance the programmes in the framework of the above-mentioned strategy. In this first period, the urban renewal was limited on the physical renovation of buildings and neighbourhoods. The majority of resources were allocated to the IXth district, and to a lesser extent to other inner city areas, in the Vth, VIth and VIIIth districts.

During the 1990s the available sites in the district have gradually disappeared, for the benefit at first of construction for offices and then of residential buildings. In the early 2000s it was started the demolition of existing buildings, since there were no empty areas for new construction, and the demolition of some buildings of great architectural value has fundamentally changed both the architectural environment that the social profile of the district. After decades of neglect and decline caused by the communist system, now in the city centre of Budapest is more and more evident a process of renewal of the built environment, which is complex and differentiated, leading to increasing heterogeneity of housing (in terms of quality and size), and a new emerging social mix (influx of heterogeneous social groups that coexist with long-term residents) [15].

At the beginning of 2003, the Budapest Municipality adopted its Urban Development Strategy (Budapest Városfejlesztési Konceptiója). The strategy incorporated the principles of the programme on urban renewal, and it was the first official strategic document in Budapest to clearly integrate the idea of sustainable urban and social development.

Preparing for European integration and the changing conditions of urban policies led to the formulation of new principles in urban renewal. New ways of thinking have emerged. On a global level the necessity of social sustainability of urban development is emphasised, in parallel to what emerges as the idea of “social urban renewal”. This new approach was presented in a programme document designating three neighbourhoods subjected to social urban renewal pilot projects. Two of these projects were immediately launched: in Bihari street, Xth district, and in the Magdolna quarter, VIIIth district. Here the renewal was later developed under the form of a long-run pilot project. In the third area, “Dzsumbuj”, located in the peripheries of the IXth district, the aim of the project was altered – the extremely run-down, socially stigmatised branded are going to be demolished. Contrary to a concept of urban renewal limited to the physical revitalisation of urban areas, social urban renewal is focussing on the integration of deprived neighbourhoods through diverse social, economic and cultural programmes, and on the gradual improvement of their physical environment with the involvement and participation of its inhabitants. Social urban renewal became integrated into the mid-term development strategy of Budapest, the Podmaniczky programme, that was adopted in 2005. Apart from social urban renewal, other types of programmes were also developed. Regeneration of public spaces, squares and streets together with the establishment of new cultural and tourism functions became a method applied for the revitalisation of more extended neighbourhoods. Since 2007, in light of the new period of EU programming (2007- 13), urban renewal has been recognised as a major issue in urban projects. In Budapest, the Magdolna quarter has been identified as a pilot project for social renewal, and all municipalities (districts and the Budapest Municipality) are now required to prepare their integrated urban development strategies in order to access resources in the framework of the Regional operative programmes (ROP).

4. REDEVELOPMENT OF DANUBE WATERFRONT

To face with the challenge of management this policy framework, Budapest City Council, on 24 April 2013, set up a long-term urban strategic vision called “Budapest 2030” leading to a 2030 strategic plan with the idea of “Redevelopment of Danube waterfront” and closest urban zone. It is a response to almost 30 years without a vision and a recent lack of resources. It shows the new comprehensive approach to urban development and consists of two main parts: a broad analysis and development topics and actions.

Budapest 2030 identifies four main challenges: territorial competition and cooperation across the EU network; handling climate change with a sustainable economy; overcoming short supply of economic

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and development resources; and persistent low employment, combined with an ageing society. Three principles are put forward to respond to these challenges: liveability, which becomes a basic expectation as a part of putting the citizen first; sustainability, which means non-wasteful development that does not compromise future generations; equal opportunities, which refers to fair access to economic and social resources [21].

The concept has a major aim to establish sectorial development strategies according to social, economic and ecological condition, besides ecological and economic previsions.

It consists of 147 actions with 17 possible objectives: 1 Proactive urban development; 2 Government partnership; 3 A coherent Budapest; 4 Strengthening international visibility; 5 Bringing about a healthy environmental condition; 6 Climate protection and efficient energy use; 7 Development of a unique city character; 8 A city living together with the Danube; 9 Efficient and balanced urban structure - compact city; 10 Target brown field areas; 11 Intelligent mobility; 12 Knowledge-, skills and green-based economic development; 13 Self-sustaining urban management system; 14 Conservation and development of cultural diversity; 15 Optimising human services; 16 Flexible housing structure adapted to need; 17 Welcoming society. Among these topics, eight are linked to climate connected issues (from n.5 to n.12).

The actions for adaptation and mitigation in the various development plans and management are many and important in Budapest, which identifies the main challenges and opportunities in view of adaptation to climate change, to make Budapest a city climate resilient [22,23]. Also the commitment of Budapest to face the global crisis is evident in the Budapest 2030 long-term development plan, that pay attention to the social, ecological and economic issues, as to problems related to energy and climate change adaptation [22]. A good example are the projects of energy sustainability that are aimed to reduce energy consumption and emissions of greenhouse gases, but also to re-organize and revitalize the city's economy, its infrastructure and daily life [24,25,26].

5. CONCLUSION

The paper illustrated the process of transformation which is interesting Budapest. Many considerations are useful to understand how urban regeneration process can be improved according to new needs and challenges.

The main part of the buildings of Budapest was constructed at the end of 19th century, and, after political changes of 1989 and 1990, the suburbanisation accelerates rapidly, setting up a new stage in the development of suburban ring around Budapest.

From 1996 to 2002 Budapest started to think strategically at urban regeneration. In 1997 Budapest Municipality elaborated the first strategic plan, “Urban Rehabilitation Programme of Budapest” with the aim “to help neighbourhoods to maintain and improve their urban values in order to develop their economic potentials and to fulfil their urban functions within the city”.

In 2003, Budapest Municipality implemented the Urban Development Strategy, setting up the principles of urban regeneration programme starting to integrate the sustainable and social approach in urban development, that seems to be prepared for European integration.

So, the social urban renewal stressed on deprived neighbourhoods integration trough different social, economic and cultural programmes and citizens engagement in physical revitalisation of the environment. In 2005 this approach was included into Podmaniczky programme, the Medium-Term City Development. Moreover, the revitalisation of neighbourhoods used regeneration of squares, streets and public spaces and established new tourism and cultural functions.

Starting from 2007, the aim of regeneration has been a major issue, also considering 2007-13 EU programming. Magdolna quarter was recognized as a pilot project for social renewal, and districts and Budapest Municipality are currently forced to organize an integrated urban development strategy so to be able of request financing of Regional operative programmes (ROP).

Nowadays Budapest faces an environment with numerous significant challenges together with huge opportunities. In spite of prosperous cultural and creative assets and urban design, the latest economic crisis showed the need of competitiveness, and without a proactive plan it is not assured future growth. There are a diversity of expressed visions and suggestions for urban future; however they need to be transferred in harmonized plans for physical and economic development.

The future urban development is still uncertain, and now Budapest is in a strategic circumstance for developing different drivers that jointly could realize key elements of the new strategic framework for urban development, such as the population growth, new attention on culture and creative industries for urban development, the urban agenda in Europe and EU urban financing, the interest of World Bank and EU on Danube as a strategic level for intervention.

From the analysis of comparative data, Budapest result to have major assets and some good progress examples, although in general it is not getting better in city's comparative position.

To face with the challenge of management this policy framework and to bring forward purposeful urban redevelopment, Budapest set up a 2030 Vision leading to a 2030 strategic plan and a good idea on redevelopment of Danube waterfront and closest urban zone, to start a positive cycle for Budapest development.

The vision for a new positive circle for Budapest could be in the next 10-20 years but it needs a new point of view that must be developed and shared between Budapest City Government and stakeholders. There is the risk of failing in organising around a unique prioritising plan, in place of operating with multiple agendas that generate disorder and fail to activate internal and external resources. Danube is certainly a key catalyst, but it is more important to link it to wider agendas throughout development projects, and key agendas contain competitiveness, liveability, culture, and sustainability.

Regarding collaboration and partnership, the key role at this point is for the City of Budapest which needs to establish much stronger prioritisation and internal coordination of this development agenda. It will also need to establish a Budapest Development Board or Agency to develop a clear programme for the economic and cultural development of Budapest and for brand building and promotion of the city. The City of Budapest must also create a partnership with the districts.²¹

Some authors consider the case study of Budapest a good example of how regeneration strategies are negotiated in the context of post-socialist transformation. This transformation is a clear case of globalization and adaptation of urban development in logics oriented by market. The example of consolidation strategies in Budapest highlights many of the contradictions linked to the achievement of socially sustainable regeneration strategies and integrated in the post-socialist countries. Weak levels of state intervention, institutional fragmentation, and powerful market incentives to promote a speculative redevelopment tend to hinder the emergence of an effective social dimension. In Budapest there are processes of experimentation within a political space characterized by: market-led redevelopment, administrative fragmentation, autocratic style of government and new multi actor approaches, partly funded by the European Union, the socially inclusive regeneration.⁹ Following the regime change, in the metropolitan region of Budapest, the socio-spatial differentiation is started. The process of diversified urban development is the result of the existing different local structures, with the legacies of the past work and new regulatory environments (local urban policies, free market, etc.). With the post-socialist transition, the localization preferences of the main stakeholders (residents and investors) are changed causing a rapid change in the path of individual urban areas: the rediscovery of the city center, a slow and steady improvement of the historic residential neighborhoods, the gradual social erosion of residential areas, decline and subsequent reinvestment in brownfield, and an explosion and then stagnation in the peripheral areas. Finally, local forces increasingly influence urban development and the city's future appears to depend on the sum of the efforts, investments and quality of change of its neighborhoods.

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Heritage and space hybridization

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Extended abstract

Contemporary cities face constant pressures from economic development, population growth, service diversification, as well as natural and anthropogenic risks. In this context, achieving sustainability and resilience in the built environment requires effective management through procedural, administrative, and legislative interventions.

An individual, a social group, and a community of people live objectively in a space that changes physically through remodeling, while simultaneously determining a new subjective perception of it. This dynamic turns space into a renewable resource both materially and spiritually, but especially emotionally. Master-planning space and its affective design create the identity of territories which generates stability. It is what makes the difference between existence itself (Sein) and living in itself (Da Sein) according to Heidegger (1927).

For a given space to become resilient, it must always be a space capable for people to live in by adjusting space according to their needs and aspirations or by adjusting space to certain purposes. Do we need to permanently reconfigure the space where we live in or not? To what extent do we keep certain permanencies or solidities? Looking back at urban history, space offers us personal identity through its preserved landmarks. Spatial changes can be generated by the evolution of concepts such as the concept of an individual in a society, the concept of family, and the concept of social groups. In this context, this paper refers to the evolution of the housing question - what we mean by both managed and regulated urban habitat and under-regulated informal habitat.

In all cities, land resources are limited; and therefore, development must take into account a sustainable balance of indicators. The city's centre usually includes several monuments which are preserved structures through time, exhibiting heritage values, and contemporary buildings that reflect the present needs of the society. Thus, restoration and reconfiguration of the existing built fabric shift its value as a cultural, functional or identity resource. Existing building spaces can be subject to restoration, reuse, and restructuring through interior interventions, new storeys or extensions. Existing buildings, even heritage ones, are often in an advanced state of degradation as a result of natural or anthropogenic hazards, as a result of complex risk analyses; and they require significant work for consolidation, restoration, and restructuring interventions. As an alternative, this fact has led to the reconfiguration of building spaces, superstructures, extensions, and insertions of the existing fabric into "new" assemblies through "spatial hybridization" procedures. The proposed case study is the historical centre of Bucharest, where hybridization has created controversial debates. The spatiotemporal dialogue opened by this approach reevaluates heritage as a development resource value, emphasizing the resilience dimension of the built space.

Keywords: *heritage, identity, spatial hybridization, urban development, sustainability, resilience*

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1. INTRODUCTION

The city is a mosaic of built spaces from different periods, with diverse structures, forms, and materialities, enriched with histories, stories, and emotions experienced over time by the community. This wealth of values, which is constantly being rewritten, forms a distinctive imprint that provides cohesion, fosters a sense of belonging, and enhances the civic dimension of the community's identity. Preserving these layers remains a desideratum for stability. The disappearance of certain landmarks creates trauma, distorts the precious "mental maps" identified by Kevin Lynch (1960), alienates, and disrupts the balance. Space is not only a physically determined content (Sein) but also a life experience (Da sein) as Martin Heidegger describes it in his book "Being and Time" (1927).

The city, as a sustainable space with the adaptability capacities specific to an ecosystem—informationality, historicity, integrity, and fluent balance—becomes resilient if it can continually be lived in, by adapting to the needs and aspirations of the community. Historical and architectural value has exclusively constituted the criterion for identifying built objects that must be protected, but over time, interest has extended to the space with environmental value as a whole and to those minor components which, through their coexistence, contribute to defining the affective value of the built space (Gociman et. al, 2019). Francois Choay highlights in "The Allegory of Heritage" (1998) the relationship between historical heritage and its acceptance by communities as a point of reference and support for the community.

A primary research question of this work is how we reconfigure space while maintaining a balance between heritage values and present needs.

The main focus of the research refers to identifying ways of intervening in a built space affected by multiple aggressions (risks, age, pollution) such as the historic area of the city of Bucharest.

The research continues the results of the "Urbasrisk" project (Gociman et. al, 2016) by extending documentation and analyses with new case studies.

2. HABITAT TYPOLOGY – BUCHAREST'S CASE

As a result of different stages of development in its history, Bucharest can easily be described as an urban manuscript, composed of three major zones: the central protected area with numerous monuments, the large standardized residential neighborhoods built systematically by the communist regime, and the disorganized, unregulated slum-like areas. The central area, which grew organically along the banks of the Dâmbovița River, was heavily affected by bombings during the Second World War and later by the earthquake of March 4, 1977, which had a magnitude of 7.7 on the Richter scale, causing 3,000 casualties and \$2 billion in damages. Following this tragic event, leader Nicolae Ceaușescu decided to demolish and restructure the affected area, leading to the disappearance of 450 hectares of old built heritage, developed over time with many monuments, to make way for the new Civic Center of the city. The brutal intervention in the urban fabric included demolishing many monuments on the Arsenal Hill in Bucharest, where demolitions began to clear the land for the location of the Palace of the People. The current Palace of the Parliament is the second-largest building in the world after the Pentagon, measuring 110 meters in height, 275 meters in width, and occupying 6.3 hectares of land.

The Church of Saint Nicholas Monastery, founded in 1589 by Prince Mihai Viteazul on the Arsenal Hill, complemented over the time by other state institutions such as the Army Arsenal and the State Archives, became a cultural and functional ensemble with great historical value and spatial coherence. The relocation of the Mihai Vodă Church by structural movement over a distance of 241.9 meters, including 197 meters on a 2.8% slope, an operation led by engineer Eugen Iordăchescu, saved the building, but destroyed its context. Its relocation behind tall blocks distorted its spatial perception. The destruction of the surrounding residential neighborhoods and the displacement of the population created traumas.



Figure 9. Site Of The Demolished Mihai Vodă Monastery



Figure 2. Relocation of The Mihai Vodă Church



Figure 3. Studied area



Figure 4. First Price – Bucharest 2000 – authors: Von Gerkan Meinhard, Zais Joachim

The area was the subject of the "Bucharest 2000" competition won by Meinhard von Gerkan's team, with a proposal for a scenographic system of urban islands and towers around the Palace of the People to block its direct perception. Currently, Bucharest still has an old, neglected, and unconsolidated built heritage, affected by risks, earthquakes, and especially by the passage of time. The current administration's decisions are overshadowed by legal property issues and financial resources that limit interventions. The protection regime imposed in the central areas with a high density of buildings and historical monuments has generated research studies focusing on protective management policies. Documents prepared by multidisciplinary teams to substantiate regulations for Bucharest's general urban planning project, continuing research on hazard mapping, typology of exposed elements (population, built environment, natural environment), and their vulnerabilities, have identified GIS-located risk maps that illustrate an overlap of central protected areas with high heritage density over those with high vulnerability. This raises a significant operational management issue regarding interventions in the territory to reduce risk. The methodology developed in the "Urbasrisk" project, corroborated with research from the Technical University of Construction, has built an observational expertise system to determine structural vulnerability.

To create a balance between the deteriorated status of the existing built environment and recent demands of beneficiaries, a series of intervention options have been identified, including conservative maintenance, improvement through restoration consolidation, transformation through restructuring, reconfiguration, demolition, and replacement. The intervention matrix is generated by the relationship between the reference value and the current status value of risk exposed elements.

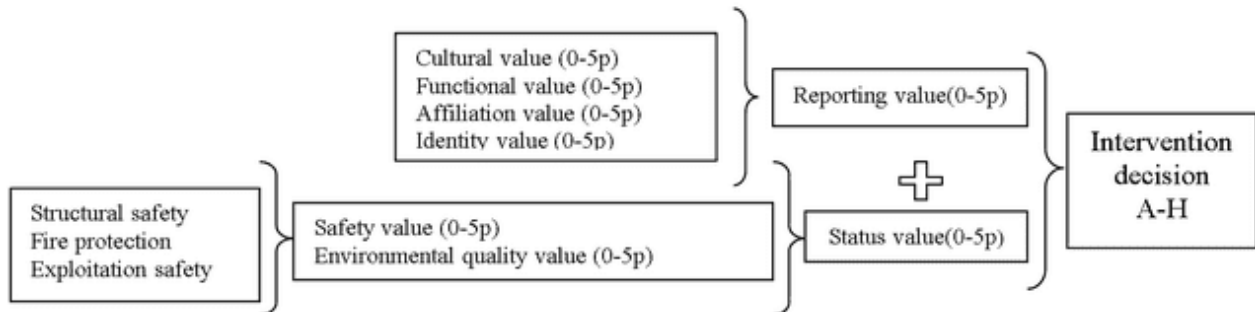


Figure 4. Evaluation of the built space

Table 1. Decision = Reference Value and Current Status Value – System Matrix

Reporting value	Status value					
	0	1	2	3	4	5
5	A	B	C	D	F	F
4	A	B	C	D	F	F
3	A	B	C	E	F	G/H
2	A	B	D	E	F	G/H
1	A	C	D	E	F	G/H
0	B	C	D	E	F	G/H

Code	Categories of interventions	
D	Restoration: conservation or maintenance works integrated into a complex intervention in accordance with specific regulations for monuments.	
E	Partial restructuring: demolition and reconstruction works of structural components involving partial transformation of the building: vertical movement, modification of floor levels, creation of new floors, redistribution of interior space of apartments without altering the total area, while preserving valuable characteristics.	
F	Global restructuring: demolition and reconstruction works involving the overall transformation of the building; compartmentalization at the building level, space accumulation, extension, alterations of enclosures while preserving valuable characteristics in relation to the whole ensemble.	
Replace	G	Demolitions
	H	New solutions

Figure 5. Categories of intervention on a built space

Similar research related to the preservation of old buildings as existential witnesses requires intervention procedures, with the concept of "adaptive reuse" being established. The typology of using old buildings is identified by Professor Dr. Michael Holleran's - *Analysis of adaptive reuse of historic buildings starting with retrofitting or dealing with old facades* through four types based on profitability criteria: reconsidering facades and architectural lighting, demolition of buildings that are

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unprofitable based on cost-benefit analysis, intervention through accessibility to the relationship between private and public space at the ground level, making it more attractive, transparent, and “walkable” and the most appealing intervention is addition, “to have more floor area in a dense city and help keeping the old buildings from demolishing” (Bollack, 2013).

2.1. Comparing sustainability of reuse old buildings with new buildings

James Douglas highlighted the sustainability of building adaptation by comparing it with new constructions in his book “Building Adaptation” (2006). He argues that “reusing or upgrading old buildings is more environmentally friendly than redevelopment. The latter involves demolition as well as new-build activities, both of which expend more energy and waste than adaptation.” Stewart Brand developed the “Shearing Layers of Change” diagram in 1994, which he published in his book “How Buildings Learn: What Happens After They Are Built” in 1995. In it, he proposes identifying the rate at which components undergo changes over time with various optimal intervals. The “Site” remains eternal, with a lifespan ranging from 30 to 300 years, while the “Skin” or facade changes once every 20 years, and utilities (“Service”) have a lifespan of 7 to 15 years. The “Space plan” or interior layout varies depending on the building’s function – 3 years for commercial spaces and up to 30 years for residences. Finally, “Stuff” (furniture) can be changed at any time (Brand, 1994).

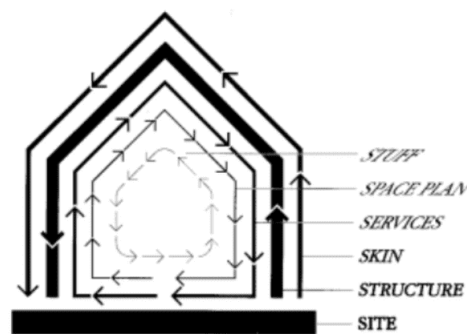


Figure 6. Shearing layer of Change (Brand, 1994)

“An old building next to a new one can create a striking visual interplay but the contrast is most intriguing when the structure itself incorporates both elements (...) These gleaming additions - many of them categorized as adaptive reuse - revitalize previously run-down buildings and areas or breathe new life into beloved structures that must be realigned to our modern priorities.” states Eric Allen in *Architectural Digest*. Adaptive reuse has been recognized as a method to improve the financial, environmental, and social performance of buildings (Langston et al., 2007; Bullen, 2007).

Ellison et al. (2007) note that refurbishing a building to meet sustainability standards can be 12% more costly than a standard reuse project. Similarly, Kohler and Yang (2007) argue that reusing buildings is less expensive than demolition. Thomsen and van der Flier (2006) suggest that adaptive reuse is preferable to demolition, which should be viewed as environmentally harmful. Their renovation study found that repurposing buildings produces less waste, uses fewer materials, and likely consumes less energy than demolishing and rebuilding.

Sustainable architectural design principles should also focus on minimizing environmental impact, creating a balance between the built and natural environments, and rehabilitating degraded areas.

3. “ADAPTIVE REUSE” IN BUCHUREST – CASE STUDIES

Overlapping of floors while preserving the footprint boundary, creating contrast through the dialogue of solid stone materials and curtain walls, the headquarters of the Union of Architects in Romania was achieved through the addition of floors onto an existing building (the former Headquarters of

Directorate 5 of the State Security during the Communist regime, partially destroyed during the Revolution of 1989).

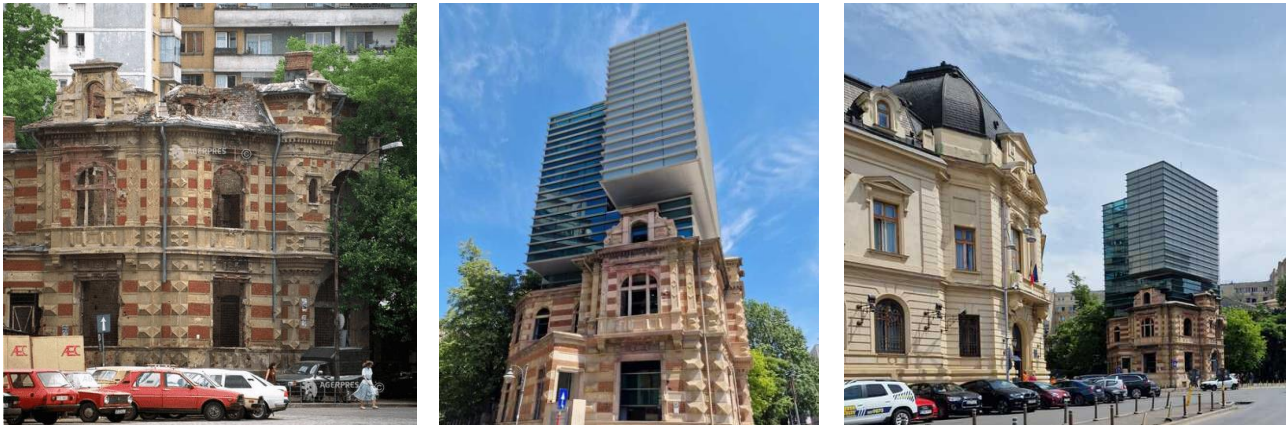


Figure 7. The headquarters of the Union of Architects in Romania, Jean Louis Calderon Street

Six years ago, in the Old Town of Bucharest, on Doamnei Street, the historic monument building designed in 1886 by architect Adolf Lang for the "Naționala" Insurance Company regained its splendor, now housing the Hilton Garden Inn Hotel, opened after an extensive process of consolidation and renovation. The building is characterized by additional floor levels added in various periods, with a change in materiality from solid domination to curtain wall.

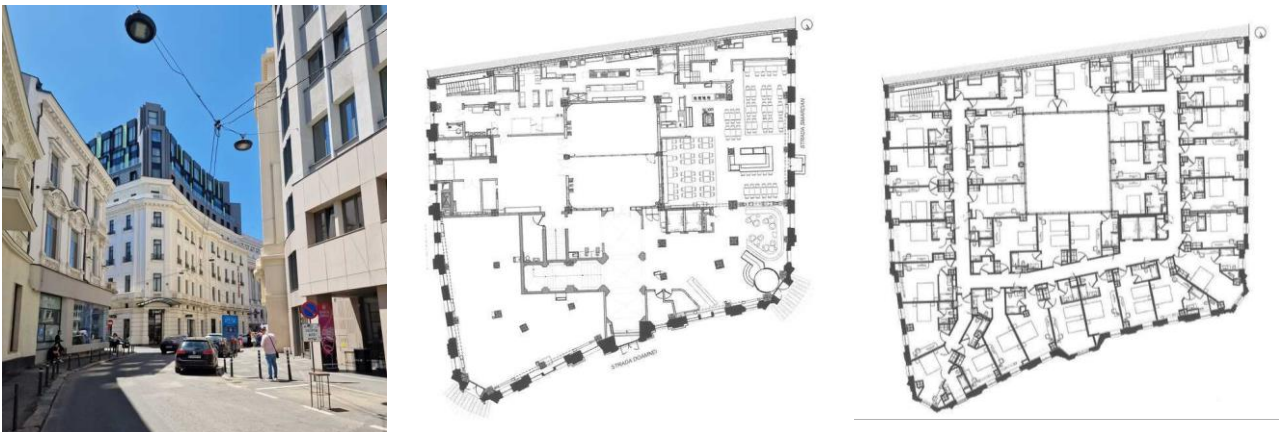


Figure 8. Hilton Garden Inn Hotel, Doamnei Street

Aggressive stacking both in volumetric conformation and in plastic dialogue, materiality, and chromatics. Hotel Sarroglia near Rosseti Square, Bucharest. Suffocating superimposition. Residential building on Regina Maria Boulevard. Incorporation, annexation of service spaces on the ground floor of the existing structure without aesthetic connections.

Apartment building on Maria Rossetti Street. Unarticulated incorporation without staircase, lack of harmonization, very aggressive aesthetics.



Figure 9. Hotel Sarroglia
Vasile Lascar Street



Figure 10. Residential building on
Regina Maria Boulevard

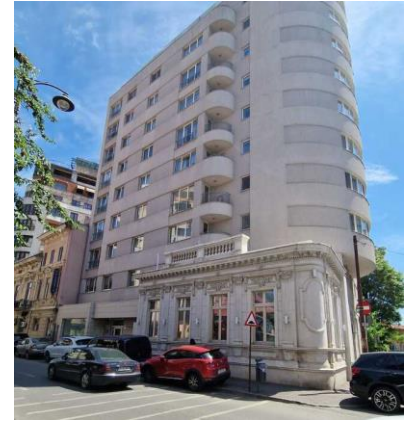


Figure 11. Apartment building
Maria Rossetti Street



Figure 12. The Marmorosch Hotel
Doamnei Street



Figure 13. Novotel Hotel, Bucharest
Victoriei Avenue



Figure 14. Rosetti
Hotel, Maria Rossetti St.

Inaugurated in 2021, The Marmorosch Bucharest by Autograph Collection represents more than the emergence of a five-star hotel in the heart of Bucharest. It means, first and foremost, restoring to the city and its inhabitants the joy and splendor of a historic fragment by reviving the Marmorosch-Bank building, classified as a Class A Historical Monument. The most significant visible intervention on the exterior was the demolition of the insertion on Eugeniu Carada Street (1995, architect Tiberiu Boitan) and the integration of the corner towards the National Bank of Romania. The new wing facing Carada Street now features a new façade aligned stylistically and compositionally with the historic one.

The reconstruction of the access of the old National Theater, destroyed by the 1944 bombing, and its use as an entrance to the new Novotel Hotel.

The Rosetti Aparthotel is an additional volumetric extension, separated with junction and integrated chromatically. The old house becomes an access device for the Aparthotel.

Extension and additional floors added to an interwar villa with an office building in an ultra-central area of Bucharest at Roman Square, harshly criticized by the public opinion for suffocating the surroundings, chromatic contrast, and integration into the context.



Figure 15. Extension of The Academy of Economic Studies, Roman Square

The project begins with rigorous historical research and site investigation, tracing the building's evolution from its medieval origins in the 15th century to its transformation into the neoclassical aristocratic residence of Ion Oteteleşanu, the prefect of Bucharest. Surrounded by a romantic park, the residence was donated to the Romanian Academy after Oteteleşanu's death and repurposed into a school for underprivileged girls. The school's inauguration by King Carol I in 1893 solidified its austere and philanthropic image, becoming a significant landmark for building restitution. In 1954, the building became the Institute of Atomic Physics, undergoing severe modifications that stripped it of all decorations. Damaged by the 1977 earthquake, it was eventually evacuated and collapsed in 2011.



Figure 16. Existing façade



Figure 17. Restoration of Oteteleşanu Castle

The structural solution aimed at reinforcing the vertical elements from the ground up, effectively tightening the structure. The project proposes preserving the original elements and creating a central hall open on four levels, featuring a zenithal illuminator to serve as a light core, symbolising newness. The reconstruction and rehabilitation of the partially collapsed Oteteleşanu Castle, which has undergone numerous stages of functional and aesthetic reconfiguration, from noble residence to school for poor girls and research institute of the Academy, through the restoration of a period image and investment with a new function as a center of excellence in Materials Physics research.

4. CONCLUSION

Case studies have inventoried several intervention methods - floor addition while preserving the footprint, extension and floor addition through incorporation, extension through addition, interior reconfiguration, and remodeling.

The contemporary city is subject to constant pressure related to development, population density increase, diversification of services, but also exposure to natural and man-made risks. In this context, the sustainability and resilience of the built environment can be achieved through proper management, procedural, administrative, and legislative intervention.

This multipolar procedural development generates hybrid spaces. The individual, the group, the community, objectively exists, evolves, and lives in a space that changes physically through remodeling, simultaneously determining a new subjective perception of it. This transforms space into a renewable resource, both material and spiritual, but especially emotional. Mastering space, marking it emotionally, creates identity territories that generate stability and must be carefully configured.

Interventions that do not preserve the scale, materiality, and chromatics of the existing have been severely criticized by the profession and civil society.

For a space to be resilient, it must always be liveable, by adapting to human needs and aspirations, or by adapting to their determinations.

Looking back in time gives us stability, and space offers us through its invariants reference points of personal identity.

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Cross-boundary Merger of public and private Dichotomy

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Extended abstract

The papers` goal is to understand the spatial quality of the private interface between the public and private realm and its perception and contribution to social life. Public, open space is the realm of public life, the space of spontaneous encounter and social activity. It provides an occasion for people of different backgrounds to come together on a daily basis. As such it constitutes a viable arena for being in and belonging to the world. On the level of neighborhood, it designates the space that can potentially foster social integration and strengthen community bonds. Whilst much research focuses on the design of public open space, less attention is paid to the equally important aspect of the transitional space between public and private and the boundaries that mark out this transition. The spatial quality of both is an important asset as it attracts residents and passers-by to engage in activities and public life at the crossover of the public and private realm in residential areas.

Drawing upon literature review a theoretical basis is built on the notion of this edge that is neither perceived as completely public nor private and simultaneously functions as boundary and seam. The paper investigates the boundary through the lens of the legal concept of ownership and possession clarifying territories and affiliations. It dives into the psychological perspective related to the need for safety and privacy, whilst also looking into its social perspective as a space for frequent meetings in the form of low-intensity, passive encounters and potential, active, social engagements. The study expands on the perceptual capacity of humans and consequent spatial properties that foster the spatial experience of both, inhabitants and pedestrians alike. It elaborates on its quality as an experience zone, where activities in both areas are mutually perceived, before possibly transforming into a zone of exchange. In closing, the investigation also looks into transformative aspirations of residents, where conceived space may turn into a constraint. When affordances are observed, inhabitants might expand their territory into public space, which is personalized by affirmation or remediation. The paper concludes with an outlook in future empirical research, where the outcome of this investigation will serve as the base for the analysis of an exemplary residential street block of a settlement for the displaced in Nicosia, Cyprus.

Keywords: *public and private realm; edge; transition; spatial and social experience; belonging.*

INTRODUCTION

Public, open space constitutes the public realm, where public life thrives and a sense of belonging and community can be established. But, public life also entails activities that spill out from the interior to the exterior private space, when these are in close proximity to and sensually perceptible from public space. In this case, then, both constitute the public realm. The purpose of this paper is to investigate the hypothesis that edges, boundaries and transition zones in neighborhoods are as important as the public space of a street or a park for social contacts to thrive and a sense of belonging and community to evolve. In this context some questions arise concerning the importance of social contacts for human well-being and where and how those contacts happen. In addition, it is important to investigate if and why public, open space in a residential neighborhood is a classic case for social contacts and their further development into community bonds. As the social reality is closely linked with the material reality, the paper elaborates the necessary, physical characteristics of edges, boundaries and transition zones along other important aspects to support public life and the resulting

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feeling of belonging and sense of community. It also looks into the fact that plot boundaries are not irrevocable despite of their legal status of ownership and that edges, boundaries and transition zones may, therefore, expand into public, open space through appropriation and possession.

SOCIAL CONNECTIONS AND BELONGING

Physical existence or being in the world, sets human beings in relation to the physical and social world, which is essential for human experience (Heidegger, 2008). Positive social connections and belonging are fundamental and universal needs of humans that influence their overall development and wellbeing (Baumeister and Leary, 1995; Cohen, 2004). Meeting this need happens on different levels, through active and intense, social interactions with the immediate social environment, family, friends, colleagues etc. and through rather passive than active, low-intensity chance meetings in the public realm or at the edge between public and private.

People, who are socially excluded and lonely, seek their salvation in social connections with strangers, as even social acceptance by strangers is proven to have a positive, psychological effect (Baumeister and Leary, 1995; Leary, 2010). Gehl (2011) continues this line of thought by arguing that social connections with strangers in public, open space, even if passive and of low intensity, can potentially stimulate future, more active, social contacts. Stronger bonds between people are developing through familiarization, which is instigated by repetitive visual encounter that ideally leads to recognition of individuals in the community. It also promotes the common good, the acknowledgement of a common code of conduct, and, in general, common social and cultural values (Amin, 2006).

RESIDENTIAL NEIGHBORHOODS

Public, open space is the realm of public life, the space of spontaneous encounter and social activity. It provides an occasion for people to come together on a daily basis. As such it constitutes a viable arena for being in and belonging to the world. On the level of neighborhood, it designates the space that can potentially foster social integration and strengthen community bonds. Whilst much research focuses on the design of public open space, less attention is paid to the equally important aspect of the transitional space between public and private and the boundaries that mark out this transition. The spatial quality of both is an important asset, as it attracts residents and passers-by to engage in activities and public life at the crossover of the public and private realm in residential areas.

The neighborhood is the smallest unit of the urban environment and is characterized by residences located in proximity to each other. Neighbors are a group of people that share experience in a territory (Gusfield, 1975). The residential street in a neighborhood is, therefore, an ideal space for social encounters, as it involves a limited number of people that have, to some extent, common interests and a common background. A sense of community is built as neighbors familiarize with each other by meeting and interacting, in a formal or informal and planned or unplanned way, on a daily basis whilst performing regular activities in open space (Kim, 2007; Capon and Blakely, 2007). Community spirit is characterized by shared experience and emotional connection, mutual mattering, integration and the feeling of being a member and, hence, belonging to a group (Davison and Rowden, 2012, McMillan and Chavis, 1986).

A social activity between neighbors takes place, every time they meet each other on the street or the interstice between the street and the residence. Such fleeting, human, interpersonal relations are a source of information about the surrounding world and help to maintain already established contacts in a rather relaxed and undemanding atmosphere. The characteristics that define the edge and its adjacent zones play an important role, as they influence if and what people can see and hear and if they spend considerable time outdoors. “The more time people spend outdoors, the more frequently they meet and the more they talk” (Gehl, 2011, p.13). Therefore, walkability in public, open space is one basic necessity beyond the design of the edge, boundary and transition zones in neighborhoods.

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Edges, boundaries and transition zones in neighborhoods

The edge is “the outside limit of an object, area, or surface” (Oxford Languages, 2024). It is a linear break in spatial continuity and is also understood by Lynch (1960) as a boundary between two areas. It may be seen as a barrier that is disruptive and closes off one space from another, whilst also limiting the degree of visual and physical penetrability. It may also act as a seam that is visually and physically porous and, therefore, welcomes exchange and joint experience. The boundary is “a line which marks the limits of an area and is a [dividing](#) line” (Oxford Languages, 2024) between two areas. It separates public and private space, interrupts flow and hinders and enables movements between the street and the private plot (Hoogkamer, 2019). Its physical properties differentiate two sides, an inside and an outside, always depending on the position of the observer. Open boundaries, which are rather passive, non-obstructive and permeable, afford crossing and enable necessary access and social contact (Benjamin, 2018). For Cullen (1961) perceiving the city while moving through it always implies a separation into an internal here and an external there based on the position of the observer, the space he is in and the space beyond. This helps the observer to break down the urban experience into identifiable parts but also understand the separation of the public here and the private there. He also sees that “porticos, balconies and terraces have this ability to communicate. They draw us outwards” (Cullen, 1961, p.36) and extend the inside in the exterior.

Gehl (2006, 2010) does not only look into the edge or boundary but rather focuses on the semi-private transition zone between public and private, open space. The street space and the space in-between the street and the residence for him are one entity, which potentially links activities on either side of the boundary and brings pedestrians and residents into contact with each other. Passers-by, who are walking along or waiting on the street, are simultaneously seeing and hearing activities that spill outside of the residence. Outdoor, stationary activities of inhabitants, such as resting, enjoying the climate and drinking coffee, or feeding cats, gardening, cleaning and maintaining, on the other hand, can be observed by pedestrians, whilst residents themselves are also following the life on the street. Lynch (1981) calls the urban condition that allows people to perceive activities in a neighborhood, transparency or immediacy, which provides a sense of life and helps us to understand the world. The transition zone, hence, is a passive experience zone, where people frequently meet in the course of daily activities. These activities optimally enrich and inspire each other and potentially turn the border zone into an active exchange zone of common activities such as talking and exchanging information and goods (Gehl 2006, 2010). MacCormac (1983) also recognizes the private space as important to enliven the public space of housing areas through interactive uses. This is also supported by Banerjee (2001) who suggests not to focus on the spatial distinction between public and private space but rather to look into the concepts of public life and social space beyond ownership. Alexander et al. (1977), too, recommend to understand the edge of public space rather as zone that has a volume than a line without thickness. They see the significance of the edge as vital for a vibrant neighborhood life, which is why special attention needs to be given to the design of the boundary and the threshold of the private residence. This is confirmed by studies in residential areas that have shown that this in-between space is with 69% of activities the most active outdoor space in comparison to activities on the street that account for 31% (Gehl, 2010). Gehl (2011) enumerates some international examples, such as the steps and landings of Brooklyn’s brownstone buildings, the porches of North-American residences, the stoops in the Netherlands, the front gardens of English semidetached houses, the front yards of low-rise row houses in Australia and the edge zones of traditional Japanese city houses.

SOFT EDGES IN NEIGHBORHOODS

Streets with soft edges have the most extensive activity level. Studies conducted in Copenhagen in 1982 have investigated the effect of soft edges on the level of outdoor activity in neighborhoods. They investigated streets that were comparable in relation to their residents and the dwellings, which were row houses. Whilst some streets had row houses directly connected to the streets, others had

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row houses with front yards. Despite of their far-reaching conformity, streets with front yards or soft edges had a double to three times higher degree of activity (Gehl, 2010). This depends on the details and activities that can be experienced in those transition zones and the rhythm of opportunities offered (Jacobs, 1993).

Soft edges do not demarcate public and private space sharply. They are permeable to movement and exposed to view and consist of space that is expanding beyond the outer walls of the private residence. This could be simply balconies, stairs or entrance zones or they could cover more space in the form of porches, front gardens, front yards and terraces with benches and chairs. In any case, due to their visibility and accessibility from the street, they are semi-private areas that invite to participate. A further characteristic of soft edges according to Gehl (2006) is the evocation of interest and excitement due to a richness in good detail on eye level and in contact with public, open space, which allows people on either side of the boundary to see, hear and meet each other. Close up, visual contact is important as the social field of vision of humans lies below seven meters, where all details can be visually experienced. Ashihara (1983), who investigated the relation of street life and street characteristics, suggests that the relation between the street width and the building height should be below one for street life to thrive.

Vision allows people to take possession of their spatial and social environment from a distance (Robins, 1996). Even though, sight is a remote sense, it cannot be denied that social communication functions properly and hassle free and increases in short distance from one another. It influences intimate, social connections and interactions, as looking at one another is reciprocal and accompanied by facial expression (Frisby and Featherstone, 1997). This goes along with an intensification of communication and the exchange of intense feelings (Gehl, 2011). Close distance also allows for all senses, including hearing, smell, and touch to be used. Each sense supports the understanding of spatial relationships, the orientation in space and the assessment of spatial qualities (Rodaway, 1994). Hearing, as an omni-directional sense that cannot be deliberately turned off, also catches traces of social life and therefore provides a sense of liveliness and pleasure (Urry, 2002; Frisby and Featherstone, 1997). In proximity to others, it enables more intense, reciprocal communication. Similarly, smell, which is also a subversive sense based on proximity, cannot be evaded but creates closeness and familiarity and evokes strong feelings and memories (Porteous, 1990; Tuan, 1993). When multiple senses are engaged simultaneously, the environment is experienced as immersive, which subsequently generates rich emotions, emotional attachment and strong memories (Gehl, 2006; Pallasmaa, 2005)

A research conducted on front yards in an Australian city also stresses the importance of their design in relation to the affordance of activities, as this influences the sense of community. The front yards, which were investigated, were commonly used for recurring, necessary, and recreational activities. Questionnaires revealed that residents were using their front yards on average one hour per week day and two to five hours on a weekend. The majority of the respondents thought of their front yards as an outdoor extension of their living area and that their visual accessibility promotes socializing. They also confirmed that the front yards are characterized by a distinct, personal expression. The investigation concluded that the front yards are a frequently used, semi-public space, where interactions between the public and private occur. This is based on the walkability of the streets and the contribution of the front yards to the street scape. The design of the boundary and the semi-public zone are strongly influencing activities and behaviors but are also clear symbols of a strong ownership whilst also promoting a sense of belonging without compromising the sense of safety (Swapan, et al. 2019).

The quality of the residents` experience rests upon the fact that the boundary is clarifying territories and affiliations. Therefore, it needs to be spatially formulated in such a way that it is separating private and public space and restricting movement. Only when it is clearly legible, it is protecting the private sphere, which is crucial for contacts with others and the basic human need of feeling safe (Gehl,

2010). Safety is also supported by activities taking place on either side of the boundary and the visibility of those activities on both sides, which Jacobs (1993) formulated as *eyes on the street*. Forms of soft edges can be subtle ones, such as landscaping, changes in pavement and height differences, canopies, steps and stairs or more restrictive, linear boundaries such as hedges and fences with gates. But it may also just be formulated by some tables and chairs that are occupying territory. The boundary between the public and private is a sensitive issue, though, as it should both, allow for contact with public life and guarantee privacy. Carmona et al. (2010), therefore, suggest the use of adjustable filters, where residents can choose the degree of privacy or communication with the public. In any way is the soft edge an important aspect that contributes to the quality of housing and the surrounding urban area, the residential neighborhood (Gehl, 2010). The contrasting necessities of sense of privacy, sense of safety and sense of belonging, therefore, need to be balanced (Doolittle and MacDonald, 1978).

The quality of pedestrians' experience, on the other hand, depends upon a close up, rich visual contact, that engages all senses and a rhythm of visual opportunities in form of activities and material aspects that passers-by can experience (Gehl, 2006; Jacobs, 1993). A study of Appleyard (1981) also points at the impact that car traffic has on the pedestrians' experience and subsequently on social interaction, which is much more enhanced on streets with light traffic in contrast to those with heavy traffic.

DIALECTIC OF SPACE

It is obvious that the material reality is closely linked with the social reality. Whilst the space is produced by society to enable social practice, it is also shaping the social practice simultaneously. Lefebvre's (1991) three-dimensional dialectic of space differentiates spatial practice, representation of space and space of representation. All three are intertwined and interact constantly in-between accordance and confrontation.

Spatial practice refers to the perception of the outside world, the everyday social activities that happen and are interlinked with each other based on the physical properties of space. It stands for perceived space and how space is perceived through the collaboration of the mind and the senses but also on the expectations of residents on the representation of space (Lefebvre, 1991). In this sense the edge zone between public and private plays a pivotal role in shaping everyday experiences and activities. Representation of space or conceived space refers to how space is conceived. Society has various images of spaces that overlap, that, on one hand, resemble each other but are also different to a certain degree. The meaning associated with these images is visualized by specialized professions that exert power due to their knowledge. As a form of preset spatial practice, it provides an organization frame that is enforced on ordinary people and restricts their practice and choice (Lefebvre, 1991). Ownership is just one aspect of conceived space and refers to the right to control and exclude, which is supported by the legal system but does not require actual control (Chang, 2015). The design of the public street is, in this regard, a top down approach that usually does not involve impetus from residents but is prescribed.

Space of representation or lived space is a symbolic reading of space that overcomes the predetermined representation of space and is based on experiences, values and social norms. It evolves in an interactive process, where ordinary users change and appropriate space based on their imagination. This is one of the reasons why built boundaries change over time (Benjamin, 2018) and expand beyond legal ownership.

Gibson (1979) calls these spatial qualities, which afford the performance of an individual's action, affordance. The number of affordances that an individual recognizes, depends on the individual's perception of the surrounding space in combination with his imagination, which might be more broad-minded or limited. Affordances refer to conceived as much as to lived space. Social possession is part of lived space, where actual control on space is taken on with the intention to remain in control. It works as a self-evident act of communication that is backed up by the social norm of respect for

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possession (Chang, 2015). This may be realized in the case of the public street in form of flower pots and beds, tree plantations, chairs, benches and tables or garbage bins. But, it may also materialize in garden extensions, barbecue areas or storage spaces that spill into adjacent public, green, open space. The legal aspect of ownership and the clear demarcation of public and private property seem to be, to some degree, more fluid than the legal frame work would suggest, as people in their lived reality of everyday life, tend to overcome such legal meaning and predetermined categories through spatial manifestation that stretch the boundary between the two (Blomley, 2005).

CONCLUSION

Edges, boundaries and transition zones in neighborhoods are in combination with public space, such as a street or a park, the very space, where social contacts, which promote a sense of belonging and community, happen. Social life can be fostered by repetitive, chance encounters in open space, for which the residential neighborhood is an ideal arena due to its small size, the limited number of neighbors and the consequent, frequent but relaxed encounters on a daily basis.

Certain spatial characteristics play a primary role in enabling these neighborly contacts of which walkability, light car traffic and the scale of the streets adapted to human perception are the most significant. But more importantly, aspects that concern the edges, boundaries and transition zones need to be met, in order for this spatial amalgam to become an experience zone, where neighbors can frequently see and hear each other during their daily activities. To motivate people to walk in their neighborhood, this transition zone needs to be rich in good detail and activities at the eye level, so that it evokes interest and stimulation. In order to safeguard that this space is semi-private and inviting to participate, the boundary should not be sharply demarcated but permeable to movement and view. This guarantees that both sides are exposed to each other and activities of passers-by and residents together constitute the public life of the neighborhood. When these criteria are met, then, this passive experience zone can turn into a more active zone of exchange, where chance encounters can slowly evolve into more active and deeper social contacts and, in the long term, into a feeling of belonging and a sense of community. These so-called soft edges also contribute to the feeling of safety as more people are potentially noticing what is happening on the street. The boundary also stands for clarifying territories and affiliations, important criteria which need to be met in order to protect the private sphere of the residents. Spatial conditions should, therefore, be sensitively designed to balance sometimes contrasting human needs of sense of privacy, sense of safety and sense of belonging.

It is apparent that the social life and the physical environment are intertwined and influence each other. Space is produced by society to enable social practice and, at the same time, shapes social practice. Spatial practice, representation of space and space of representation constantly negotiate space. Representation of space or space that is conceived by specialized professions, such as the public street, is predetermined and shapes social practice. But it might also be turned partially into a space of representation or lived space based on experiences, values and social norms as well as affordances in relation to space. This materializes in the form of appropriations, where residents take on partial possession of public space and stretch the boundaries between public and private.

Future empirical research will use this theoretical basis for an in-depth analysis of an exemplary residential street block of a settlement for the displaced in Nicosia, Cyprus. The area is characterized by small, walkable streets with very little traffic, small front yards towards the street and small backyards towards pocket parks. The settlement's previously conceived space has, in its fifty years of existence, gone through many alterations, adaptations and appropriations by residents, which will be analyzed on a typical case.

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THE LANDSCAPE PROJECT FOR CLIMATE CHANGE



Changing Cities VI, Rhodes, 24 - 28 June 2024

Organized and chaired by Prof. Em. Achille Maria Ippolito

Prof. Em. Achille Maria Ippolito, Simonetta Bastelli Cultural Association, Italy

The landscape project: analysis and critical reading Special session “The Landscape Project for Climate Change”.

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Abstract

Always remembering Lucien Kroll's saying: "everything is landscape", consolidated by the European Landscape Convention, we must realize that the landscape project has a decisive role in the management of the territory and therefore within the theme of the climate crisis. The projects, involving all the different disciplines interested and specifically useful, must be developed with a careful, analytical and future-oriented strategy. It is necessary to overcome the extemporaneousness of everyday life with long-term objectives, but visible in the various stages that follow one another. The landscape project, even in its unity, must be able to support emergencies, natural events and catastrophes, fragility and climate change. In the urban landscape, the value of public space is always a priority. The landscape project therefore needs multiple disciplinary approaches, which, overcoming their respective boundaries, collaborate as a whole. Since the beginning of this century, many things have already matured as the conditions and methods of creating landscapes have changed, expanding with new opportunities, known and debated, including issues relating to the climate, placing in first place the relationship between architecture and nature, with its implications in the urban landscape, placing the relationship between man and nature at the basis of the purposes of the landscape project. In the critical rereading it is necessary to analyze carefully and methodically, in a contemporary scenario where cities are in crisis with an evident transformation. The landscape project must not be included exclusively in planning, but its positive aspect can be included in individual specific themes, even small ones. We remember the interventions in urban public spaces and all the issues connected to parks. The first discussion to open, in a scientific debate, critically reading the projects and achievements, concerns abandoned areas, with urban redevelopment projects, also for the relationships between architecture and nature. The most significant and emblematic cases may be: the construction on the piers of the port of Amsterdam with the new residential districts of the island of Java, Borneo and Sporenburg, with a waterfront that marks a new urban landscape; the Bo01 district, on a completely eco-sustainable basis, built in a disused port area, in Malmö, Sweden, with the motto "beautiful and sustainable", which arises from the European exhibition on living, held in 2001, entitled "The city of tomorrow for an ecologically sustainable information society in an era of well-being"; Le Albere, created in Trento, in 2013.

Keywords: *Landscape Project, Climate Change, examples, critical reading*

1. INTRODUCTION

Lucien Kroll [1] was the precursor and with his concepts the precursor of the European Landscape Convention [2]. With the Convention, the Landscape Project takes on a fundamental role in "Landscape management" and "Landscape planning" [3]. In this role the relationship with the theme of the climate crisis becomes crucial. The projects, in fact, must involve different disciplines and must be developed with a strategy that is attentive to all the problems connected to the territory, with the climate situation among the first objectives. The Landscape Project, despite its different contributions,

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must be unitary and must be able, in addition to the specific design purposes, to deal with issues relating to emergencies, natural events and catastrophes, fragility and therefore climate change.

The Convention was presented in 2000 and since then, in these twenty years, there has been continuous evolution. Conditions, purposes and methods of creating landscapes have changed. The debate and research have brought important contributions. As regards the discussion relating to the climate, the relationship between architecture and nature has become fundamental.

It is also important to underline the role that *Changing Cities* has had in the various editions, with the significant scientific contributions.

2. LANDSCAPE PROJECT

The Landscape Project operates on different scales, from large territorial interventions to small scale, whether agricultural or urban. In this regard, we remember the interventions in urban public spaces and all the issues connected to parks.

In the management of everyday landscapes, for any transformation intervention, valorisation is the basis of the Landscape Project. "The management concept is based on two key ideas: the dynamic character of the landscape and the protagonism of the landscape agents. The methods associated with management are quite distant from those used in physical land or landscape planning. On the one hand they operate with more abstract, less tangible categories, on the other they possess a clear personal - and up to a certain point subjective - dimension to the extent that they imply social mediation work. [...] Management processes must not be conceived or applied as immediate or final tools, but rather as a complex and organized sequence of actions that require variable times depending on their nature." [4].

The European Convention is explicit on transformations, recalling that "actions" must be "aimed at a sustainable development perspective" and referring to the "transformations caused by social, economic and environmental development processes". Management includes, with full rights, all the skills of landscape architects, both for "natural environments" and for "built environments". In particular, a global and multidisciplinary approach is necessary for the management of natural resources. This area includes complex issues, such as the protection or restoration of plant and animal biodiversity, pollution and health, phenomena connected with climate change, the sustainable use of natural resources as well as the circular economy and therefore ecosystem services. [5] The management of built environments includes the problems of the urban landscape, with all the issues connected to the city and its regeneration. This includes new urban development interventions and recovery and redevelopment projects. In both cases, at the center of every action is sustainability, understood in a broad way, [5] and the relationship between architecture and nature; in the city in the urban landscape, designing with nature concerns both the individual building and the entire area. [6] Vegetation has a triple function: technical, ecological and aesthetic-landscape, with numerous effects on the environment and can be used as real biotechnology. [7] We must aim for effective demineralisation, starting from minimal interventions, with water and vegetation, moving on to structural interventions also connected to forestry and urban agriculture. From this perspective, all the open spaces of the city [8] fall within landscape architecture, where, however, gardens and parks have a leading role. [9]

For the specific areas of competence of the Landscape Project we refer to the IFLA indications: "public and private parks and green spaces; squares and plazas, public places, and city monuments; pedestrian areas and traffic restricted zones, promenades; sport complexes such as stadiums, arenas, grounds and pitches; playgrounds and recreation spaces for children, young people and adults; special installations like climbing walls, cycling and skating courses, and golf courses; outdoor swimming pools, bathing areas and beaches; camping and caravan sites; spa parks and recreation spaces; horticultural exhibitions and concepts for other outdoor fairs; botanical and zoological gardens; graveyards and memorials; open spaces around public and private buildings; car parks; planting of

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industrial and commercial sites; design and integration of roadside and motorway service areas and rest areas; private gardens and courtyards; roof gardens and patios; planting of conservatories and indoor spaces”. [10]

Franco Zagari questions himself: "But what is landscape design in practice? It's a topic often confused with other creative approaches. His attitude towards the contexts of intervention proceeds not by generic determinations from the general to the particular, or from the plan to the project, or from morphology to typology, but instead by thematic sequences always defined with precise directives in time and space. It is a logic for relationships between activities and flows, rather than for relationships between objects, with a strong vocation to welcome and integrate different knowledge and different opinions, open to involving as much as possible any instance that proves responsibly available. On the border between philosophy and economics, the objectives of a landscape project are principles of orientation and new centrality, while beauty, work and listening to the vocations of the places are the core values. When a community is involved and responsible for a place then that is where the heart of the game is played.” [11]

3. THE ROLE OF LANDSCAPERS

As far as designers are concerned, their projects and their principles depend greatly on their studies, training and previous experiences. Diana Balmori, precisely frames the difference in planning between architecture and landscape: “Architects think of architecture as object, and of landscape as background to that object, just something you put the object on but not something that has anything to do with the object itself. The famous dividing line given is five feet from where the building ends is where the landscape starts. That explains the separation in a very graphic way. While many of the arts have really been moving away from the object, architecture has really become more and more object-oriented. The change in the relationship between the two has a lot to do with the fact that space has become more important than the object. That elevates the status of landscape on the one hand and diminishes the status of the object. That's the beginning of the change. It's quite evident that this is happening now so architects have suddenly become more interested in landscape. It is now space that interests us. And landscape is the discipline in which artistic ideas are being debated. It has become the place in which to have the debate. [...] The real points of agreement are outside of both professions in a way. It lies in the new definition of nature, a definition that has dramatically changed. [...] Landscape can be like poetry, highly suggestive, and open to multiple interpretations. Landscape can create a meeting place where people can delight in unexpected forms and spaces, inventing why and how they are to be appreciated. I think this sense of invention, of not knowing how my landscapes are going to be used is exciting. People use spaces in ways I hadn't imagined. I love that”. [12]

Even if there has been a great evolution in the last twenty years, the role of landscape architects must be revisited, also based on individual and specific skills. The landscape project has taken on different roles and meanings and therefore landscape architects must fit the project within a large and complex system, in a new relationship with nature. The relationship with the physical, social and cultural context is the premise for each project, giving rise to the different approaches of landscape architects. One of the main aspects, which can be seen from the roles of landscape architects, is the way of understanding planning, which goes beyond the concept of a plan to place ecology at the centre. Gilles Clément even states that “the lack of planning is a biological advantage!”. [13] Many think that the methods specific to the urban planning discipline are outdated and that the landscape, especially through infrastructure (green infrastructure and ecological infrastructure) can be the driving force.

Paolo Bürgi illustrates the themes "with which we must necessarily deal today, not only in the field of landscape architecture: the recycling and conversion of exploited territories, the curious and careful observation of the complexity that surrounds us, the care of places transformed, manipulated or to be saved, the themes linked to food, energy, the environment and sustainability, the creative reinterpretation that draws inspiration from the historical culture and future development prospects

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of a place" and recalls the values intrinsic to beauty: "at the base, the timeless themes and profound values linked to the sensitivity of approach to the place, to the art of landscape design and to its essence remain fundamental. Beauty, for example ("Nature has given you the gift of the knowledge of beauty" said Lorenzo the Magnificent to Michelangelo), the need to create something for the spirit and for the serenity of thought, the ability to express the poetry hidden in things . [14]

The relationship with nature is often the fundamental theme for landscape architects, with a dialectical relationship in the various modalities, from interventions in natural places to nature projects in the city. The relationship with nature, in any place and at any time, in the urban and agricultural landscape, includes all issues connected with the problems of environmental sustainability and therefore climate change.

In the urban landscape, landscape architects have paid much attention to projects for parks and gardens, also considering them experimental laboratories for sustainable design and environmental, climatic and social functionality. In the professional field, a lot of attention is given to the garden, to its rediscovery, to the relationship with tradition, but in an innovative way. Studies, experiments and projects are multiplying, with autonomous and multiple methods also based on the climate. Gardens and parks certainly represent a point of reference for the regeneration of cities, but they cannot be separated from all other open urban spaces, with the square first and foremost. The theme of open urban spaces is at the center of the planning and profession of the landscape architect.

4. CLIMATE CHANGE

The theme of climate change is among the primary interests of the landscape architect, distinguishing the phenomena that arise from human actions compared to natural ones. [15] The United Nations Framework Convention on Climate Change [16] is among the first to use the term "climate change" for any type of climate change regardless of the cause. In the past, the phenomenon was attributed above all to natural elements, while in recent decades it has been acquired, as a scientific assumption, that most phenomena can be attributed to anthropic actions. It must be kept in mind that the scientific data on the phenomenon is increasingly dramatic. The Sixth Assessment Report of the Intergovernmental Panel on Climate Change IPCC, [17] presented in Interlaken, Switzerland, in March 2023, indicates the main critical issues and concludes with a clear message: something must be done now (by 2030) or it will be too late. The report also proposes possible interventions; in practice it is a sort of instruction manual for combating climate change, to be kept in mind with the utmost attention. The report, in essence, provides a precise picture on the topic of current and future losses and damage that affect ecosystems and individual people, calling for precise and timely interventions. One of the authors, Aditi Mukherji, said: "Climate justice is crucial because those who have contributed the least to climate change are disproportionately affected" and pointed out that "Nearly half of the world's population lives in regions highly vulnerable to climate change Over the last decade, deaths from floods, droughts and storms have been 15 times higher in highly vulnerable regions." [18]

Accelerated climate change adaptation actions are essential in the coming years to close the gap between existing and necessary adaptation. The solution lies in climate-resilient development from which the importance of landscape design arises, with different purposes related to energy sources, mobility and the relationship between architecture and nature. The report specifies that coordinated policies, international cooperation, ecosystem management and inclusive governance are key to effective and equitable climate action. Regarding the role of landscape design, the report highlights the opportunity that urban areas have on a global scale for ambitious climate action that contributes to sustainable development.

Let us remember what Giuseppe Scarascia Mugnozza writes in reference to the urban climate. "The urban environment is characterized by climatic conditions that are quite different from those found in more natural systems such as wooded or rural areas. [...] In fact, many urban and suburban areas

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have higher temperatures than their surrounding rural environment; this temperature difference constitutes an urban "heat island". The average annual air temperature of a city with a million or more people can reach up to 12°C higher than its surroundings, especially at night." [19]

The European Union weather service [20] has released some important data relating to the last few months. This year's March was 1.68°C warmer than the fifty-year March average of the pre-industrial era 1850 - 1900. 2024 was the warmest March. warmest ever recorded in the world, with a global average of 14.4°C, 0.73°C higher than the average for the thirty-year period 1991 - 2020 and 0.10°C compared to the previous record of March 2016, adding to a series of ten consecutive monthly records: the average temperatures from April to March 2023 are the highest ever recorded. Before the publication of the Copernicus data, 2023 had already been confirmed as the warmest year on record since 1850, with the increase in global average temperature close to the 1.5°C limit.

5. ARCHITECTURE AND NATURE

The topic was extensively covered during the third edition of *Changing Cities*, [21] but here it is important to report some concepts that refer more directly to the topic of climate change.

In recent decades the relationship between Architecture and nature, extending to the urban landscape, has taken on a clearer and broader role, linking itself, with environmental sustainability, directly to climate issues, therefore to well-being and its perception.

In studying the relationship between Architecture and Nature in the context of the urban landscape [22], the theme of sustainability, with the repercussions linked to the issue of climate change, in fact, involves, with the utmost attention, the design of open urban spaces. These spaces have always played a role in the design of the urban landscape, but recent experiences demonstrate, incontrovertibly, that in the design, or redesign of an urban area, one must start from public spaces and their connections. Even if the landscape project is based on a multiplicity of disciplinary contributions, at its basis there are the phenomena that study the vegetal aspects, as it has numerous effects on the environment and can be used as a real biotechnology for the ecological recovery of the areas degraded both in urban, peri-urban and extra-urban environments. The use of vegetation has a triple function: technical, ecological and aesthetic-landscape, with immediate effects on the climate. In urban areas, we must strive towards effective demineralisation of the landscape, both with minimal natural interventions, with water and vegetation, and with structural interventions connected to urban forestry and urban agriculture; both in a systematic and not extemporaneous and random form.

Operational analysis can be classified into four specific areas of study: architecture, open urban spaces, infrastructures and neighborhoods.

As regards architecture, in recent years, the use of vegetation has had a further development, deepening and perfecting the technical aspects and those more properly connected to linguistic expression, in different ways: on the fronts, on the roofs, on the internal. [23] For the roof garden there are numerous examples that demonstrate the relevance and effectiveness of the use of the turf, with shrubs and trees, becoming a tool for environmental rebalancing, with safe and proven results aimed at improving the microclimate. For vegetal façades, the shade produced by the vegetal wall mitigates solar radiation, decreasing the heating of the facades in summer and in winter it becomes a protective screen from the elements.

Both roofs and vegetal facades, at all times and in every place, improve acoustic and thermal insulation. The contamination of the positive aspects that are transmitted to the environment is important, improving the microclimate, contributing to the absorption of CO₂, limiting the production of smog and the formation of the urban heat island, also reducing radiation along the roads.

For open urban spaces the need is to build an urban network, which allows for true and complete regeneration, overcoming isolated cases.

Infrastructures have the important role of stitching and connection, as a sign of continuity and matrix of a network; fundamental for the purpose is the interconnection between the mobility system and the natural system. Among these, in the foreground we have green infrastructures that offer ecological, economic and social benefits through solutions in harmony with nature. [24] Gorm Dige announces that there is ongoing EEA research, which will be published in a report, “to demonstrate how green infrastructure helps mitigate the negative effects of extreme weather and climate events, which are among the natural hazards most expensive and deadly in Europe and in the world”. [25]

Lastly, the neighborhood. For this purpose, the term eco neighborhood is used alongside the name sustainable neighborhood, addressing the environmental dimension of the intervention, i.e. energy efficiency, the reduction of environmental impact and therefore the climate.

6. URBAN LANDSCAPE

In compliance with the European Landscape Convention, as an urban landscape we must understand the entire city territory, as we perceive it, regardless of its presumed qualities, with its complexity and completeness.

The original matrix of the contemporary city dates back to the era of the industrial revolution, as in those years the great urban expansion began, with the birth of metropolises. Its structure, maintaining the ancient center as the focal point and identity of historical memory, is organized with the peripheral neighborhoods: the residential ones, with offices and shops and the working-class and popular ones, often without primary services. [26]

Towards the end of the 19th century, urban planning began, including important urban restructuring interventions that often redesigned the urban landscape. “Yesterday the city was a world, today the world has become a city” as Lewis Mumford wrote, more than half a century ago. [27] Since 2007, city dwellers have outnumbered rural dwellers.

The urban landscape, on a general level, is memorized and classified in the global form of an international megalopolis, with similar archetypes and symbols, but in every single city it is possible to identify the characters and identities. We must observe and read the internal divisions of the urban fabric, aware that every internal differentiation is also linked to the different external connections. The contemporary city is looking for its new identity, through sudden and unexpected changes. The main functional structures are modified, redefining roles and connection networks. Cities, especially megacities, are changing their role and the very essence that has been at the basis for centuries.

Public space, all the new places of the urban collective, are strategic urban spaces, due to their location and use, but also because they are often the main nodes of social and economic relations. Even in the absence of particular symbols, they take on a symbolic role. For these reasons, the redevelopment of degraded urban areas passes through the redevelopment of open public spaces, where perception, visibility, symbolism, sustainability and climate become the keys to understanding a new urban landscape.

Since the end of the sixties of the last century, there has been a progressive and irreversible conceptual and programmatic change. The traditional city is entering into crisis, the debates, research and proposals are numerous, but the very way of doing urban planning is certainly entering into crisis. The presumed assumption of control over the entire urban structure collapses. The city is transformed by social and economic changes, by the new habits of citizens, by the decisive contribution of new telematic technologies. The urban landscape is not only that of the large metropolises and within the latter there is not only the historic city with the central representative areas and consolidated neighborhoods. There are peripheral areas, abandoned areas, but, in some cases, there are also agricultural areas, and above all peri-urban areas with the phenomenon of urban sprawl. The contemporary urban landscape includes all the different environmental situations, as they have been inherited and as they have been planned and therefore as they are modified, but we must take

advantage of the phenomena of redevelopment and regeneration to address issues relating to climate change. The purpose is the future city as a perceptive subject and as a protagonist of transformations: a landscape to be perceived in a state of well-being, aware of the intersection between landscape and environment. [28]

7. SIGNIFICANT AND EMBLEMATIC CASES

There are many important and significant examples, in different countries. Three emblematic and symbolic cases are reported, known and already reported in various research, published in books and illustrated at conferences, including *Changing Cities*.

The example of the piers of the port of Amsterdam is among the most important. At the beginning of this century, new residential neighborhoods were built on the artificial "islands" built between 1874 and 1927, with a waterfront that marks a new urban landscape: the island of Java, Borneo and Sporenburg. [29]

The island of Java, (Figure 1) is located in the Oostlijk Havengebied, in the area of the Eastern Harbor District; the neighborhood project, of 6,000 inhabitants, people; it was designed by Sjoerd Soeters and among its purposes it has the utmost attention to the environment, with water always the protagonist. The original pier was divided into five new small islands by building four new channels. It is a truly new eco-neighbourhood as, with the exception of the "slat" near the eastern access bridge to the island, reused for offices and residences, all the pre-existing buildings have been demolished. On the longitudinal fronts there are block buildings with the street side 27 meters wide and a height between 5 and 10 floors. The buildings located on the northern side, only residential, are intended for social housing, while the southern ones, for the free market, have commercial activities on the ground floor. On the fronts of the four new canals there are terraced houses. All different from each other, but with a front of 4.5 meters, which recalls the memory of the central streets of the city. As regards open public spaces, as it was not possible to create large squares, the internal courtyards were made public and a system of urban voids was organised. [30] The vegetation fills the courtyards in a compact form and in rows; the presence of grassy surfaces is widespread; numerous buildings with vegetation on the fronts. The presence of water is a constant not only for the canals, but also for the presence of pools and fountains.

Borneo (Figure 2) and Sporenburg, (Figure 3) [31] falling within the Vinex ministerial program for housing development, were supposed to be high intensity, but after public-private negotiations they were built, with a master plan designed by the West studio 8 at the end of the nineties, especially extensive housing. [32] This is an innovative interpretation of the canal house: new types of three-storey houses, which go beyond the traditional terraced type, with patios and hanging gardens. The intervention programme, including public housing, subsidized housing and free market housing, includes 2,500 homes. In Borneo, always in correlation with water, there is a vegetal heart, while for Sporenburg the vegetal elements are above all in private spaces. The perception of the context is immediately and directly delegated to the specific characteristic that derives from feeling on an island, even if in reality they are located on two peninsulas. Water is the characterizing element both in public spaces and in homes; all residences with mostly glass facades have a view of the water. The mobility system is centered on pedestrianism and the network of bridges. Much attention was given to the visual perception of all internal routes, both in terms of the margins and partial and final views. [33]



Figure 1 - Amsterdam, Netherlands,
Java Island



Figure 2 - Amsterdam, Netherlands,
Borneo



Figure 3 - Amsterdam,
Netherlands,
Sporenburg

The Bo01 neighborhood in Malmö, Sweden, (Figures 4 – 5 – 6) was built on a former industrial area serving the port. Usually named West Harbour, is almost entirely composed by an artificial peninsula, about 140 acres, built in the late 1800's for the Kockum shipyards. The 30 hectares of the area are located in a strategic location between the old town, the sea and the urban parks system. Consists of nearly 800 dwellings in low - medium high buildings, but the 54 storytower, 190 meters high, designed by Santiago Calatrava, the Turning Torso, it rises. The reason why they constructed Turning Torso was to re-establish the skyline of Malmö, after the elimination of Gru Kockum, in 2002. The idea comes within the framework of the European exhibition on living and involved Central Government, local government and entrepreneurs. Entitled "the city of tomorrow for an informed society ecologically sustainable, in a well-being era" held in Malmö in 2001. The restoration project of the entire area and the General Plan of the new district coordinating by Klas Tham. The guiding principle was focused not only on physical environmental sustainability, but also on the social one, with the motto "beautiful and sustainable." An human scale neighborhood, with a city appearance. In this context, the concept of sustainability is used for the neighbourhood, for the open public spaces and for buildings. The whole neighborhood is on a human scale, completely pedestrianised, with small roads and paths that led to important urban scenarios, strongly and constantly connected with natural elements. Expertly, the built alternates itself with urban voids, designed and natural, including the two parks: the Anchorpark, with vegetable elements typical of the region and the Dania, with herbaceous stretches towards the sea. The mobility system, both within the neighborhood and the one connecting to the rest of the city, is organized favoring pedestrian routes, bicycle routes, public transport, even with shared car, that means it is extremely convenient considering time and cost. The masterplan was organized through a continuous sequence of sites on the banks of the Canal that empties into the basin of the Öresund. The building types essentially consist of line house and court house, with a multiplicity of languages and forms. Designers, more or less known, were different. Among them, in addition to Swedish and Danish architects, we address Ralph Erskine, from England and Mario Campi, from Switzerland. Of extreme value even the sea front characterized by soft colors in harmony with the surroundings, and by great spaces directly interconnected with water. The connection takes place through a series of terraces that represent a true place of urban collective. The same is for public open spaces, connected by a precise-lined paths made from trees. The entire urban fabric is articulated in continuous dialogue between architecture and nature. In addition to the vegetation, a hegemonic role is represented by water, according to different fields and methods. Internal paths joins and connects with the canal system. The South-facing facades of the building are totally glazed to help a proper climate control. All aspects related to bio-architecture have been applied in buildings and in urban open spaces. From a technological point of view any aspect was not overlooked. The role of natural system for the purpose of social sustainability, is very interesting,

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focusing on the quality of urban spaces, intended as comfortable living in the natural system, connected with the hanging gardens and vegetal walls, mostly implemented with climbing plants. The choice of species was made by ensuring biodiversity. Should be emphasized that vegetal walls, as well as social aspects strongly cooperate for thermal insulation and have an important collaborative role in collecting and draining rainwater towards the tanks. From these tanks, water flows into open-air network of channels, alongside roads, in order to reach the sea, after being purified. These elements, in harmony with others, set up the urban landscape. The aspects connected to energy are also very important, extremely innovative and articulated, designed to power the neighborhood exclusively with energy produced on site from renewable sources. We already mentioned glazed walls and green roofs, but also collaborate solar panels and windmills. There is a wind turbine 80 meters high which every year produces enough energy to power approximately 200 residential units. Moreover, there is also a system, which extract heat from the bedrock of the subsoil. Were performed a number of cavities, 90 meters deep, which are filled with hot water, during summer; the heat is preserved and stored by the bedrock. During the winter it is extracted and used as the biogas extracted from waste. The latter, from every single dwelling, is collected and disposed at the level of the same quarter by directly reusing what is recoverable from bio-waste, first of all for the fertilization, and then to create energy. [34]

“The environmental sustainability of the neighborhood is closely related to its energy efficiency, obtained thanks to a supply from predominantly renewable sources and the reduction of consumption. In fact, the neighborhood appears to be a concrete example of the application of design strategies and plant technologies aimed at reducing emissions of climate-altering gases into the atmosphere, in total harmony with the increasingly high-performance standards required by the European Commission regarding sustainable urban -ty and eco-compatible construction.” [35]



Figure 4 - Malmö, Sweden,

Bo01 - eco-sustainability



Figure 5 - Malmö, Sweden,

Bo01 -



Figure 6 - Malmö, Sweden,

Bo01 -

In Italy: in Trento, the Le Albere neighborhood [36] was created in 2013, designed by the Renzo Piano Building Workshop studio. It stands where the Michelin factory, now abandoned, was, with the specific task of environmental redevelopment. It consists of 300 homes, offices and commercial activities with a surface area of approximately 12 hectares, with a park of over 5 hectares and almost 3 hectares of open urban spaces. In the complex there is also the Science Museum, Muse, and the Congress Center. The project focused on reconnecting the area with the existing city fabric and on recovering the relationship with the river environment, with the aim of returning to the city the areas that had become marginal. The facades of the buildings are characterized by wooden grilles in front of the windows; the green color predominates. [37] Renzo Piano writes that "the entire project is conceived and created to [...] be reasonable and sustainable on a management level, because the basic inspiration on which this new century opens for an architect is to understand that the fragility of land must not only be defended by saving money but also by searching for the best architectural expressions [...] this is an ethical quality of the Le Albere project which has strictly to do with my vision of the future... Le Albere is a classic example of transformation of brownfields, abandoned industrial lands, into greenfields, a cemented ground that becomes largely green..." [38] The theme of sustainability, also aimed at the problem of climate change, addresses the energy aspect with a

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centralized system that optimizes the resources and reduces management costs by paying close attention to energy saving in buildings equipped with photovoltaic panels; fixtures and cladding are made to contain thermal dispersion. Summer and winter air conditioning is managed by a central unit for the needs of the entire complex. A system of canals feeds two large bodies of water on which the buildings "float". The plant system is organized around a transverse axis of rows of trees; the courtyards of the buildings are open so that the internal gardens can be seen from the outside; the park from the residential complex reaches the bank of the Adige river. [39]



Figure 7 -Trento, Italy,
Le Albere,



Figure 8 -Trento, Italy,
Le Albere,



Figure 9 -Trento, Italy,
Le Albere,

8. CONCLUSIONS

There are no conclusions to be drawn on the merits of the treaty, but we must hope for a total, comprehensive and shared commitment so that the landscape project is increasingly sustainable, also with reference to climate change.

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Sacred Mexican plants: the value of native flora for sustainable urban green spaces

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Extended abstract

In the design of landscapes, botany should play a fundamental role together with aesthetics and science. In this context, the value of native vegetation, can be an additional element of support for the overcoming climate crisis.

The purpose of this paper is to underline the importance of recovering the value of autochthonous Mexican plants, showing not only their importance as part of the Mexican historical and collective memory but also as forces that can provide sustainable urban green spaces.

In pre-Hispanic Mexico the whole of the cosmos was animate and the deities were represented in anthropomorphic form as well as in the form of animals and flora. As a result of the high value placed on plants and flowers by Mesoamerican people, gardens were well stocked with ritual and medicinal plants. Dominican friar Bartolomé de las Casas describing the gardens of the Aztec emperor, affirms that Montezuma had orchards and gardens with all kinds of flowers that one could find in his kingdom. Flowers were very much appreciated by pre-Hispanic people because they were offered to the gods and flowered branches were also given to leaders to strengthen them for their tasks and to affiliate them more closely with the divine powers.

As the years went by, and with the arrival of plants from other countries (during Colonial times) along with the development of allopathic medicines, the knowledge and use of native plants in Mexico has disappeared little by little. Only indigenous peoples have maintained this knowledge in different ways. In the same way, the famous pre-Hispanic gardens have been forgotten and the few archaeological remains of these gardens have not received due attention. As a result of this, the Mexican appreciation of native aromatic and ornamental plants has been fading during the years. In fact, the preference for non-native plants is quite common in contemporary Mexican public and private gardens. This limited knowledge of native plants is evident in the designs of urban green spaces by the most acclaimed Mexican landscape architects, who seem to prefer non-native plants that generally require more water and maintenance. In the design of urban landscapes, it is important and strategic to use native plants in order to support local environment. Contemporary landscape architects should deepen their knowledge on Mexican flora and consider botany as a fundamental discipline for the creation of green spaces.

Keywords: *Mexico, native plants, urban green, sustainability*

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Landscapes collection: The Voorlinden Experience

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Extended abstract

The territory of the Netherlands is strongly characterised by landscapes of outstanding natural value: areas of approximately 10 square kilometres that are distinct in terms of their characteristics and conformation, forming a system of national parks with four main objectives: 1) the protection and development of nature and landscape; 2) outdoor recreation; 3) education; 4) research. The most important and extensive area is the Nationaal Park Hollandse Duinen.

The historic Voorlinden agricultural estate is just next to the Park, with the eponymous Museum of Contemporary Art, designed by Studio Milani in 2016.

The thesis project, assisted by the landscape atelier Arscape, aimed to create a botanical collection that could work in parallel with the park system and be a forerunner for the tangible development of its guidelines. The opportunity of academic work has allowed the development and experimentation of a design model capable of being innovative in the use of plants, starting however from the character of that specific territory; a project dropped into that place, tailored to its specific geomorphological characteristics, its history, its invisible traces and its current setting as a museum and informative centre.

It is a creative workshop in which the acclimatisation gardens' plants and the ones grown inside the greenhouses, reinterpreted in a contemporary key, populate the collective space: autochthonous but now disappeared plants, or new ones that can be adaptable with the current climatic conditions of the place, coexist in a continuous process of experimentation of migratory plant cells. Their shape on the ground, an emanation of the imprint of the waves beyond the dunes, tell something about their proximity and their final purpose, namely their responsible and creative knowledge and re-population. The dissemination of the history of the place through traditional museum-type systems and through the form of the designed space, ignites synapses between the place of production and the countries from where the visitors come from: the latter will bring with them 'postcard seeds' as a memory of the experience made to be repeated at home. The challenge that today's designers have to face, supported by researchers and any expert in the botanical, climate or engineering field, is that of not losing sight of the history, form of the territories and the communities that live there, broadening the concept of sustainability towards the idea that it is a matter of social, economic and constructive sustainability. Acting this way, they will be able not to distort the territories in an undesirable globalisation of the communities and places in which they live.

Keywords: *crowdsourcing; participatory mapping; open data; building attributes; Athens*

1. INTRODUCTION

The territory of the Netherlands is strongly characterized by landscapes of outstanding naturalistic value: terrestrial and aquatic environments with specific flora and fauna, areas of approximately 10 square kilometres that are distinct from North to South of the country in terms of their characteristics and conformation.

These areas were identified and subdivided in the first decades of the 20th century and subsequently named National Parks of the Netherlands.

Altogether, there are 20 parks in the European territory of the Netherlands, covering a total area of 135,030 hectares, more than 3% of the total area of the country.

In addition, there are many natural reserves and smaller parks scattered throughout the country, as well as country estates and other natural areas with more touristic purposes, such as campsites and golf clubs, which are always integrated into the surrounding landscape, respecting the natural environment around them.

National parks have four main objectives:

- the protection and development of nature and landscape;
- outdoor recreation;
- education;
- research.

The most important and extensive area is the Nationaal Park Hollandse Duinen (Dutch Dunes National Park), which stretches along the entire coastline from North to South over approximately 60 km of coastline. (Fig. 1)

The Dutch Dunes were formed more than 5000 years ago because of rising sea levels. They therefore synthesise and bring together various aspects of the dune culture, referring to height, to the presence of drinking water, to displacements and continuous structural variation due to winds, not least due to human action.

Men over the centuries have in fact played a decisive role in the development, but also in the degradation of these areas: in past centuries grazing and agriculture have impoverished and modified the development of the dune's fauna and flora, also causing the uncontrolled multiplication of various tree species.

A further impoverishment of the dune ecosystem certainly occurred during the Second World War: bunkers and anti-aircraft guns were scattered over them, some of which are still present today.

Starting from the awareness of the degradation of certain dune landscapes, the main objective of the European project, "Life Dunes", was to restore severely neglected dune areas to allow plants and animals, that had become rare, to repopulate these natural spaces.

In the dune restoration project trees, bushes and improperly accumulated plant soil were removed in a timely manner, letting nature have a new rebirth.

Several valleys and natural pools were recreated to restore the habitats of amphibious species, such as the magnet toad, or large mammals such as deers; the rebirth of many tree species was also ensured. The valleys were thus populated with alders, birches and buckthorns, which provided protected spaces for animals in general and nesting sites for birds in particular.

The sea buckthorn berries, for example, are a source of nourishment for migratory birds that stop here before setting off on their long journey South.

As of most European socio-cultural projects, one of the strengths of "Life Dunes" has been the active involvement of the local population in the regeneration, maintenance and restoration of the dune areas.

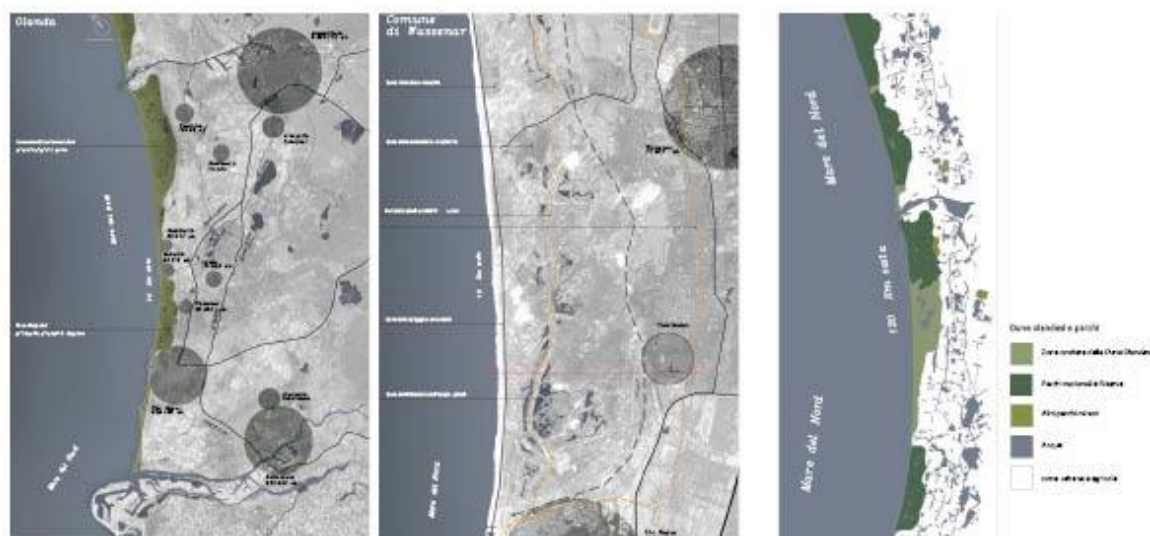


Fig.1. Focus on Dutch Dunes National Park and paths: extract from the thesis project.

2.THE VOORLINDEN ESTATE: FROM FARM ESTATE TO COLLECTION OF CONTEMPORARY ART

The southernmost area of the Dune Park is the Meijendel area.

It separates the sea from the Voorlinden Estate, a totally flat green piece of land that is the site of the homonym contemporary art museum and the setting for the "Landscapes collections-the Voorlinden experience" project.

The earliest records of the Voorlinden Estate in Wassenaar date back to around the 17th century, a period in which a series of agricultural estates were established along the important road from The Hague to Haarlem, where villas and parks were built over time. In a landscape characterised by dense forests, beaches, dunes, open polders and fields of bulbous flowers, these historic places provide an interesting window into the past.

In the 18th century the estate was inhabited by the Portugese banking family Lopes Suasso. The mansion was situated on the left of the current driveway, near the greenhouses and service housing. This property covers about 40 hectares and its conformation as an agricultural estate remained virtually unchanged until mid-19th century.

Landscape architect Johan Zocher Sr (1791-1870) designed a park in the beginning of 19th century, later constructed by his son J.D. Zocher jr (1820-1915).

When esquire Ir. Hugo Loudon (1860-1941) acquired Voorlinden in 1912, he commissioned the construction of the current mansion, designed by British architect R.J. Johnston, who also conceived the surrounding gardens with their characteristic geometrical divisions and brick terraces.

In this same period, Leonard Springer (1855-1940) reorganised the landscape park to reconnect the estate with the new mansion.

The villa becomes the focal point of the intervention, with a wide visual opening on the front; the driveway is populated with both native and exotic tree species. The non-native trees are mainly placed in visible and prominent positions in the park, along the paths and at the edges of the open field.

Some of these special trees still grace the Voorlinden estate today, such as the bald cypress along the access road and the silver maple on the north-western edge of the forest, in front of the country house.

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This rearrangement defines the character of Voorlinden's green areas, transforming the original park into a green collection, a kind of open-air botanical museum.

Since 1950 Voorlinden is owned by the Dutch Post, Telegraph and Telephone company. The country house was used as a training centre. Employees lived here as residents.

Today, the country house, the gate at the entrance, the stables and the double service houses at the Voorlinden estate are national monuments.

In 2011, the ownership passed to the Dutch entrepreneur Joop van Caldenborgh, founder of the Caldic chemical industry and a major global collector of contemporary art.

In 2016, Mr Van Caldenborgh commissioned a museum in Voorlinden to host the Caldic Collection.

3.THE VOORLINDEN MUSEUM PROJECT AND STUDIO MILANI ARCHITECTURE

The museum is inserted in the North-east side of the property, in a space among the thinnest trees, a few dozen metres from the Villa, remaining autonomous yet on an axis with it, without obscuring its original geometries, perspectives and proportions.

The new contemporary art museum, on a single level and with a rectangular floor plan, measuring 180 metres per 80 metres, was initially designed by the Dutch architectural studio Kraaijvanger.

A special feature of the project is the white metal roof perforated by 115,000 inclined solar cylinders that bring natural light into the halls, while minimising the use of artificial lights inside.

Glazed facades reflecting the surrounding landscape contribute to the perceptive fluidity between inside and outside.

Three main objectives were dictated by Mr Von Caldemburg: the quality of light, the level of safety, and the aesthetic quality of the technical details; safety signs and installations disappear both in the white walls and in the floor design.

A wedge that cannot be eliminated from the framework of the overall project is undoubtedly the intervention of landscape architect Piet Oudolf, a well-known representative of “The Dutch Wave”, who creates a new garden around the museum, modelling the terrain organically, with planes and knolls which remind the course of the dunes. A colourful sea of herbaceous plants and wild flowers, showing their continuous seasonal metamorphosis. One can savour the scent while strolling all around through small paths, or enjoying the green perspectives from inside the museum, as if they were real living impressionist paintings.

During the construction process, Mr. Joop Van Caldelborg entrusted the Siense architecture studio “Andrea Milani” with the completion of the design concept of the work, as well as the artistic direction for its completion.

The definition of the external facades and the interior design proposed by Milani's studio thus reinforces Von Caldemburg's emotional and cultural bond with Italy and establishes the indissoluble relationship between the plant material, the external landscape and the works of art contained within. In fact, the Siena-based studio brings to Voorlinden the way of conceiving the project in a comprehensive and meticulous manner, besides their unique design thinking, based on the concept of *site-specific*, *timeless* and therefore *iconic* results.

A vibrant travertine cladding reinforces the monolithic form of the museum, thanks also to a detailed and punctual laying pattern, which recomposes the texture of the entire original stone block chosen for the museum.

A clean geometric system, in which the compositional lines and the play of shadows define a metaphysical volume, that works in assonance with one of the preponderant materials of the territory: the sand of the dunes.

The surface material breathes with the surrounding landscape, working as a boundary space between architecture. The perimeter floor, made in large format, is laid dry on travertine strips, with the same cutting criteria as the facades, and merges on two sides with Piet Oudolf's garden.

Inside, the design of the art shop, the ticket office, the bookshop and the auditorium composes clear spaces in which the proportions and millimetric manufacture define unprecedented surfaces in terms of shape and orientation, recovering the same meticulous and skilful approach to design, to the definition of details and the laying of finishing materials.

The new layout of the Voorlinden estate, which was asked to Studio Milani in order to complete the contemporary art museum system inaugurated in 2015, envisaged a project to create a complex and stratified cultural compartment that would be a reference for the area north of The Hague.



FIG. 2. Auditorium and Library, Voorlinden Museum from Studio Milani

4.3. THE LANDSCAPE DESIGN AND CONTEXT

The Voorlinden Museum is located in a part of the Netherlands that is not yet characterised by major museum complexes, as Amsterdam or Rotterdam are; this is why it holds the gift of uniqueness and exemplarity.

The thesis project developed by Caterina Cipriani and assisted by the architect and landscape designer Annunziata De Comite (Arscape) was born with the aim of amplifying the ‘‘Voorlinden experience’’ by inserting itself into the landscape and creating an emotional and formal stitching between the Estate, the coastal dunes and the Wassenaar diffuse residential area. Thus the idea of the ‘‘Voorlinden Landscape Collection’’ was born, which in a spatial and functional continuum from the nearby Clingenbosch Sculpture Garden arrives to the entrance of the Meijndel Park behind the Villa, crossing the estate.

The flow of experiences within the estate is composed of individual collections organised along a step-by-step path made up of meanings of use around the concept of a collection:

- 1_ *Open air art collection*: the sculpture park of Clingebosch
- 2_ *Experimental botanical collection*: the parking area-garden of acclimatisation
- 3_ *Botanical collection from the world*: the Green House and its vegetable garden.
- 4_ *Wassenaar Dunes collection*: the underground car park-art storage with roof garden
- 5_ *Original art collection*: the Voorlinden museum and villa
- 6_ *Territorial botanical collection*: the Meijndel Dunes.

Starting from the limits of the place subjected to natural-historical constraints and its evolutionary-historical peculiarities, conceptual axes were identified, capable of shaping those constraints as opportunities for a contemporary reinterpretation of the place.



FIG. 3. Spatial relations, master plans and planting matrices: extract from the thesis project.

A condition that immediately appeared necessary was to keep cars and tourist buses away from the heart of the estate by immediately defining the rules for accessing and moving within it, i.e. mainly on foot or by bicycle. The aim was to empathise with the landscape and breathe in the design and thematic balances developed within it. The didactic artistic route that brings together the art and plant collections as well as the existing botanical areas, both natural and experimental, becomes tangible and can be experienced in a tactile and olfactory manner, in a calm and reflective time.

The car park therefore also becomes part of the collection and an introductory chapter to the whole experience.

These are acclimatisation gardens in which the cars are physically plunged in a vegetal system on two levels: on one hand, the plant essences intended for the pre-treatment of rainwater along the canals perimeter to the car parking areas, before being reintroduced into the territorial drainage system; on the other hand, the choice of trees and shrubs coming from the neighbouring greenhouses which, following acclimatisation, can be reintroduced into the adjacent portion of the Dune park.

From here we proceed to the heart of the project where the “Green house”, built to replace the existing agricultural greenhouses, reinterprets the theme of the 19th century greenhouse as an educational but also convivial space.

It is a large greenhouse made of glass, designed according to the profiles of typical Dutch houses, following along the line of the milky Dutch sky that inevitably also recalls the variation of windswept dune silhouettes.

Dedicated to the knowledge of dune environments, the greenhouse is an exhibition space for eight dune landscapes, from as many countries in the world, where, as in the Netherlands, dunes are a distinctive feature in the landscape.

Habitats with different climates and configurations are compared with a field research program, in order to test and verify the behaviour of various dune species in continuity with the coastal dune restoration and regeneration activities mentioned above.

The aim is to create a sort of *nursery of coastal vegetation* that has disappeared or has been degraded over time.

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The interior of the greenhouse provides a flowing walkway between the restaurant-café area and the retail space for seeds and products from the “Voorlinden garden-collection”, a vegetable garden which is developed in front of the main elevation of the greenhouse.

The use of glass and metal structures for the perimeter walls and roof was complemented by a material that is highly evocative of the local building tradition, functional to its climatic and transparency requirements: the glass brick.

The use of the brick is formally connected to the perimeter walls that delimit certain areas within the estate, partly maintained in the project as a frame for the greenhouse and as a functional separation between the car park and the vegetable garden.

The contrast between the solidity of the car park and the apparent fragility of the garden, animates this architecture with an unusual dynamism for such apparently flat countryside, together with the play of ephemeral shadows, the morning mist and the iridescent greys of the Dutch skies.

The open square of Voorlinden's vegetable garden, designed with reference to the shape of Dutch polders or peat bogs set in large corten steel tubs, counterbalances the covered square of the greenhouses with the dune islands of the various continents.

The regular pattern of the basins is crossed by an organic pathway that connects the acclimatisation gardens with the entrance to the roof garden of the underground collection.

Along this pathway, the vegetation develops according to a planting scheme that, like a shock wave, gradually dematerialises and thins out from the sea towards the greenhouse building: thus we pass from small, fragrant shrubs in shades of grey and purple, to two-coloured herbaceous plants and vegetables scattered like small, autonomous sculptures. Moving away from the pedestrian street, going to the opposite direction, the vegetation changes consistency and colour, fading and softening thanks to the masses of decorative grasses that change colour throughout the year.

The central area occupied by the open-air seating of the café-restaurant is enlivened by ancient fruit trees, bringing back a domestic atmosphere in which the idea of harvesting and direct consumption becomes more tangible.

Giant medlar trees from Holland, persimmons, quince trees, cherry trees and strawberry trees inebriate the air with colours and scents in the flowering and ripening seasons of their fruit.

Their foliage generates natural shadows for visitors, relaxing or feasting in the square in front of the greenhouse.

The entire intervention is uniformed by a finely designed stone carpet, that makes the areas of permanence and social gatherings precious and elegant. Asphalt made from recycled plastics was chosen for the roads, while a medium-small gravel was used for the “beach” around the garden ponds, in order to slow the pace and make the experience of walking while observing and smelling comfortable.

The opportunity of an academic work allowed to elaborate and experiment a design model able to be innovative in the use of vegetable matter, starting however from the character of that specific territory; a project dropped in that place, adapted to its geomorphologic characteristics, to its history, to its invisible traces and to its current museum and popular configuration.

That's how that the planting system, designed according to a form consistent with the design original idea, does not try to imitate nature and its alleged disorder, but rather seeks that “contemplation as a geographical experience of space” of which Nogue speaks (1 note “Other landscapes” p.38) that pertains to highly symbolic, and in our case also evocative, landscapes.

With this aim, the project is not only technical, but also spiritual, with the goal to create possible alternative views within the proposition of a life scenario.

Similarly, the concept of the autochthonous is also applied in a fluid and interpretive manner because what is autochthonous today was probably not autochthonous yesterday but has also worked for the creation of an evolving scenario.

This is why in our case we can speak of a creative workshop in which the plants of the acclimatisation gardens and the plants grown inside the greenhouses populate the collective space: indigenous but now disappeared or unseen plant essences, assonant with the current climatic conditions of the place, coexist in a continuous process of experimentation of migratory plant cells.

Their shape on the ground, an emanation of the imprint of the waves beyond the dunes, tells of their proximity and of the ultimate aim, bringing back knowledge and responsible and creative repopulation.

Another topic that is indispensable for us in today's landscape, alongside the emotional geography of spaces and the interpretation of conceptual assumptions such as the meaning of autochthonousness, is the dissemination of the history of the place through traditional museum-type systems and above all through the shape of the space designed to trigger synapses, between the place of production and the countries of the visitors <,who will carry with them “postcard seeds”, the memory of the experience made to be repeated at home.

A step further than simply communicating the starting fact, i.e. the loss of quality of a natural, historicised territory and the damage it causes.

Not a news item among the many, albeit serious, reports on the state of degradation of the climate and the planet, but an awareness based on a tangible memory of an experience that will be recounted and tried to be replicated, of which one will become an actor in the first person.

For this purpose, objects were imagined containing the seed of that experience and linked to the world of technology and the meaning of connection, network sharing, as well as the concept of production as creation.

A series of “smart” objects and experiences that allow access to a database of botanical collections, to an app that allows the user to connect with Voorlinde: adopting a plant, following it on its path of birth-growth and verification of acclimatisation experiments to habitats different from the original ones, up to the end of the life cycle with sowing and re-pollination.

Objects that allow you to take a part of the Voorlinde journey with you and, once at home, transform and evoke your experience in the museum.

In an era of fast images that are increasingly aseptic and empty of meaning, detached from the contexts in which they are dropped by unrealistic and uncreative artificial intelligences, doing architecture and landscape design means, more than in any other era, knowing how to deal with places and their formal and socio-cultural culture.

We must guarantee the coherence, ethics, legibility but above all the innovativeness and uniqueness of a creative design path by critical reading of the contexts and the natural and anthropic processes that have generated them and the assumption of responsibility for the possible error in producing a new vision of them.

The metaphor expressed by André Corboz of the “territory as palimpsest” is as pertinent and topical today as ever.

In urban or agricultural and natural territories, we can always identify visible and invisible traces that can be recovered, erased, or reinterpreted in order to evolve, supporting or directing the transformation processes underway.

In all this, the project cannot and must not be secondary in the transformative and creative process and must freely aspire to beauty, now often demonised and debased as a mere aesthetic concept and unnecessary when compared to those of environmental sustainability and lowering CO2 emissions.

We cannot, however, make an argument of exclusivity of values, but of critical synthesis in the forms designed and in the use of raw materials applied, whether they are animated or not, to aspire to architecture as the art of inhabited space.

The need to reduce the impact of what is built is inescapable, but constructive and economic sustainability cannot be applied at the expense of cultural, social and historical sustainability.

The challenge that today's planners will have to face, flanked by researchers and any expert in the fields of botany, climate or engineering, will be that of not losing sight of the history and shape of the territories and the communities that inhabit them, broadening the concept of sustainability towards the idea that it is a matter of social sustainability, and then also economic and constructive sustainability, so as not to distort the territories in an undesirable formal globalisation of the communities and places in which they live.

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A systemic and informed approach for waterscapes design

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Abstract

Since the history of humanity has always been intertwined with that of water resources, it is possible to interpret water contexts in the light of our actions feeding a bond of exchange and mutual dependence.

Water landscapes, with their fragility and vulnerability, represent the mirror of those territories which today are perhaps most affected by the ongoing climate crisis and which therefore demand to be rethought in terms of protection, management and planning.

This research concerns the Mantua water system, a complicated field of application which faces the challenges of climate change with a series of environmental conditions that appear far from those in its birth and development.

More specifically, the investigation concerns the area located north of the city of Mantua (Lombardy Region, Italy), an area with strong agricultural vocation characterized by the scattered presence of small and medium-sized urban centres. The territory analysed is linked to the Adige-Garda-Mincio-Tartaro-Canalbianco water system which carries out a series of functions aimed at the hydraulic defense of the territory.

Mincio river is a central concern. It plays a key role for these landscapes, as its course intersects the entire stretch of the district, constituting an important ecological corridor that connects Lake Garda to the Po river. The large waterways in this territory, the dense network of multifunctional canals (irrigation, reclamation and mixed use) and the natural conformation of these places make this area exceptional for experiencing the coexistence of a multiplicity of different landscape scenarios.

Working with the water resource, naturally elusive but at the same time conditioned by the will of man, involves an effort of accommodating the breadth of nuances that it entails. The plurality of gazes that it attracts is remarkable: water as an ordering element, water as a structural element, water as an instrument of identity construction, water as an element of sensorial attraction and so on.

The water system is therefore analyzed and interpreted in the light of this physical and semantic richness, putting into practice a series of observations that converge in different but strongly complementary readings.

To preserve and pass on the multilevel nature of this resource, the research proposes the recovery of the principles at the base of the systemic approach. The project aims at using the overall heterogeneity of water and the interaction of its different aspects as an element of strength and a starting point for the development of a landscape design in line with the complexity of these places.

Keywords: *Water system, landscapes, complexity, systemic approach, Mantua*

1. WATER STORIES AND ARTIFICIAL STORIES

The history of humanity has to do with the history of water.

And the history of water is not unique, it is a history made up of many stories, narratives of communities that have based their lives on the presence and use of this resource [1].

Vito Teti, in “History of Water”, describes the character of water as pervasive and heterogeneous in its relationship with every form of life. In its plural logic, “water performs its necessary functions, articulates and shapes its cyclical flow and drain, giving rise to different geographies and histories, modifying, depending on the places, times, interactions with other physical and historical factors –

first of all the shaping or destructive action of men – its ways of being, its material presences, its very symbolic values.” [2].

The impact of man’s transformative action on water landscape is an unavoidable aspect. This is testified by various publications, but we can also notice it by crossing the landscapes in which we live, where, depending on the case, it is possible to come across the ancient remains of Roman aqueducts, rather than the rigid and rectilinear path of the most recently canalized rivers.

In this regard, Francesco Visentin, professor of Human Geography, underlines how "the history of rivers and bodies of water can be read as the history and evolution of the control of a moving element, water" by men and their will [3].

The recent, and unfortunately numerous, environmental disasters that have hit the Italian water system are at the same time the mirror of an accentuated climate crisis and the clear story of a living, dynamic, uncertain, variable, transitory, and above all free agent.

What is even more shocking, emphasizing the fragility of liquid matter, is not only the number of disasters occurred in the last period but the speed and diversity of the different episodes. Andrea Rinaldo, the first Italian in the world who received the “Stockholm Water Prize”, also called the Nobel Prize of water, during his lesson “The government of water in the changing world” held at the beginning of the year at the National Academy of Lincei, invites the audience to reflect on the speed of the cycle, describing the episodes of flood and drought as two sides of the same coin [4].

The images of these events, with their expressive power, demand the need for a change, certainly in our way of acting but above all in our way of thinking.

In this direction find place all those studies that in recent years are trying to shift the point of view, embracing a less anthropocentric perspective of the subject that in some way explores the theme of water, reasoning in an unusual and oscillatory way, outside the box, just like water would do.

With this background, the contribution of each discipline is proving to be fundamental. The work of everyone, from architects, to geographers, to engineers, to artists, to photographers and any other profession, constitutes the engine that feeds the construction of a new imaginary of water landscapes. Taking as an example the studies pertaining to Landscape Architecture - the field in which the following study is placed - and considering the various experiences that are offering more flexible and resilient attitudes to the theme, it is impossible not to mention experts such as Mathur and Da Cunha who, going beyond the recurring trajectory interested in the man-nature relation, have long supported a description of water as an autonomous and omnipresent entity, which is everywhere, even before being in a well-identifiable location [5].

In other words, we are facing a real proliferation of ideas and contributions that wish to clarify the role of water in relation to our landscapes and their design.

A cultural movement that has also strongly affected the different universities, each with its own tools and insights. Among the examples, we recall the recent "Water in the landscape. Cultivating Hydrologic Imagination in Environmental Design", a thematic blog conceived and launched by the University of British Columbia school of Architecture and Landscape Architecture that, in a perspective of constant exchange and growth, aims to offer knowledge and provoke curiosity to outline new paths of investigation. The following research finds place in this complex context dominated by the paradigm shift, a scenario that attempts to look to the resource with its agency and its capacity to act as a living and changing element.

2. THE MANTUA NODE

The context explored is located north of the city of Mantua (Lombardy, Italy), an area with a strong agricultural vocation characterized by the presence of small and medium-sized urban centers. The chosen area has a strong liquid characterization due to the presence of a complex water system that starts from the Adige, continues with Lake Garda and advances further south with the Mincio, Fissero, Tartaro and Canalbianco towards the Po, entering the innermost meanders through a dense network

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of canals. From a hydraulic point of view, this interaction of water bodies is associated with the "Mantua node", the focus of this research (Figure 1).

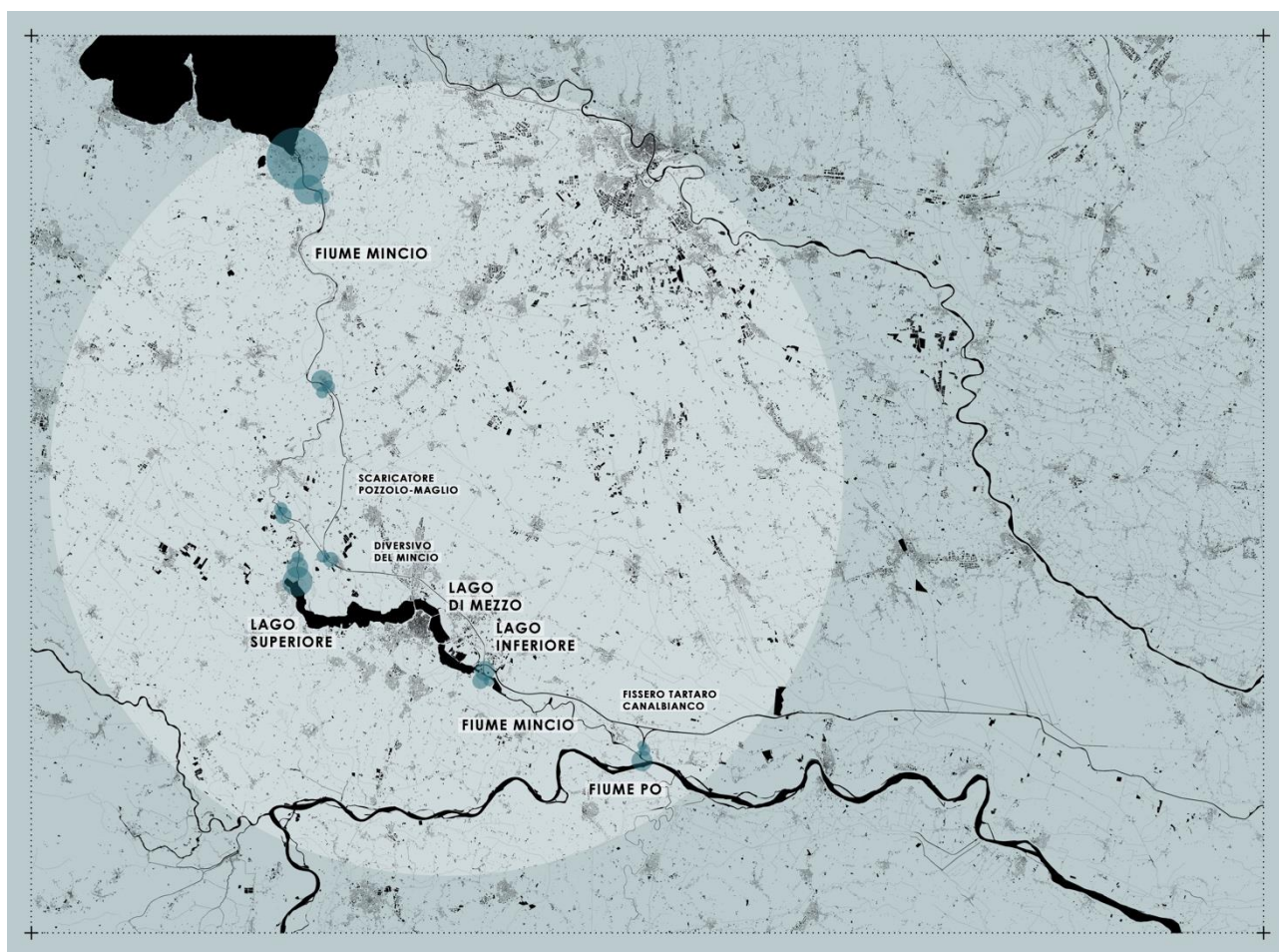


Figure 1. Frame of the investigated water system with focus on the Mantua node and its main intersection and confluence points. Graphic elaboration by the author.

A water system like the one just illustrated allows the coexistence of a multiplicity of different landscapes, which fit perfectly into the previously described framework, made of paradoxes and contradictions.

We are talking about a context that also finds space in one of the most provocative prefigurations of recent times, the so called “Viaggio nell’Italia dell’Antropocene” [6]. A story that, thanks to the narrative and geographical skills of Telmo Pievani and Mauro Varotto and the cartographic sensitivity of Francesco Ferrarese, imagines and stages a new Grand Tour in the Italy of 2786, exactly a thousand years after the challenge made by Goethe. An undoubtedly dystopian journey that however tries to give substance to those various scientific evidences that have been predicting for some time a sudden rise in sea level, which would therefore lead to the submersion of the city of Mantua, the disappearance of the main water system with the various canals and the birth of a new coast in the area of the morainic hills, at the base of Lake Garda.

To find even more concrete evidence, it is not necessary to look far back in time, just remember the summer of 2022, when the Po was in the spotlight due to the presence of a massive drought, later assessed as a "record drought", the "worst hydrological drought ever observed since 1807" [7]. Not long after, a year after this serious drought that had provoked a strong damage to the entire territory and its populations, several Italian newspapers announced the disaster caused in Emilia-Romagna by

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the flood, which, with the flow of the Po growing by a meter and a half in 24 hours, completely overturned the situation.

In an area like the Po Valley that is constantly witnessing change, those who work daily for the sustainable management of water resources, in their various local declinations, are the Land Reclamation Consortium, which deals with the hydraulic defense of the territory and the distribution of water for irrigation using a multifunctional approach.

Two activities related to water that have gradually made this area an artificial context, the result of human genius: "We can show foreigners our plain, all shaken and almost remade by our hands [...] We have taken the waters from the deep riverbeds and from the marsh depressions, and we have spread them on the arid lands. Half of our plain, more than four thousand kilometers is equipped with irrigation". Retracing some passages from the texts of Carlo Cattaneo, such as this extract from "Notizie naturali e civili su la Lombardia" of 1844, Giorgio Bigatti describes the Lombard countryside as an "artificial land" [8].

Today the city of Mantua appears to our eyes in a condition, often considered obvious and natural, but which actually is the result of a century of projects and transformations at different scales [9].

In other words, if the Mantua territory had not been reshaped by man, it would today present a very different relationship with water, much more immersive and in some cases precarious. Consequently, the cultivation system, settlements and other activities that today constitute the identity and character of these places would most likely not exist, or at least not be the same.

Among the various hydraulic constructions carried out in this area over time, there are two works that have affected more the separation between the land and water space, reducing to a minimum the possibility of mutual mixing.

The first, the oldest, can be attributed to the engineer Alberto Pitentino who, during the 12th century, began major hydraulic works that can still be seen in the presence of the three lakes that today surround the city of Mantua.

The second instead, carried out in the second half of the last century, concerns the construction of two canals that run alongside the natural course of the Mincio River (Figure 2). The first is the so called "Scaricatore Pozzolo-Maglio", which, with a length of 14 km and a flow rate almost double respect to the natural course of the river, diverts the excess flow at Pozzolo and continues southwards, in the Maglio area; the second is the so called "Diversivo del Mincio", a canal with banks entirely made of concrete, which collects the water flows from the territories on the left bank of the Mincio and transports them for about 18 km to the south, upstream of Formigosa, by-passing the city of Mantua [10].

As further highlighted in a study conducted on the area by a group of researchers from the C.N.R. (National Group for the Defence of Hydrogeological Catastrophes) and the Department of Earth Sciences of the University of Modena, these hydraulic interventions, combined with the even more damaging extractive activities typical of the area and the strong urban development that has occurred since the 1950s, represent the cause of serious damage to the geomorphological conformation of the territory, the hydrogeological situation and the landscape [11].

Therefore, if on the one hand these transformations prove essential from the point of view of security and territorial progress, on the other hand it is inevitable not to think of them as elements of possible landscape compromise.



Figure 2. Point of intersection between the so called “Scaricatore Pozzolo-Maglio” and the “Diversivo del Mincio”. Photo: Carmen Angelillo.

3. PLURAL WATERS, UNSTABLE COEXISTENCES

Considering landscape as the perception that people can have of the surrounding territory, as well as the outcome of the interaction between man and nature, it is appropriate to look at the landscape reading considering the coexistence of concrete elements and more ephemeral manifestations.

This research therefore attempts to develop a systemic story that can give voice to the dual soul of this liquid landscape, that ambiguous duplicity that already in the nineties had induced Franco Farinelli to speak of the landscape as a "bat-word" [12].

The complexity of the landscape was therefore investigated through the filter of water by putting into practice various decoding processes borrowed from an initial phase of literature review.

The review of some thematic texts, carried out with the awareness of an inevitable incompleteness and of the contradiction that a theme like this implies [13], allowed us to focus on four families of contrasts that the relationship with water suggests: protection-transformation, abundance-scarcity, surfaces-networks and tangible-intangible.

Clearly labile oppositions that have not been explored in the disjunctive perspective but rather in the conception of the “and-and”, a vision that takes the paradox as a foundation and allows for further considerations and meanings. Robert Venturi, whose critical thinking has repeatedly gone beyond the architectural discipline, emphasizes how accepting contradictions is not an easy task. “The simultaneous perception of multiple levels requires efforts and hesitations on the part of the observer”, it demands an attitude with a multiplicity of focal points to oscillate between different concepts, avoiding exclusivity of meaning and searching for unstable coexistences [14].

It was precisely during this first phase of work that a transversal observation gradually emerged. It corresponds to the detection of a double posture to the theme that, in a certain way, recalls one of the most recurrent thematic nodes in architectural disciplines, and, more generally, in anthropological thought: the debate between form and function.

In the specific case of landscape architecture, and considering the theme of water landscapes, the form-function binomial has been translated and re-proposed in the hydrography-hydraulics pair.

As described in the well-known Treccani dictionary, hydraulics is the science that theoretically and experimentally deals with problems related to the motion of water, while hydrography is the science that deals with marine and terrestrial waters in their various physical and biological aspects.

The in-depth study of various sources has allowed this research to broaden the semantic extension of both words, arriving at the representation of a much more complex constellation of meanings, where hydraulics is not only motion but also balance, regulation and control of water, and hydrography also encompasses geological or geographical issues, the theme of surveying and the effects that waters cause on the landscape (Figure 3).

The choice was therefore to select some of the meanings found in each of the two areas explored, investing them with a new meaning and giving life to two new interpretative keys that partly reflect the classic projection provided by the sciences and partly constitute a unique and personal vision. The two interpretative processes were thus defined: the "reading of hydraulic characters" and the "reading of hydrographic phenomena".

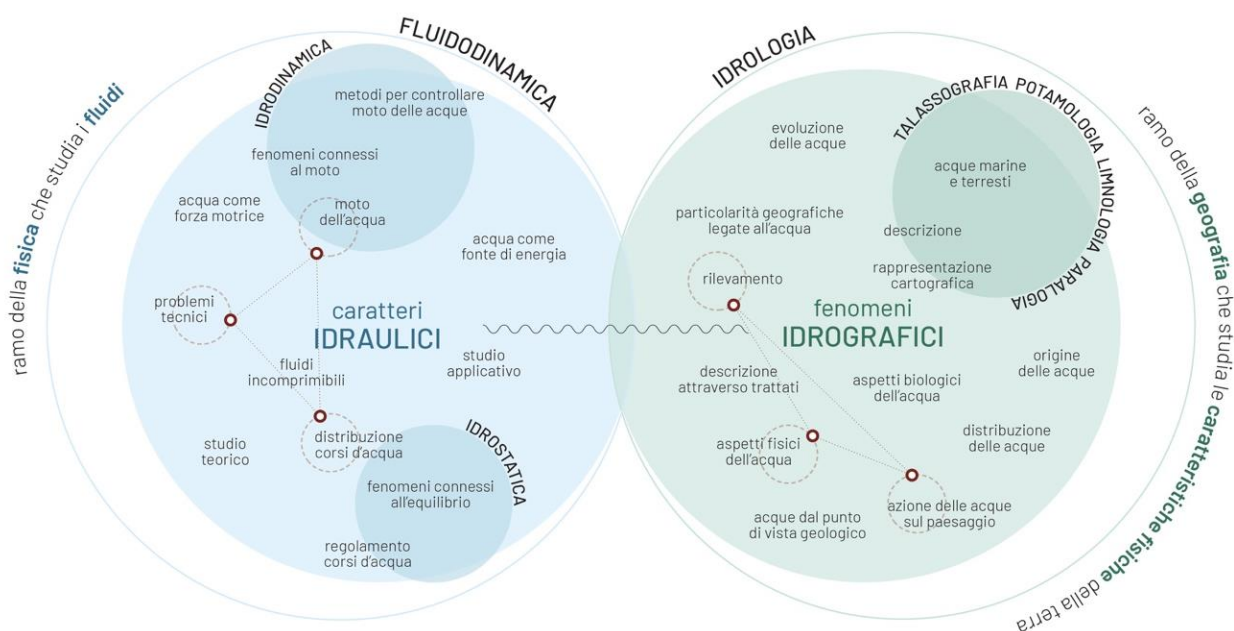


Figure 3. Cognitive framework around the hydraulics- hydrography binomial.

Graphic elaboration by the author.

The two readings have been applied to the Mantua case in the belief that the juxtaposition can provide a fertile contribution in the direction of rediscovering, and promoting, meaningful relations between the different elements that constitute these water landscapes.

The use of this approach has two immediate outcomes: on the one hand, the increase in knowledge of the territory examined from a systemic point of view, on the other, the expansion of the representations that make it consultable and shareable.

3.1 Reading of hydraulic characters

“What we call reclaimed landscape is one of the most successful examples of “cyborg-landscape”. If a gear in the landscape-machine breaks or gets jammed, in a short time the artificial stability that allows to separate water from land is interrupted and the equilibrium stopped.” [15].

The reading of the hydraulic characters has pointed interest towards all those distinctive signs of the Mantua water landscapes connected to the dynamics of water and its functions with particular attention to motion, technical issues and aspects connected to distribution.

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The cartographic representation that emerged from this reading highlights a series of different components. The network of canals with the indication of the different purposes (land reclamation, irrigation and mixed); the points of intersection and the deviations of the same system; the troughs, concentrated in the north-eastern area, on the border between the high and low plain, where the aquifer is located at a shallow depth and the water can naturally emerge and move from the source to a specific destination; the irrigation extraction points, through which the water is captured from the river or another watercourse with variable methods (gravity, lifting or spring) and dissipated in the surrounding countryside; the hydraulic artefacts, some with irrigation purposes and others aimed at land reclamation; the navigable network that constitutes an invisible link between the waters of “Lago di Mezzo” and those first of the Po and then of the more distant Adriatic Sea; the set of harbors, some for tourist use and others for commercial use; the characteristics of the soils with the distinction between morphologically depressed areas, river terraces, surfaces made up of lateral migration deposits, floodable areas and raised surfaces, with the aim of highlighting the strong relation between the functioning of the waters and the nature of the land; finally, to conclude, the main network of canals, that is the supporting skeleton of the dynamics linked to the waters, both in terms of irrigation and reclamation. Since this is a restitution that is mostly oriented to the technical aspects of the water, we also find indications regarding the flow rate of the hydraulic artefacts and the capacity of the irrigation intakes.

3.2 Reading of hydrographic phenomena

“In the search for a semiotics of the landscape, [...] one can arrive, among other things, to feel the need to further investigate perception. In relation to this, for example, I was induced to introduce the notion of Iconema [...]. Iconema as an elementary unit of perception, as a sign within an organic set of signs, as a synecdoche, as a part that expresses the whole [...]” [16].

Regarding the second process, the reading of the hydrographic phenomena has turned attention towards all those exteriorities or appearances of the Mantua water landscapes that can be evaluated for their perceptive impact. With reference to the scheme, the attention in this case is directed to the physical aspects of the water, to the possibility of gathering of these characteristics and to their effects on landscape structure.

The cartography emerged from this reading highlights a series of components, partly already reported through the reading of the hydraulic characteristics, here deciphered differently through a series of cognitive and experiential processes. In other words, in this reading, the different factors are observed with a less technical and more identity-based perspective.

In the representation it is possible to find the hydraulic artefacts, whose presence is distinguished in three different degrees depending on the level of complexity of the system and, consequently, the degree of recognizability that it assumes in the landscape; the agricultural system in which, in addition to the widespread predominance of arable land, the emblematic presence of four crops emerges: the permanent meadows in the Mincio Valley, the rice fields located in the trough belt, the orchards in the high plain area and the poplar groves, mainly located in the Po river belt; the set of embankments with the presence of different altitudes and observation points in the landscape; the network of canals, which, compared to the previous reading, is examined through a different approach: some sections are reinterpreted with respect to their course (sinuous and meandering or rigid and rectilinear), others are distinguished by the strong impermeable character due to the presence of cement, others are highlighted for their significant naturalistic value or, on the contrary, for the division that their path entails. What further enriches this type of representation is the set of 19th century cartographic inserts (recovered from the online portal Arcaum) that have been applied in an experimental manner. The different fragments are arranged with a juxtaposition method that can be associated with the patchwork technique, with the aim of offering an immediate comparison between different temporal

thresholds and suggesting some considerations linked to distributive effects and gradients of landscape transformation.

4. CULTIVATING METAMORPHOSIS AND DESIGNING RELATIONS IN WATER LANDSCAPES

The two landscape appearances here described contribute to providing a particularly complex vision of the Mantua water system where the ordering and structuring nature mixes with the perceptible and identifying component.

The outcome of this part of the research is the systemic and informed restitution of a portion of territory from which the local peculiarities connected to the water resource clearly emerge.

Considering this evidence, it is appropriate to identify an adequately broad interpretative key that can constitute solid theoretical foundations to accommodate the genesis and development of bold projects.

In this critical process, the perspective notoriously transposed starting from the territorial research of the academic André Corboz [17], which today is condensed in the expression of “landscape palimpsest”, plays a crucial role. According to this vision, recovered and analysed over the years by many scholars, the landscape is understood as a set of layers or thicknesses, material and semantic, which have progressively sedimented through a process of continuous additions and subtractions [18]. In this sense, the landscape is like a manuscript, scratched and rewritten several times, in which large quantities of signs, traces and memories find space [19].

Corboz's interpretation, despite its constant relevance, seems to be less exhaustive in relation to an elusive and dynamic subject of study such as water.

A perhaps more suitable option for this investigation is to think of water landscapes as an assembly of different entities and movements constantly subjected to transformative processes [20]. In other words, with further reference to the thought of the geographer and philosopher Jean-Marc Besse, who has made an important contribution to the development of global ecological thought, it would be more appropriate to speak of landscapes as “sets of metamorphoses” in which forms and functions change over time, evolve, but do not decay, on the contrary, they persist differently.

In this sense, it is as if the metaphor of the manuscript left space for other possible ideas of landscape that do not necessarily concerns with cancellations, but rather with continuous deviations and mutations.

Besse's belief according to which “the transformed component always exists, even if otherwise and in another way” recalls the “practice of elsewhere as identity” suggested by Marco Belpoliti in the book “Pianura” in relation to the dynamism of the Po river [21]. The river, but more generally all the characteristic features of these water landscapes, such as canals, embankments or floodplains, suggest an inherent ambiguity, more or less broad: being multiplicity, being diversity and contradiction, being movement.

In a landscape like this, where the power of action cannot be eliminated but only redirected elsewhere, it is then necessary to assume a moving perspective that allows to cultivate present and possible metamorphoses. In this sense, we should look at the design of water landscapes as a design of relations [22] between heterogeneities, as project able to grasping the interactions between different dimensions, enhancing their dynamism. The kaleidoscopic character of waters, changeable and polymorphic, is potentially the starting point for the development of a conscious and sustainable water landscape design.

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Visual complexity, stress levels, and restorative environments: 1/f noise analysis for a better understanding of Intangible Human-Environment Interactions

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Abstract

Humans and environments are intertwined through sensory experiences, with visual perceptions significantly impacting emotional and psychological states. Research has explored spatial visual complexity's role in image processing, cognitive load, and stress relief, as well as the positive effects of fractal properties on stress reduction and emotional responses. While fractal properties in natural landscapes are crucial for understanding visual complexity, they can be further analysed through the geometrical properties of spaces. By integrating 1/f noise analysis, the complexity of signals processed by the brain is further enhanced, offering significant potential for understanding 1/f noise's impact on visual perceptions, which remains underexplored in urban research. This study examines 1/f noise values and their effects on visual perceptions and physiological responses in various spatial complexities. In a pilot test, participants viewed images with different spatial complexities and 1/f noise values while their brain activity was monitored with an EEG device. The study aims to preliminarily explore changes in live brain activity and note potential trends between stress levels, engagement, and attention focus across a limited range of 1/f noise values. The initial results of this study suggest the potential for larger-scale experiments to further investigate the impact of spatial complexity measures such as 1/f noise on brain activity using EEG, highlighting the ongoing need to refine urban design practices to better cater to the psychological needs of urban populations.

Keywords: *1/f noise, visual complexity, stress reduction, EEG, restorative environments*

1. INTRODUCTION

Humans experience their environments through various senses, and understanding the ways in which the sensations work together can be critical for designers to optimise the city from a strictly functional-based design to a perceptual restorative design paradigm. Researchers from related fields have extensively explored this topic, paying particular attention to vision and visibility analysis. The concept of 'visualism', which places vision at the top of a sensory hierarchy, often results in 'visual privilege', where visual information dominates interpretation. This notion has been frequently criticised in related works [1,2,3,4]. However, it is still valuable to learn more about vision, particularly in large-scale landscapes, since vision is the only sense capable of engaging with landscapes over long distances [2,5,6,7].

Visual perception has a strong connection with humans' emotional and psychological states. Researchers have found that the visual stimuli in cities affect people's stress levels and cognitive load [8,9,10]. On the other hand, fractal patterns in nature can make people feel less stressed and improve their emotional health [11,12,13]. In particular, fractal properties, as well as repeating patterns at different scales, were related to reduced physiological stress markers [14]. It has been proven that having a glance at natural elements, such as vegetation in parks, trees along the streets, and even plants throughout windows, can improve citizens' cognitive performance and reduce negative emotions [15,16].

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For exploring the possible method to engage visual complexity as a factor in urban design, this study uses 1/f noise analysis as a visual complexity quantification parameter and electroencephalography (EEG) to understand the detailed relationship between visual stimuli and biological response. In the field of visual cognition and environmental studies, 1/f noise is a signal that represents a frequency spectrum where the power of the signal inversely correlates with its frequency [17]. Its characteristics include being self-similar and fractal [18]; the pattern looks similar and regular on all scales; it is usually found in natural environments; and it has been associated with aesthetic and psychological benefits [19,20,21,22,23]. EEG, a non-invasive method that measures brain activity, provides insights that enable researchers to observe how cognitive load impacts the brain's responses to external stimuli [24]. Our research tends to further explore the relationship between 1/f noise and brain activity in urban environments. Beginning an exploration towards the understanding of how different levels of visual complexity affect stress and cognitive responses and the way that 1/f noise as a parameter can contribute to designing urban spaces could be crucial to promoting well-being for better urban futures.

2. LITERATURE REVIEW

Spatial visual complexity is a pivotal concept in environmental psychology, visual cognition, and related interdisciplinary areas [8,25,26,27]. One of the most efficient ways to analyse visual complexity is through fractal dimensions. Researchers have found recurrent self-similar fractal structures in nature [26,28,29,30], which allow the studies to simplify and analyse the visual scenes from an infinite scale to a sizable portion of the whole scene. Consequently, researchers can have an overview of the brain response to the whole scene that shares the same fractal dimension, providing insights for understanding the hierarchical order of visual processing [31].

Electroencephalography (EEG) is a non-invasive technique that measures brain activity by placing electrodes on the scalp. It is a powerful tool that demonstrates brain activity with five basic brainwaves: Alpha (α), Beta (β), Theta (θ), Gamma (γ), and Delta (δ), that are categorised by different frequencies and brain states [32]. In the visual-environmental related fields, there are many studies that have proved the efficiency and precision of using EEG and fractal dimensions to analyse the human biological response to environments, focusing on understanding the visual stimuli, complexity, and cognitive process [33,34,35]. Specifically, Dorosti and Khosrowabadi have investigated the fractal dimension of EEG signals, giving insight into the fluctuation between visual complexity and the fractal dimension and their proportional relationship with the significant brain activities in the centre-parietal and parietal regions [35]. Namazi et al. [33] and Namazi [34] also supported the statements about the visual-cognitive relationship made by Dorosti and Khosrowabadi [35], with further research on the relationship between fractal patterns in stimuli and their impact on fixational eye movements and EEG signals. Additionally, Purcell et al. [36], Joye [37], Joye & Berg [38], and Hägerhäll et al. [39] describe the evolution of using EEG and fractals as methods for analysing environments. The discussions focus on the roles of fractal patterns in shaping aesthetic preference [36], how EEG responses to exact and statistical fractal patterns [37], and the significance of fractal patterns in nature and natural elements with their physio-psychological benefits [36,37,38,39].

In relation to environmental studies, Ulrich's psychophysiological framework emphasises the significance of complexity in shaping human preferences for natural environments [30]. Ulrich utilised Kaplan's evaluative matrix with components like coherence, mystery, and preference, demonstrating that the cognitive load is directly impacted by visual complexity. In comparison with urban environments, natural scenes are typically less visually complex and more restorative as they reduce the cognitive load [29]. Further, Cooper et al. find that the fractal dimension of streetscapes affects perceptions of quality and engagement. Suggesting that engaging the vegetation in the urban environment can enhance the aesthetic quality of streets and positively contribute to residents' perceptions and well-being [25]. Valtchanov and Ellard, on the other hand, used the fractal dimension

to analyse the complexity of a natural scene, finding that natural scenes can enhance cognitive engagement while reducing cognitive load [8].

By connecting the fractal dimension with visual complexity, studies found that higher visual complexity can make environments more interesting, engaging, and stimulating for observers; however, it requires a higher cognitive load with less restorative perception, which might lead to a higher level of stress and intensify the possibility of negative mental issues [24,29,30,31].

Given the potential that fractal dimensions have shown in past studies in broadening our understanding of spatial visual complexity, with this study we explore another parameter, founded on the same grounds of fractality taken as a quantification of visual complexity. This parameter is called 1/f noise, otherwise referred to as ‘pink noise’. Mathematically, it produces a line in a log-log spectral plot with a slope approaching -1, indicating the presence of a scale-invariant scaling relationship that is typical of fractal structures [40]. Some studies have investigated using 1/f noise as a method to analyse the urban environment [41,42,43]. Le et al., for instance, noted the visual discomfort in urban scenes [41]. They have found that in modern urban environments, the unnatural 1/f noise stimulates large amounts of hemodynamic responses in the visual cortex. Meanwhile, in Flitcroft et al.’s studies, they compare both indoor and outdoor scenes in the urban area with the natural scenes, with the same findings as with 1/f noise analysis that urban scenes require a higher cognitive load and increase visual discomfort, which leads to a higher development of myopia in cities [43].

This study will focus on some urban typologies to explore possible reactions of brain activity to 1/f noise ranges. Carmona’s works deliver a comprehensive understanding of typology as an advanced classifying method that considers physical attributes with design, functional perspective, social interaction, and management practice [44,45,46].

Current studies on the relationship between visual stimuli, 1/f noise, and cognitive and psychological processes lack statistical correspondence with bio-signal data [41,42]. Besides, there is a need for methodologies that integrate urban design and neuroscience to underpin this topic and explore more in-depth 1/f noise as a parameter for designing restorative urban environments [41,43]. In this study, we begin some exploration of possible relationships between visual complexity and brain activity through the integration of 1/f noise analysis, images as visual stimuli, and EEG responses. The research is hoping to set the groundwork for exploring 1/f noise potentials as a parameter in designing restorative urban environments.

3. METHODS

3.1 Data collection on-site and image selection

The image collection was based in Shenzhen. On a single day, under consistent weather conditions, we used a Sony 6400 camera equipped with a tripod to maintain a viewing height of 1.60 m. A total of 592 urban street scene photographs were taken at an approximate focal length of 50 mm using a zoom lens. These images were then rigorously screened, resulting in the selection of 502 photos with focal lengths between 45–55 mm. These photos were manually classified into five urban typologies typically found in Shenzhen: urban parks, urban streets, housing estates, shopping malls (indoor and outdoor), and science and technology parks.

3.2 Experiment Design

The experiment was conducted in a controlled dark room environment (Figure1), with a large screen measuring 1.904 metres in width and 1.071 metres in height used as the display device. The centre of the screen was positioned at a height of 1.60 m. We conducted the experiment with 8 participants from the Southern University of Science and Technology. During the experiment, the 11 selected images were displayed randomly, with a neutral grey image serving as an interval. Each participant was exposed to each image, and brain activity was recorded as a reaction to the visual exposure. We employed an EMOTIV EPOC X, a 14-channel wet sensor EEG device, to record brainwave activity

in the theta (3–8 Hz), alpha (8–12 Hz), beta (12–30 Hz), and gamma (30–100 Hz) frequency bands. The Fast Fourier Transform (FFT) was used to obtain the spatial frequency power intensity for each band. Invalid high-frequency and low-frequency information was filtered out, and fitting calculations were performed to determine the slope of the power spectrum.



Figure 1. Snapshots from the experiment.

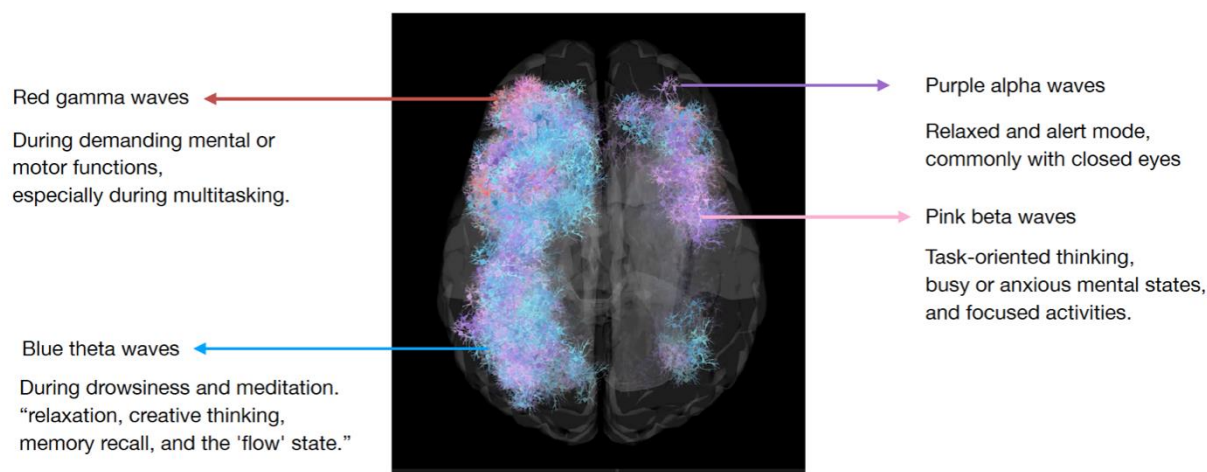


Figure 2. Snapshot of recorded brain activity and corresponding colours for each frequency.

3.3 Data processing: 1/f noise and brain activity

To calculate the 1/f noise value, images first undergo conversion to grayscale, followed by the application of a discrete Fourier transform to transition the grayscale values from a spatial representation to their frequency components. By squaring the absolute values of the Fourier transform, the power spectrum is obtained, which quantifies each frequency component's contribution to the image's structure. The 1/f noise value is derived from the slope of the log-log plot of frequency versus amplitude, focusing on the frequency range between 2 and 80 cycles to emphasise the frequencies that most significantly represent structural information in the image. (Figure 3). For brainwaves, the real-time high-precision brainwave frequency data were segmented into eleven 25-second periods (including both test and rest phases) and eleven 15-second periods (eyes-open test phases only). The peak, trough, and average values of the four types of brainwaves were then obtained, and these values were averaged across eight groups of data. To obtain these data, we employed the HSL colour model to extract the brainwave signals corresponding to four colours (each colour corresponding to one of the four frequencies detected by the EEG measurement), frame by frame (Figure 2). The sum of the amplitudes of the four types of brainwaves in the frame with the

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largest overall amplitude was set to 100%, and the amplitudes of other frames were proportionally mapped.

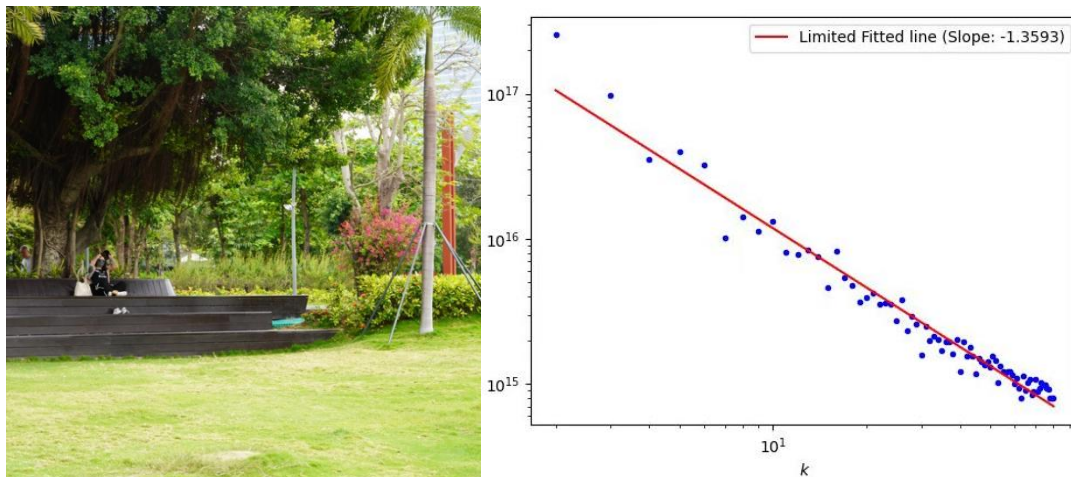


Figure 3. Image 01 (urban parks) and related 1/f noise diagram.

4. RESULTS

The comparison between 1/f noise slope values and specific brainwave patterns has yielded insightful results with different urban environment types (urban parks, shopping malls, science and technology parks, urban streets, and housing) eliciting distinct physiological responses (Table 1).

Housing features the steepest 1/f slope values (-1.275 and -1.414), which indicate lower visual complexity, and also has higher theta proportions (mean theta proportion: 38.4%) associated with relaxed and creative states and lower beta proportions (mean beta proportion: 1.9%) indicating lower cognitive effort.

Urban Street images represent flatter 1/f slope values (-1.07 and -1.14) and exhibit lower theta values (mean theta proportion 34.6%), indicating less relaxation, but also lower gamma (mean gamma proportion 0.006%), indicating lower cognitive load.

The Science and Technology Park images represent a wide range of 1/f slope values (-0.98 and -1.27) but consistently feature the highest gamma proportion (mean gamma proportion 1.1%), suggesting these environments require more cognitive effort and alertness.

Table 1. Table of 1/f and EEG calculation result

Type	Image	1/f noise	theta_Average	gamma_Average	alpha_Average	beta_Average
Urban parks	01	-1.359	40.209	0.012	33.572	2.345
	10	-0.982	36.120	0.006	25.736	1.799
Shopping malls	02	-1.286	36.869	0.007	34.196	2.852
	07	-1.119	33.362	0.008	30.890	1.789
I-Parks	03	-0.985	38.020	0.011	30.100	2.278
	09	-1.265	33.191	0.011	30.989	2.646
Urban streets	04	-1.072	33.056	0.007	31.577	2.339
	08	-1.141	36.154	0.005	27.193	2.315
Housing	05	-1.275	37.531	0.009	31.175	1.958
	11	-1.414	39.360	0.006	28.480	1.884

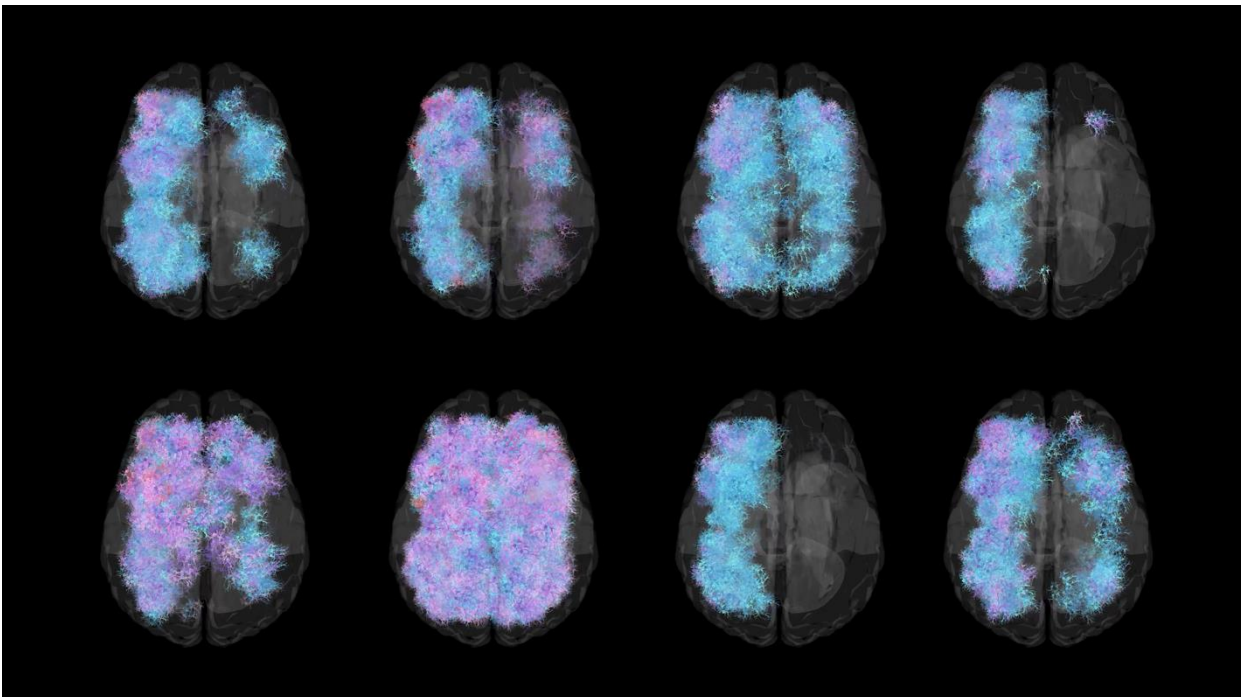


Figure 4. Screenshot of brainwaves recorded during the experiment. The 8 participants were individually looking at the same image (source: the authors).

5. DISCUSSION

This study investigates the possible role of 1/f noise in shaping human perceptions in urban environments. The study of physiological responses to different levels of spatial complexity through EEG data offers a unique window into how human brains interact with their visual environments (Figure 4). By correlating these responses with specific types of visual stimuli, we can draw deeper insights into the cognitive and emotional effects of spatial complexity.

We ask the question of whether environments that mimic the fractal patterns found in nature can help reduce stress and promote mental health. This study takes some tentative steps to expand upon existing literature that links naturalistic elements in urban settings with reduced stress and increased cognitive engagement. The exploration relates to how spaces designed with complexity similar to natural environments could facilitate cognitive restoration and stress reduction more effectively than monotonous urban landscapes; however, a lot more research is needed to corroborate this.

The study acknowledges limitations, such as the controlled setting of the experiment, which may not fully capture the complexity of real-world environments. Additionally, the sample size and demographic homogeneity could bias the results, limiting their generalizability.

Future research should aim to replicate these findings in more diverse and dynamic urban settings to enhance their applicability. Longitudinal studies could also explore the long-term effects of exposure to environments with varied 1/f noise levels. Expanding the demographic breadth and incorporating multidisciplinary approaches could provide a more comprehensive understanding of how urban design influences human health and well-being.

6. CONCLUSION

The initial results observed in this study show potential for conducting a larger-scale experiment to investigate the relationship between special complexity measures, like 1/f noise, and the impact on brain activity as measured with an EEG device. The study moves towards investigating the importance of considering sensory inputs in the design of urban environments.

Ongoing research is crucial to further discern how different special complexity measures, like 1/f noise, and other design elements affect human health and behaviour. Continuous study will help refine urban design practices to better meet the psychological needs of urban populations for better futures.

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Ethical considerations

Ethical approval was obtained by the Medical Ethics Committee of the Southern University of Science and Technology and the School of Design of the Southern University of Science and Technology.

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The landscape of agrobiodiversity collections: a small-scale urban vineyard in Rome

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Abstract

The presence of species of food interest within cities responds to the demand for more sustainable food systems, such as those based on urban proximal farming, in more inclusive cities where urban agriculture may also serve social functions and climate change adaptation strategies. The use of agrobiodiversity in urban planting design allows for the employment of resistant and resilient genotypes to cope with the multiple stressors of city environments. At the same time, food-related species help increase awareness of the importance of biodiversity for feeding cities, regenerate dysfunctional urban spaces, and promote agroecological transition. The grapevine (*Vitis vinifera* L.) is an emblematic food species for urban climate adaptation strategies and landscape design, owing to its high plasticity and hardiness in extreme environments. Urban vineyards are becoming a challenge in land use for the multifunctionality of cities. In the Botanical Garden of Rome, there is a large collection of Italian autochthonous grapevine cultivars, which serves as a precious gene database for assessing the resistance of genetic types to the urban environment through eco-physiological determinations. These determinations have shown that local grapevine varieties, such as those from the Latium region (Central Italy), exhibit better adaptation to Rome's microclimates. Therefore, the implementation of the grapevine collection with a core collection of regional grapevine germplasm has been considered. The design of a small-scale urban vineyard based on regional agrobiodiversity will serve multiple purposes, such as *ex-situ* agrobiodiversity conservation, opportunities for citizen food education, communication of the value of viticultural landscapes in terms of land preservation, and promotion of wine tourism by highlighting local grape-wine culture and traditions.

Keywords: *agrobiodiversity conservation strategies; climate change adaptation; landscape design; Mediterranean cities; Vitis vinifera L.*

1. INTRODUCTION

The presence of species of food interest within cities responds to the demand for more sustainable food systems, such as those based on urban agriculture, capable of performing productive, social, and environmental functions like adaptation to climate change.

The use of agrobiodiversity in the design of urban open spaces may represent a strategy for the sustainable use of genetic resources, thanks to genotypes resistant and resilient to the multiple stress factors of cities [1]. At the same time, the use of agrobiodiversity in urban landscape design allows for increased awareness of the importance of sustainable food systems, based on local productions, where the productive landscape can provide agro-food products but above all environmental services, such as maintaining soil fertility and increasing carbon storage, thereby contributing to the regeneration of dysfunctional urban spaces [2,3].

Given the simplification of food consumption that has occurred over time, the conservation of autochthonous agro-biodiversity, a heavily eroded biological heritage, is of great importance for the protection of local identities and the landscape enhancement of the territories where it has evolved.

There is a very strong link between typical and traditional agro-food productions, territories of origin, and the landscape, which also constitutes the element of uniqueness and irreplaceability of places [4]. The grapevine (*Vitis vinifera* L.) is an emblematic species for climate adaptation strategies in the urban environment, thanks to its high plasticity and adaptability even in extreme conditions. Historically, grapevines have been constantly present in Mediterranean cities as elements of public and private gardens, as well as main agrosystems in the farms of metropolitan areas [5]. Urban vineyards represent a growing phenomenon of interest, and numerous small-scale vineyards are being designed to perform multiple functions: conserving agrobiodiversity, providing environmental services, strengthening the culture of the vine and wine and their landscapes. Therefore, urban vineyards can represent a challenge for the use of urban space aimed at the multifunctionality of the city.

In terms of viticultural biodiversity, Italy is one of the countries in the world with the greatest richness of native grape varieties. The Italian viticultural database (Italian Vitis database - an open-source platform cataloguing Italian grapevine varieties, selected clones and biotypes) lists about 500 accessions, making the country's wine offering unique due to the great variety of grapes and thus oenological products.

In the Botanical Garden of Rome, there is a large collection of native Italian grapevine cultivars, which constitutes a valuable genetic database for assessing the resistance of genetic types to the urban environment. Eco-physiological determinations conducted on various Italian grapevine varieties in the collection have shown that local vine varieties, such as those from the Latium region (central Italy), show better adaptation to the microclimate of the city of Rome [6,7].

This study reports on the design. Criteria of a small-scale vineyard dedicated to the native grapevine varieties of Latium, to: (i) conserve the regional native agrobiodiversity *ex-situ*, (ii) provide opportunities for citizens' food education, (iii) communicate the value of the diversity of vine landscapes as identity elements of the territories, and (iv) promote wine tourism, through the enhancement of local wine culture and traditions.

2. AGROBIODIVERSITY CONSERVATION AND LANDSCAPE IDENTITY

2.1. DOC Wines and Wine-growing Areas of Latium

Protected designations play a fundamental role in enhancing native genetic resources and conserving agro-biodiversity. In Italy, there are 173 DOP (Protected Designation of Origin) and 143 IGP (Protected Geographical Indication). Of the 685,000 hectares of vineyards (Istat, 2022) in Italy, 77% is claimed as surface area for the production of Protected Designations, involving 43.7% of wine-growing companies. In the Latium region, the vineyard areas intended for the production of quality wines are also predominant. There are 27 DOC (Controlled Designation of Origin) wines in the region and 3 DOCG (Controlled and Guaranteed Designation of Origin) in the region (Fig.1). Many designations are predominantly or even exclusively based on native grapevine varieties.

The 27 DOCs are distributed across the regional territory in different geographical areas, distinguished into 4 main wine-growing zones, which approximately correspond to the territories of: (1) Vulsinia, (2) Castelli Romani, (3) Ciociaria, (4) Agro Pontino.

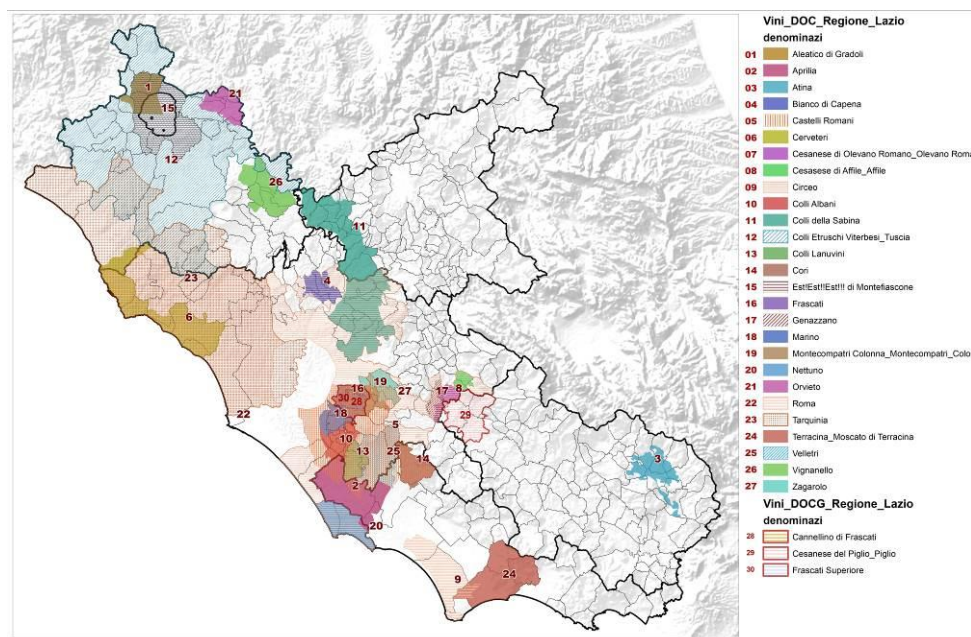


Figure 1. Perimeter of the wines' Designations of Origin in Latium.

(1) The Vulturna or Tuscia area, which includes the province of Viterbo, boasts several DOCs, including the well-known *Est! Est! Est!* di Montefiascone, Aleatico di Gradoli, Orvieto DOC (on the border with Umbria), Vignanello DOC (west of the Tiber River), Colli Etruschi Viterbesi (between Tuscia and Maremma Laziale), Tarquinia and Cerveteri DOC (in the coastal strip of Maremma Laziale).

(2) In the central area of Latium, which includes the Metropolitan City of Rome and the Castelli Romani, numerous DOC wines are concentrated: Frascati, Castelli Romani, Colli Albani, Colli Lanuviani, Nettuno, Velletri, Aprilia, Montecompati-Colonna, Zagarolo, and recently, the DOC Roma.

(3) In the Ciociaria area, which includes the province of Frosinone, the most famous production is Cesanese, in addition to Atina DOC.

(4) In Agro Pontino, Circeo DOC and Moscato di Terracina represent the main wine quality productions.

The figure 1 highlights the perimeters of the different DOCs of Latium, from which it can be noted not only the diversity of the incidence of quality viticulture (Protected Designations) within the region but also the association of the DOCs with very diverse geomorphological and, more generally, environmental characteristics of the territory.

2.2. Viticultural Biodiversity and the Identity of the Latium Landscape

Native grapevine varieties, i.e. local genetic resources, are products of the co-evolution of a biological system with its innate environment, where various factors related to the geological, geomorphological, pedoclimatic, and microclimatic characteristics of the territories play a significant role. Italy is an extraordinarily heterogeneous country, predominantly vertical with hills and mountains, where the Utilized Agricultural Area (UAA) hosts the majority of the vineyard surfaces. Recognizing and enhancing this diversity is a competitive factor for the Italian viticulture and wine sector.

The knowledge of the different expressions of the genetic characteristics of grapevine varieties based on the environment allows for the prioritization of high-quality grape and wine productions obtained

in particularly suited areas. Protected designations also enhance this richness of diversity by admitting in the technical protocols the recognition of sub-zones, often historically significant areas, associated with a particular grapevine variety. These areas represent sites with the best viticultural suitability and are identified through the methodology of viticultural zoning, a complex multi-scalar approach aiming the physical characterization of viticultural environments.

The Lazio coast extends for 360 km, where viticulture in sandy soils allows the cultivation of the own-rooted vines, an Italian peculiarity. The exposures of the slopes create peculiar microclimatic conditions, in which the characteristics of the vines, from the morphometric characteristics to the biochemical components of the berries, can take on peculiar traits, that cannot be reproduced elsewhere.

In the following figures, the areas of the DOC wines of Latium have been superimposed with the map of "landscape systems and areas" (Fig. 2), with the "land use" map and the geo-lithological map (Fig. 3), to assess, through thematic mapping techniques, the possible relationships of the DOC areas with the diversity of the landscape-environmental factors of the regional territory.

The figure 3 highlights a great diversity of soils of different lithological origins, from sandy to volcanic and alluvial ones, which give unique characteristics to the grapes and wines [8,9].

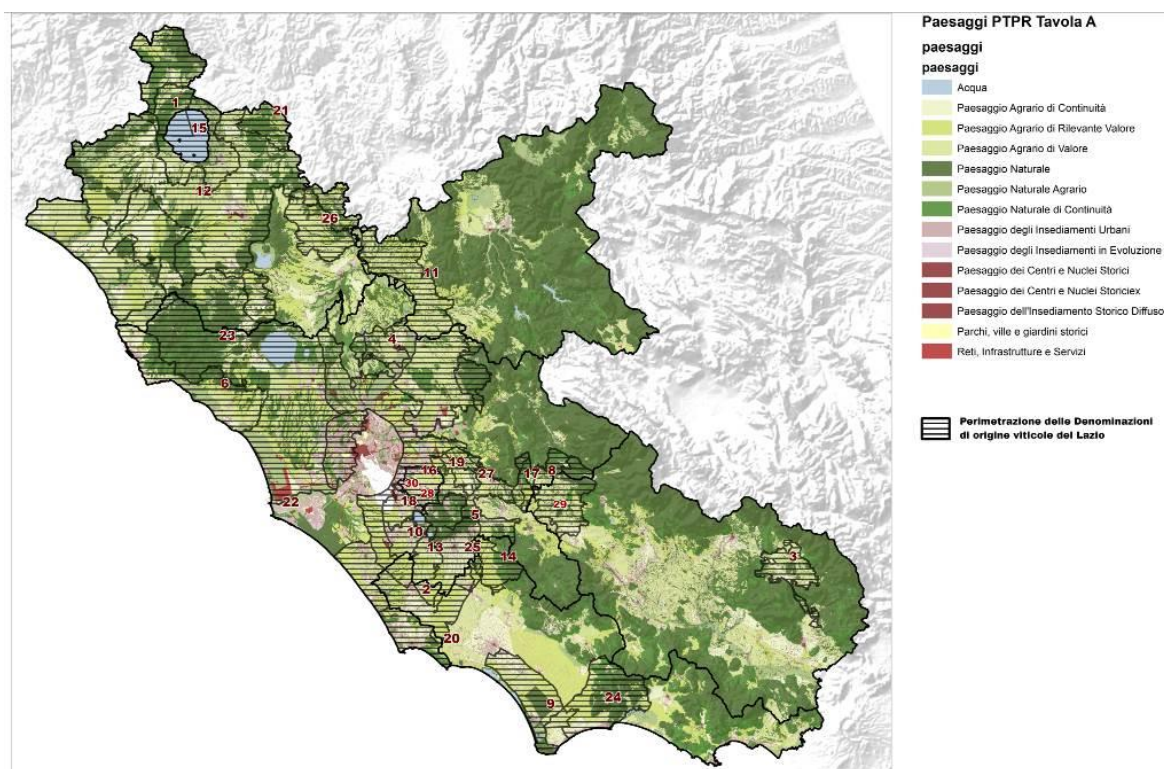


Figure 2. Graphic reworking of thematic maps, including the shape file of the areas of wine Designations of Origin in Latium, overlaid to the map of the landscapes homogeneous areas of the Regional Landscape Planning.

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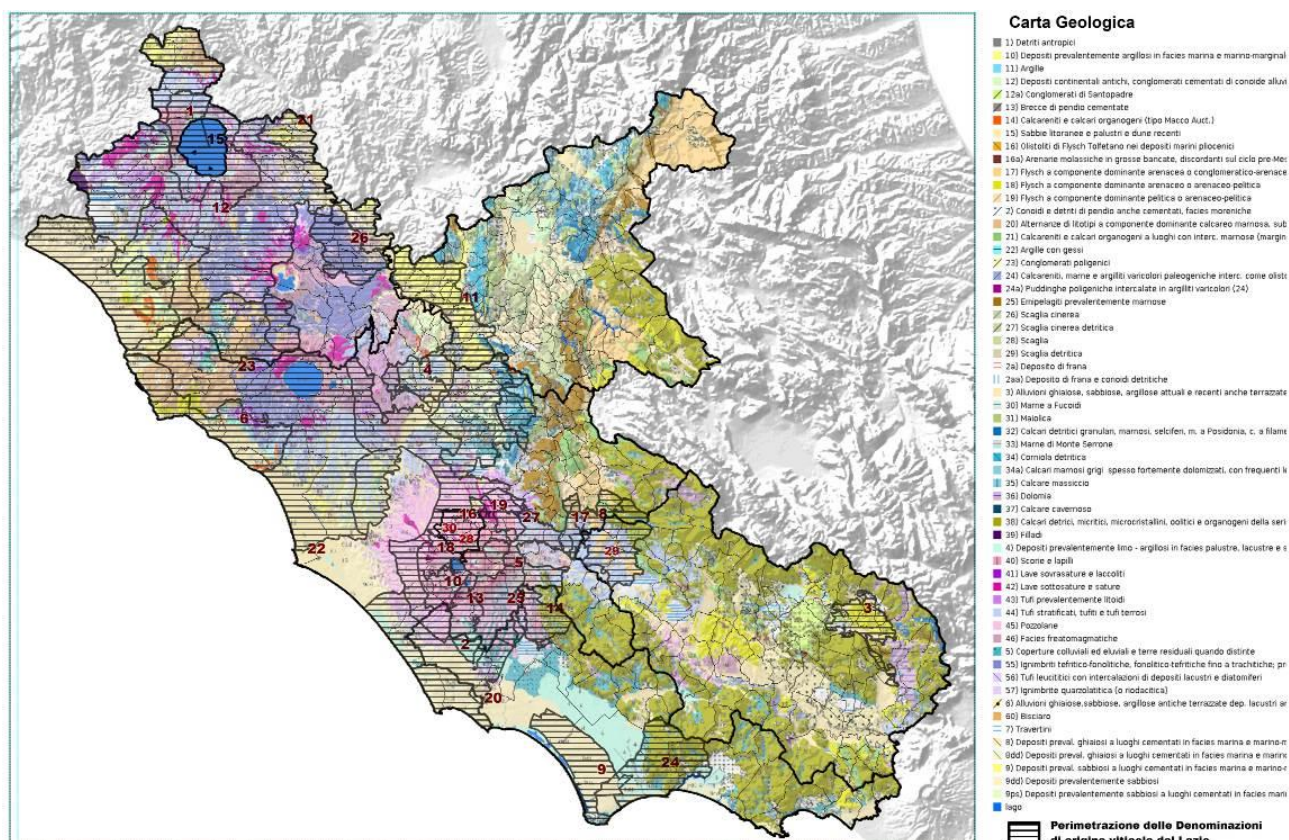


Fig. 3. Graphic reworking of the geological map, with superimposition of the areas of the wine Designations of Origin in Latium (black striped screen).

The hills, which cover approximately 50% of the regional surface, are eminently of volcanic origin and the soils have a composition that varies from area to area. The soils of the *Colli Albani* are sandy and clayey, very permeable and rich in minerals. In particular, on the western side of *Colli Albani* the vines offer more mineral wines, thanks to a friable tuff soil, rich in potassium and phosphorus; while in *Colli Romani* the volcanic soils with arenaceous, clayey and marly sediments contribute to determining the structure and properties of the oenological products. The areas of Maremma Laziale, Agro Romano and Agro Pontino have clayey-limestone soils with alluvial residues, favouring the production of more aromatic and structured wines.

On the other hand, the pedoclimatic environment can be influenced by many factors, mainly exposure and elevation, which can determine significant variations in wine characteristics [10]. In the Vulturno area, from volcanic soils and under the influence of the microclimatic factors induced by the Tyrrhenian Sea and Lake Bolsena, it is produced the wine called *Est! Est! Est!* of Montefiascone DOC and the aromatic wine Aleatico di Gradoli.

Close to the coastal strip, characterized by a Mediterranean climate, with mild winters and summers refreshed by sea winds, there are important grape-wine growing areas, like those of Circeo and Terracina DOC wines. The continental climate of the hinterland, with strong diurnal and seasonal temperature variations, can lead to less favourable conditions for wine production, while in the Castelli Romani area, some production areas are positively affected by the influence of the lakes and the proximity to the Tyrrhenian Sea.

Considering the transformations of the uses of the agricultural land in the Latium region, from the time of the Etruscans and Romans to the present day, including the more recent history of Lazio wineries, it is clear how human action has been strongly impactful and determinant in transforming

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the environment for this productive activity, always with the goal of valorising productive territories and the identity of local products [11].

The viticultural landscape is an expression of the “terroir”, which is the result of the characteristics of the natural environment transformed by humans for their productive activities, according to different cultures and traditions. In the technical protocols of Protected designations, Article 9 specifies the "link with the geographical environment," based on natural factors as well as human factors, history, and viticultural tradition. Protected designations even go as far as to support the so-called heroic viticulture, including mountain viticulture, terraced areas, and small Mediterranean islands.

3. A SMALL-SCALE URBAN VINEYARD BASED ON REGIONAL AGROBIODIVERSITY AT THE BOTANICAL GARDEN IN ROME: A RESEARCH PROJECT FOR LANDSCAPE ENHANCEMENT

3.1. Aim of the project “Latium Vineyard”

The “Latium Vineyard” aims to complement an existing collection of Italian native grapevine varieties (“Vigneto Italia”) present at the Botanical Garden Museum, dedicating central importance to the genetic resources of Latium region and the of the metropolitan city of Rome in particular. This centrality is justified based on historical, cultural, and biological considerations, also due to the location of the Botanical Garden in the historical landscape of the city of Rome.

In line with the objectives of botanical collections within botanical gardens, the “Latium Vineyard” aims to represent the viticultural biodiversity in its reconstructed environment, promoting biological and cultural values related to genetic resources and landscapes.

With its "taxonomic" classification of grapevine varieties based on the DOCs in which they are admitted for vinification, or based solely on the presence in territorial niches, the “Latium Vineyard” aims to be a place for the representation and knowledge of the viticultural heritage of the Latium Region and the metropolitan city of Rome. It may serve as a study site for viticultural research, experimentation of innovative viticultural management practices, but also as an exhibition space, where cultural initiatives and educational activities related to the culture of the grapevine, wine, and the landscape identity of the territories, can be promoted.

Therefore, the project of this urban vineyard implies a multidisciplinary approach, including viticultural knowledge, landscape design, exhibit and multimedia design, with the aim of promoting education on the topic of urban viticulture as expression of urban agriculture and of disseminating the results of scientific research that may be conducted within it.

3.2. Description of the Vineyard Collection Project

Current Status and Location of the project area

The project area is located within the Botanical Garden of Sapienza University of Rome, adjacent to the collection of Italian native grapevines (“Vigneto Italia”), in the historic center of the city. The area identified for the so-called “Latium Vineyard” extends over a surface of approximately 230 square meters, currently occupied by a collection of bamboo plants, to be relocated and reused (Fig. 4).



Fig. 4. The Botanical Garden of Rome and the project site of “Latium Vineyard”.

Project configuration of the “Latium Vineyard” with the planimetric distribution of grapevines.

The physiographic variability of the Latium region and its relationship with territorial wine productions has represented the design criteria for the collection vineyard, particularly in the distribution of native varieties within the rows. The spatial distribution of the grapevines, according to the Latium region's planimetry, aims to emphasize the relationship between geographical denomination and typical product (Fig.5).

From a morphological and distribution perspective, the “Latium Vineyard” will be terraced with double rows on each terrace (width of 3 meters). The available space and slope allow for the construction of 4 terraces, each hosting 2 rows of vines with planting distance 0.80 x 1.85m. The training system will be the classic Guyot, thus the vineyard architecture will include supports and wires for canopy management (Fig.6).

The distribution of grapevines within the area follows a spatial criterion that mirrors the region's planimetry and the distribution of different DOCs across the territory. Along the first rows (lower terracing), the grapevines of the coastal strip and small islands are placed; in the upper left area, the Vulsinian grapevines are grouped; in the central zone, numerous grapevines from the Castelli Romani and the Metropolitan City of Rome are allocated; while in the rows arranged on the right margin, grapevines from Agro Pontino and Ciociaria are reserved.

Through this approach it has been represented the biodiversity and the environment (see following paragraph) of the 30 protected denominations of origin in Latium (27 DOC and 3 DOCG) and the native biodiversity of the IGTs.

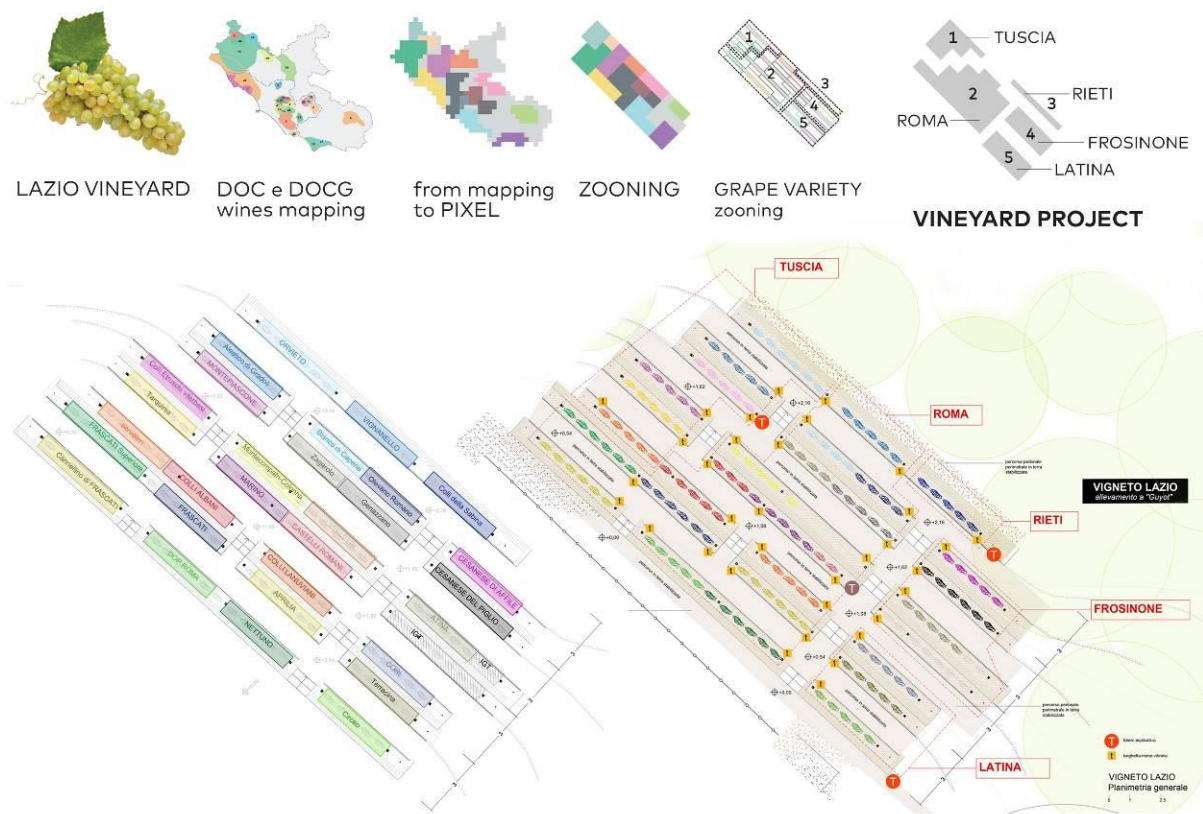


Figure 5. Project Concept: Spatial Distribution of Grapevines in the Project Area based on the Geographic Distribution of DOCs in the Latium Region.



Figure 6. Project rendering

Aspects related to visual and multimedia communication

The vineyard collection will function both as an exhibition space and as a storytelling device to promote the identity of the landscapes of Latium region and the preservation of local autochthonous germplasm.

Identifying signage, supported by references to multimedia content, can guide visitors in exploring the peculiarities of the various regional grapevine varieties.

It is planned to install 4 totems with descriptions of the different geographical areas and 30 labelled posts, one for each DOC and DOCG, with a description of the grapevine variety and the landscape of

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the innate territories. Additionally, metal inscriptions with pre-spaced letters will be embedded in the paths, identifying the geographical denomination related of the grapevine variety (Fig.6). QR codes placed on the posts will link to a portal where users can acquire information and further details.

4. CONCLUSIONS

The conservation of agro-biodiversity is of great importance for the protection of local identities and the enhancement of landscape values in territories, given the relationship between native biodiversity and the identity of traditional landscapes. On one hand, ecological and environmental factors (mainly pedological and climatic components) are crucial for optimizing the genotype-environment relationship. On the other hand, the diversification of territorial products, reinforced by cultural and traditional factors of local production chains, results in a visible diversity of unique and irreproducible landscapes [11].

The landscape is the visible manifestation of this interaction between man and the environment, in which the physical components of the territory count as much as the immaterial ones, which include historical and cultural factors, which are promoted and valorised, transferring the relationship between man and the environment onto the semiological level of interpretations and recognition of local identities [12].

Many cities have recognized that landscape identity is an irreplaceable value by initiating marketing strategies that leverage the promotion of local agro-biodiversity to increase the attractiveness of their territories and contribute at the same time to promoting the transition to more sustainable food systems, as advocated in food policies promoted by some metropolitan cities, such as Rome. In this contest, the collections of the Botanical gardens may play a crucial role in promoting values related to food systems and landscape heritage.

Acknowledgements

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Resilient public spaces under psychological distress: a closer look at high-density urban streets' vibrancy in Hong Kong

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Abstract

Urban streets play a crucial role in providing accessible public spaces for psychological restoration, especially in densely populated areas where demand often exceeds supply. However, the resilience of these spaces faced unprecedented challenges during the pandemic, with widespread psychological distress affecting urban populations worldwide. This has prompted a re-evaluation of the design and nature of future public spaces to ensure resilience in the face of public health crises and psychological challenges. In response, this study focuses on the vibrancy of high-density streets in Causeway Bay, Hong Kong, a bustling commercial district. Walking behaviour is widely regarded as a way to promote the vitality and sustainability of urban space. Through a longitudinal study involving video recordings and Geographic Information System (GIS) analysis, the research delves into street vibrancy under psychological distress, represented by walking behaviour. By examining stationary activities and their spatial, morphological, and design factors, the study aims to uncover patterns that can inform future urban design guidelines. The findings not only contribute to understanding the dynamics of high-density urban streets but also offer insights for creating resilient and vibrant urban environments that prioritise psychological well-being. Ultimately, this research serves as a valuable resource for urban designers and architects seeking to enhance existing environments and develop future cities that are responsive to the psychological needs of their inhabitants.

Keywords: *psychological distress, high-density streets, Hong Kong, street vibrancy, urban activities.*

1. INTRODUCTION

The phenomenon of intense high-density urbanisation is currently being experienced worldwide, with over 50% of the global population residing in urban areas [(a)]. Urbanisation has consequently emerged as a significant issue in the 21st century [(b)]. This heightened attention is due to the growing acknowledgement of the reciprocal influence between the urban environment and public health, as well as the profound impact of cities on people's living conditions and lifestyles [(c)]. Hence, urban areas are increasingly recognised as one of crucial factors for achieving sustainable development and enhancing human well-being in the future [(d)]. However, the adverse effects of urbanisation are eroding advantages of urban residents' health [(e)] via deteriorating ecological environment [(f),(g)], social isolation [(h),(i)], overcrowding [(j)], lack of public services or poor infrastructure [(k)] and so on, all of which are increasing human health risks. Thus, how to alleviate various issues caused by the development of rapid urbanisation and promote the health and well-being of citizens towards sustainable development goals in urban areas has become an essential focus in academic research. Walking behaviour has been extensively researched, advocated for, and called upon one of the many sustainable behaviours in urban areas [(l)]. While the relationship between walking and sustainability is not fully explored, certain studies are placing emphasis on this connection [(m)]. Generally,

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walking behaviour is widely considered a cornerstone of sustainable transportation [(n),(o)], perceived physical environmental sustainability for individual and a significant factor affecting community sustainability [(p)]. Simultaneously, walking behaviour has also been shown by many studies to have a positive promoting effect on individual physical and mental health, and has attracted the attention of researchers from different disciplines [(q)]. At the individual scale, relevant study on physical health of individuals indicated that walking behaviour can promote individual physical health [(r)] and mental health [(s)]. On the other hand, for its impact on individuals, walking behaviour contributes to creating high-quality social experience and encourages people to engage in relaxed social contact [(t),(t)]. In brief, the sustainability of the regional environment is intricately associated with public activities represented by walk behaviour manifested through pedestrian activities in urban settings.

2. SOCIO-SPATIAL RESILIENCE FOR WALKING BEHAVIOUR

More than 40% of Hong Kong's total area is composed of parks and natural areas, but less than 25% are development zones [(u)]. With a population density of 6.5 persons per kilometre, Hong Kong is one of the world's most densely populated cities [(v)]. With the COVID-19 upon Hong Kong, the pandemic disrupted daily routines and affected the mental and physical health of local residents. A significant decrease in walking frequency has been observed and obtained among residents, and their activities have not yet fully recovered to pre-epidemic levels [(w)]. The pandemic requires prompt and efficient measures for recovery planning and crisis management. While the majority of cities, with slow and relatively rigid traditional planning mechanisms, require long-term growth targets [(x)]. Under the pandemic, Hong Kong has identified the imperative and urgency for urban planning transformation, which calls for more nuanced and adaptable planning. This inquiry not only reconsiders alterations within land use, infrastructure, and other environment elements, but also includes the individual behaviours and habits [(y)]. For example, with the opportunity of changing towards sustainability caused by the pandemic in Hong Kong, promoting green and active mobility in the open space through the management of public open space has been proposed [(z)]. Moreover, considering the severe contradiction between people and land in Hong Kong, coupled with a lack of resources, makes it an ideal location to conduct research on the social resilience of urban spaces under epidemic conditions.

the concept of spatial resilience originated from the establishment and discussions of The Resilience Alliance [(aa)], Cumming et al. work has arisen the definition of space resilience as follow: spatial resilience, refers to the ways in which spatial variation in relevant variables, with both internal and external factors of the system, interact system resilience across multiple scales [(bb)]. The study by Adger et al. define social resilience as the ability of groups or communities to cope with external pressures and disturbances brought about by social, political, and environmental changes [(cc)]. Other relevant studies have shown that, under natural disasters or pandemics, the quality of socio-spatial resilience has a significant impact on post-disaster restoration and human wellbeing of local residents [(dd)] via social activities, lifestyle, walkability et al. The work of Zhou et al. reviews the resilience research and proposed a disaster resilience model based on the multiple perspective [(ee)]. Based on the impact of public health risk, Wu et al. proposed five principles for designing resilient urban spaces after disasters, and elaborated on their technical prerequisites and basic elements [(ff)]. It has great research value and significance for resolving social and environmental issues in high-density areas and promoting sustainable transformation from the spatial resilience perspective of urban areas.

From an individual perspective, pedestrian comfort is used to measure an individual perception of the surrounding environment. Pedestrian comfort is affected by a number of factors such as wind speed, temperature, relative humidity, clothing, activities, solar radiation, noise, and air quality around buildings [(gg)]. Studies have revealed that tree planting patterns, street orientation (but not aspect ratio), and neighbourhood morphological attributes significantly affect pedestrian comfort in the

baseline configuration of streets in Hong Kong [(hh)]. From the perspective of assessment system, the Hong Kong Building Environment Assessment Method (HK-BEAM) and the building research establishment environment assessment method (BREEAM, UK) provides a static evaluation form to improve pedestrian comfort by indicators-based approach, while there are still some deficiencies in complex environments and human scale. Existing relevant research has explored various issues under the pandemic such as the thermal comfort or response [(ii),(jj)], walking environment [(kk)], space environment and health [(ll)] et al., while there is short of relevant comparative studies of pedestrian comfort in Hong Kong under psychological distress.

With this study we aim at detecting spatial resilience in Hong Kong under high-levels of psychological distress during COVID-19 through behaviour monitoring in an iconic high-density neighbourhood. Visualising socio-spatial resilience under psychological distress in correlation to morphological conditions can help with the understanding of urban morphology characteristics that could improve pedestrian comfort and consequently promote walking behaviour under psychological distress conditions for future cities planning and design.

3. METHOD

3.1 Study Area

Causeway Bay (CWB) is formed by numerous department stores and shopping centres, conveniently located adjacent to the Victoria Harbour. Notably, the Hong Kong Planning Department's shopping survey reveals that Causeway Bay ranks as the second most frequented shopping area in Hong Kong, characterized by its bustling atmosphere, high-density traffic and multitude of towering commercial edifices [(mm)] Given its vibrant and densely populated setting, Causeway Bay emerged as an optimal site for our examination of pedestrian comfort amidst the ongoing pandemic. The study area is located in Wan Chai district, Hong Kong, as shown in Figure 1. The street configuration of Causeway Bay (CWB) is intricate, featuring a frontage comprised of various establishments such as shopping centres, restaurants, and shops. These spatial patterns offer outdoor pedestrian areas for both local residents and tourists. In this study, three distinct urban areas have been selected as the focal points of investigation. The first area (R01 & R04) includes identified landmarks such as CWB Mass Transit Railway (MTR) Station, Hennessy Road, and Hang Lung Centre. The built environment in this area primarily consists of medium to high-rise buildings, predominantly serving commercial purposes and housing office spaces. Additionally, it involves multiple pedestrian streets. The second area (R02) is composed of Jinghua Centre, Jinlilong Centre, and other similar establishments, characterized by vibrant streets and high foot traffic. The third area (R03) mainly is a street that predominantly encircles the prominent shopping mall, Hysan Place. Whereas, the thoroughfare is lined with street vendors street snack bars, restaurants, and real estate consulting establishments. All streets are equipped with well-established infrastructure and demonstrate a high level of modernization.

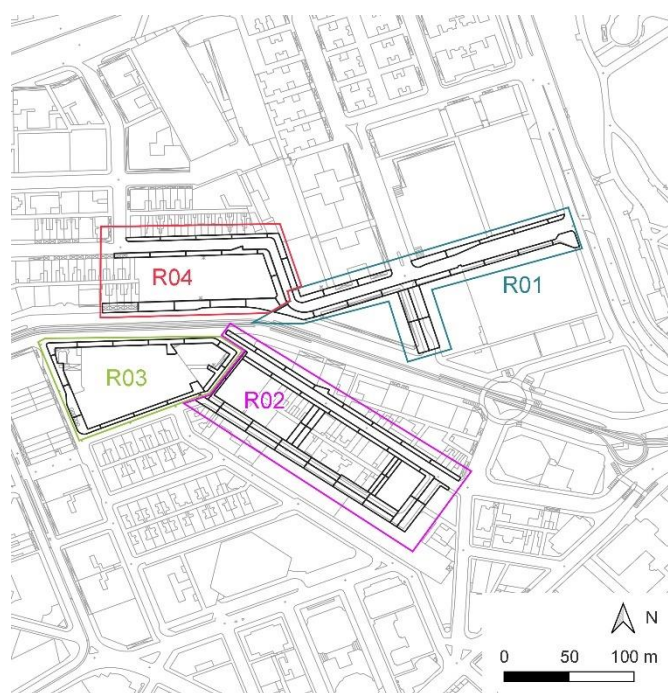


Figure 1. a) Location of CWB and study route, b) Location of Wan Chai in Hongkong

3.2 Data collection and validation

We conducted a longitudinal study in Causeway Bay streets, videos were recorded twice a day for 7 days. Through videos, the aim consisted in detecting and observing spatial resilience in one of the most iconic districts in Hong Kong Island by performing behaviour mapping of activities and standing behaviours on the streets. After data review and invalid data filtering, the usable data comprehended the following days: April 8, 2020 (two rounds), April 18, 2020 (two rounds), May 16, 2020 (two rounds), June 10, 2020 (two rounds), June 24, 2020 (two rounds), July 4, 2020 (two rounds), and July 18, 2020 (two rounds). We then conducted statical analysis considering transportation, accessibility, and streets configurations in relation to standing behaviours.

4. RESULTS

4.1 Statistical results of spatial distribution

Based on the calculation of the number of standing behaviour event in each street, the following visualisations of the mean, standard deviation and coefficient of variation of the number of standing people in each block based on multiple different time and spatial distributions can be obtained, as shown in Figure 2, 3, 4.

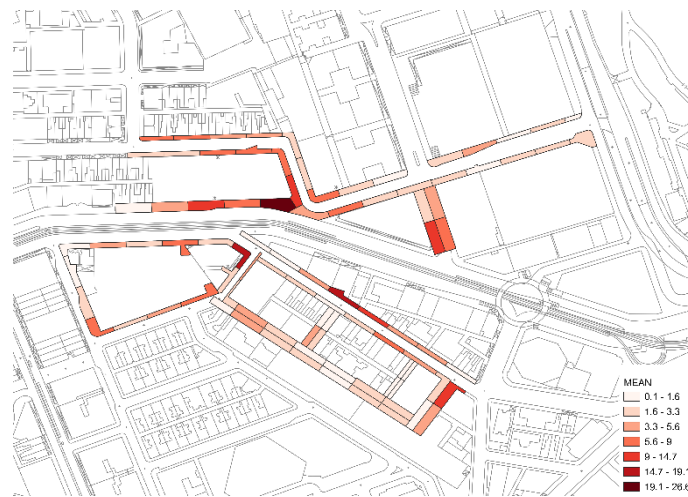


Figure 2. Geographical distribution map of daily standing population based on average.

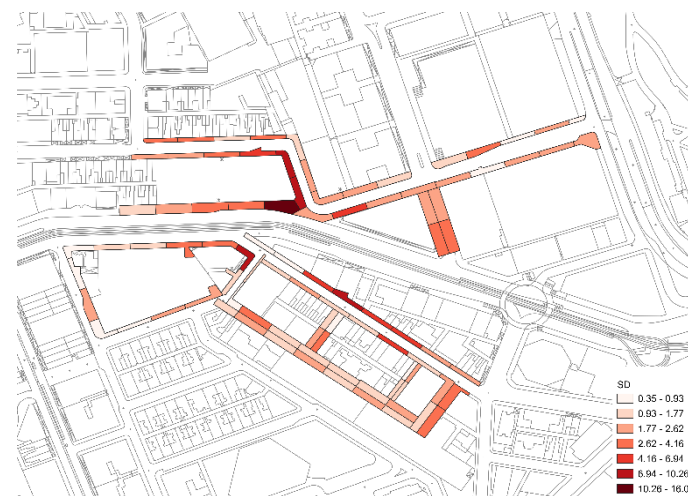


Figure 3. Geographic distribution map of daily standing population based on standard deviation.

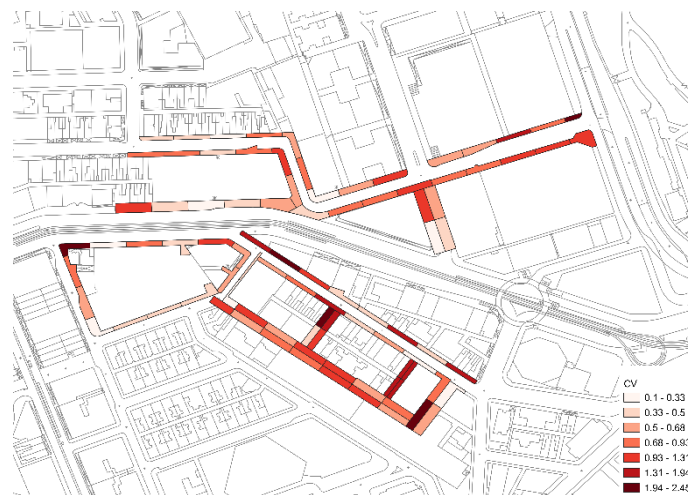


Figure 4. Geographic distribution map of daily standing population based on coefficient of variation.

4.2 Global/Local Moran's I results and Local Indicators of Spatial Association (LISA) results

Based on the number of standing people obtained, the relevant spatial autocorrelation analysis and LISA analysis results are as follows: among them, the Moran's I index based on the aggregate data was 0.386 (Figure 5), and in the spatial autocorrelation analysis calculated for subsequent daily data, the highest value of the Moran's I result was 0.421 in the data set on April 8, 2020 (Figure 6). The lowest value was 0.161 on July 4, 2020 (Figure 7).

4.3 Correlation Analysis and Variance Inflation Factor (VIF) Results

Based on defined groups of dependent and independent variables, VIF calculating results are shown in Table 1. Based on the VIF results and the source of the variables, the variables $x1$ (CV), $x2$ (SD) and $x3$ (Average) were excluded, which is the same as the results of the previous round of analysis. Furthermore, the results of correlation analysis of y (Number of standing behaviour events), $x4$ (Dummy variable of standing behaviour events), $x5$ (Distance to nearest entrance), $x6$ (Distance to nearest MTR) and $x7$ (Distance to nearest bus stop) are as shown in Figure 8.

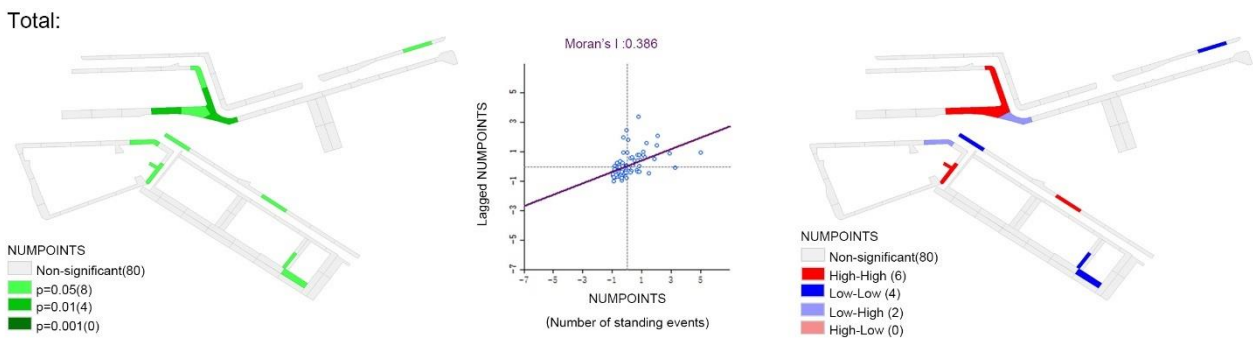


Figure 5. LISA and Moran's I results

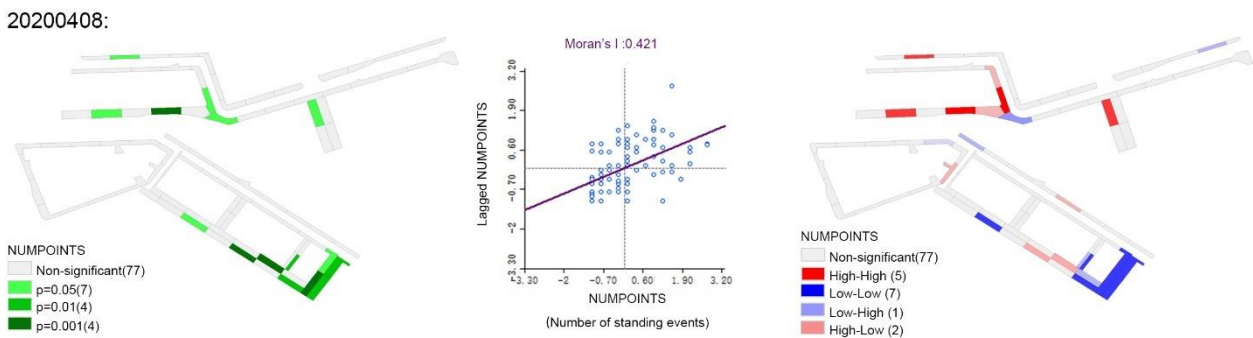


Figure 6. LISA and Moran's I results of April 8, 2020

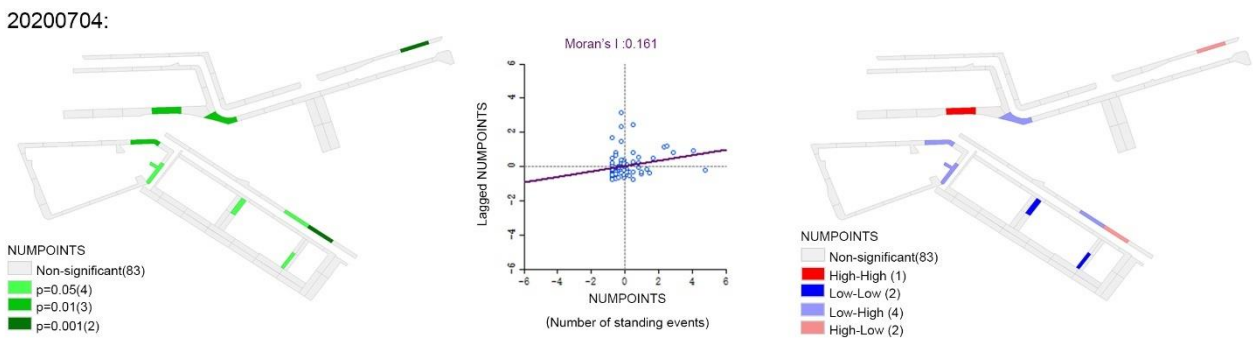


Figure 7. LISA and Moran's I results of July 4, 2020

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Variable	VIF	T-value	P-value
X1	2.126601	1.118485	0.263782
X2	11.45353	0.031419	0.974945
X3	10.73859	12.10867	0
X4	1.547668	0.131545	0.895386
X5	2.468823	1.750942	0.080438
X6	5.213733	0.631745	0.527781
X7	5.762698	1.218496	0.223487

Table 1. Table of VIF calculation result

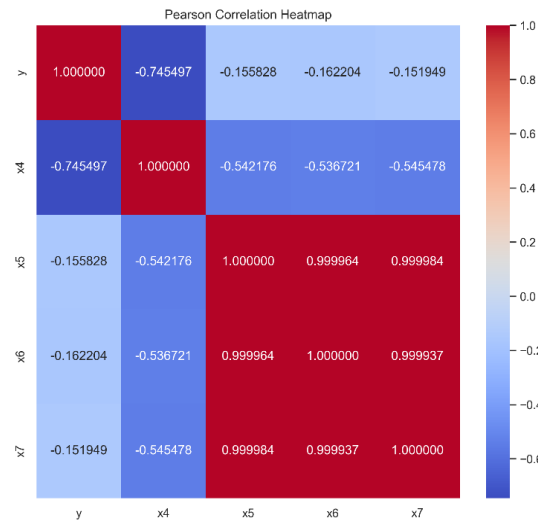


Figure 8. Heatmap based on the Pearson coefficient results.

5. DISCUSSION

Based on the results of the geographical distribution maps, it is evident that the topological proximity between standing events and adjacent bus stops/building entrances is relatively close in some locations (Figure 2). Observations from video recordings reveal that most standing behaviours are concentrated at street corners and intersections where multiple streets converge. The coefficient of variation analysis (Figure 3 and 4) further indicates that these locations maintain a stable frequency of standing events without significant fluctuations. This consistency suggests that certain spots inherently attract standing behaviours due to their spatial configuration. Additionally, the results of both global and local Moran’s I results, being greater than 0 (Figure 5, 6 and 7), demonstrate a positive spatial correlation in the overall standing behaviour data. In this study, higher Moran’s I value signifies a more positive correlation of standing behaviours.

Despite the positive spatial correlation, the correlation analysis of the four variables examined in the study indicates only a weak association with standing behaviours (Figure 8). This finding suggests that while there is some connection between the environmental variables and standing behaviours, it is not particularly strong with current data set. However, this does not undermine the importance of understanding the environmental design elements that influence standing behaviours, especially under conditions of psychological distress. This finding is consistent with the conclusions of previous research by authors [(nn)], which indicate that studies conducted under psychological distress help elucidate the impact of design variables on individual behaviours experiencing it.

To fully comprehend the impact of these design elements, further theoretical and empirical investigations are necessary. Future research should explore the psychological factors that drive individuals to engage in standing behaviours at specific locations and under varying conditions.

Although experimental methods in psychology and medicine have been well-developed, they are still in the early stages of application in urban planning and architectural design [(oo)]. Zapata et al. [(pp)] 's work has indicated that by integrating psychological insights with spatial analysis, a more comprehensive understanding of standing behaviours can be achieved. This will aid in designing urban environments that cater to the needs and behaviours of individuals, promoting comfort and well-being in public spaces.

6. CONCLUSION

Beside the psychological distress induced by the pandemic, some spaces were found more resilient than others. More specifically, street corners and street intersections showed more positive values for standing behaviours in public spaces. These findings indicate more potential for fragmented morphological conditions supporting accessibility and walkability in dense conditions. Although correlations were still slightly weak, there is a lot of potential for future studies in deepening the understanding on how urban morphology and public space design can support walking behaviours by providing favourable conditions for pedestrians in high-density cities.

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Dynamic waterscape challenges

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Extended abstract

The undeniable evidence of climate change and its ensuing crises stands as a stark testament to the epochal shift known as the “*Anthropocene*”. From the melting polar ice caps to the increasingly frequent and severe extreme weather events, the Earth's systems are manifesting the consequences of human activity on an unprecedented scale. Architecture can be seen as both part of the problem leading to climate change as it shapes the interaction between human and nature but as part of the solution too. In order to address the fields where architecture can shape the solutions, we need to understand the new conditions. We assume that under the effects of climate change, landscape and terrain relief is becoming more dynamic as it is subject to constant changes. Water is a crucial element leading to this new dynamism. River floods and rising sea level are becoming significant factors that shape urban and natural landscapes. In the face of dynamic landscapes shaped by climate change and increasing occurrences of floods, architecture undertakes a critical role in adapting to and mitigating these challenges. Drawing from the philosophical concepts of Gilles Deleuze, particularly his notions of “*rhizomatic*” thinking and “*assemblages*,” architects envision new strategies that transcend conventional linear approaches to design. Instead, they conceive of architecture as part of complex networks and interactions within ever-changing environments. Diagrams, inspired by Deleuze's emphasis on multiplicity and interconnectedness, become tools for understanding and navigating these dynamic landscapes. They represent not static blueprints, but rather fluid processes that respond to shifting environmental conditions, fostering resilience and adaptation. By embracing Deleuzian concepts, architects engage with the inherent complexity of climate change and floods, seeking innovative solutions that blur the boundaries between built and natural environments, and promote sustainable relationships between human habitation and the ever-transforming landscapes of the Anthropocene. A further reading of this approach can provide insights not only to handle the immediate effects of climate change, but to also reach a better understanding of the relation between human and nature. Diagrams and Deleuze's concept of interconnectedness helps to understand our relation with nature as a constantly transforming procedure where architecture shapes this interconnection.

Keywords: *Anthropocene, architecture, diagram, dynamic landscapes, water*

Hanbury Botanic Gardens and Nature-based Solutions: First Steps Towards Co-Designing a Kitchen Garden in a Protected Area.

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Abstract

The Hanbury's Blue and Green project aims to restore areas of the Hanbury Botanic Gardens between Ventimiglia, Italy and Menton, France. Funded by the Fondazione Compagnia di San Paolo, the project focuses on habitat restoration and improving the use of terrestrial and marine ecosystems. Key interventions include: Restoring coastal wetlands and *Posidonia oceanica* beds; Creating a kitchen garden for traditional cultivated and wild species; Controlling invasive alien species; Establishing new museum spaces.

This paper focuses on the initial steps taken towards the creation of the kitchen-garden. It identifies the main actors involved in its co-design and the involvement of experts for the landscaping of the site through naturalistic engineering works.

The project emphasizes preserving traditional knowledge about natural and agricultural biodiversity. It aims to raise awareness of ecosystem services provided by local plants used for food, nutraceuticals, and medicine. Additionally, it will stabilize a degraded pathway and reconstruct a historic pergola with ancient Moscatello vines. Overall, the project seeks to enhance sustainability and biodiversity in the Hanbury Botanic Gardens.

Keywords: *Ecosystem Services; Nature-based Solutions; Protected Areas; stakeholder involvement; Italy*

1. INTRODUCTION

The Hanbury's Blue and Green project, which aims to restore areas of the Hanbury Botanic Gardens located between Ventimiglia, Italy and Menton, France, has received financial support from the Fondazione Compagnia di San Paolo. This represents a significant step towards environmental conservation and sustainable development. The project's objectives include the restoration of natural features of the Hanbury Botanic Gardens as well as the promotion of biodiversity, protection of ecosystems, and raising public awareness of the importance of preserving natural heritage.

The project employs innovative restoration techniques and strategic interventions with the objective of establishing the Hanbury Botanic Gardens as a model for the harmonious coexistence of human activities and the environment. By focusing on habitat restoration, the project enhances the ecological value of the area while creating a space where visitors can learn about and appreciate the rich biodiversity of the region. The objectives of the Project are in alignment with those of the Management Plan (MP) of two Special Areas of Conservation (ZSC) – IT1316118 Capo Mortola and IT1316175 Fondali Capo Mortola – San Gaetano, which was approved in 2016. However, despite this approval, the plan has yet to achieve concrete results.

The project represents a framework of actions and interventions on land and at sea, which are coordinated with other national and European projects. Activities are envisaged for the regeneration of degraded areas and habitats through techniques of habitat restoration and the prevention and limitation of existing pressures.

The two ZSC, Capo Mortola and its Seabed, are part of the Natura 2000 Network established in accordance with the European Habitats Directive and extend to approximately 50 hectares on land

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and 339 hectares at sea [1]. The two ZSC overlap with the Regional Protected Area of the Hanbury Botanic Gardens [2], which was established in 2020 and encompasses approximately 20 hectares on land and 462 hectares at sea. This area is referred to as the ‘Capo Mortola Marine Protection Area’. The project is coordinated by the University of Genoa, which has a perpetual concession for the compendium (State Heritage) of the Hanbury Botanic Gardens and is the managing body of the regional protected area and of the ZSC, in accordance with Regional Laws 31/2000 [3] and 28/2009 [4]. The partnership, which involves scientific research, the public administration of the area and the associations involved in its protection and enhancement, assumes a significant value. At the same time, it creates a new link of possible collaborative development between Liguria and Piedmont, between sea and hinterland, involving the University of Turin and a development agency in Asti. The local community was already engaged in the Strategic Environmental Assessment process at the time of the MP's adoption, and this engagement is reinforced through the involvement of schools and associations, with the definition of the design details of certain interventions being a notable example. The project proposes the implementation of a series of coordinated interventions with the objective of restoring and improving the use of terrestrial and marine ecosystems. These interventions are designed to reduce the pressures caused by the expansion of invasive species in priority riparian habitats and by the anchoring of pleasure boats on the *Posidonia* beds. In addition to the aforementioned renaturalisation measures, communication and dissemination actions are to be implemented with the objective of raising awareness at a territorial level, and not only (considering the international attendance of the Hanbury Botanic Gardens), of the value of natural capital, environmental problems and nature-based solutions in a framework of enhanced sustainability.

Among the many activities that are taking place as part of the project, one of particular interest is the realisation of nature-based solutions related to the community garden or kitchen garden, as well as the redesign of the Muscat vinyard, which was formerly present in the protected area.

This paper focuses on the initial steps taken towards the creation of the kitchen-garden. It identifies the main actors involved in its co-design and the involvement of experts for the landscaping of the site through naturalistic engineering works.

2. ASSESSMENT OF POTENTIAL BARRIERS BEFORE TACKLING THE PROJECT

Some actions, even among the most challenging ones, replicate experiences that have been quite successful in past years. However, the main critical issues may in some cases concern the respect of time schedules, which may be affected by weather and sea conditions. Nevertheless, these criticalities appear to be surmountable, having considered a sufficiently long period for the entire project to allow for a temporal rescheduling of activities.

A number of actions have already been included in the ‘Capo Mortola’ ZSC Management Plan or the ‘Capo Mortola Seabed’ Management Plan. There are no criticalities in the issue of authorisation by the competent bodies that were consulted at the time of the drafting of the aforementioned plans and with which there are assiduous contacts. In the case of the movement of sediments that have accumulated over time in the terminal stretch of the Rio Sorba, the intervention meets the periodic requests/signals of the Fire Brigade regarding the need to restore a correct water flow, obstructed precisely by excessive graveling. Furthermore, it aims to reduce the mass of flammable *Arundo donax* reed. However, important criticalities may arise from the difficulty of eradicating invasive species and consolidating the establishment of planted species. It cannot be ruled out that subsequent interventions to control invasive allochthonous species may be necessary. Such interventions could be carried out as part of the ordinary maintenance of the Regional Protected Area.

In the case of the fire risk reduction actions, although they are a prevalent action within the ‘Capo Mortola’ ZSC MP, it is believed that agreements still need to be formalised with the owner of the area bordering the Hanbury Botanic Gardens compendium (Grimaldi). In this regard, however, the lead partner has been directly involved by the same property in the drafting of an overall plan for the

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environmental redevelopment and sustainable use of this area. Nevertheless, it is possible that further resources may be made available by the Grimaldi's private property. With regard to the preparation of a prevention plan, it is notable that all the owners of the areas west of the Hanbury Botanic Gardens have expressed great interest. Furthermore, the availability of recent data, collected as part of cross-border projects on a regional scale, can be highlighted as a valuable resource.

3. NEW EXHIBITION AREA IN THE BOTANIC GARDEN DEDICATED TO TRADITIONAL PRODUCTS OF FOOD OR NUTRACEUTICAL INTEREST, CULTIVATED AND WILD

Article 8(j) of the Convention on Biological Diversity [5] is dedicated to the subject of traditional knowledge, innovations and practices. Each Contracting Party shall, to the greatest extent possible and in an appropriate manner, respect, preserve and maintain the knowledge, innovations and practices of indigenous and local communities embodying traditional lifestyles relevant to the conservation and sustainable use of biological diversity. Furthermore, they shall promote the widest possible application of such knowledge, innovations and practices, with the approval and involvement of the holders of such knowledge, innovations and practices, and encourage the equitable sharing of the benefits arising from the use of such knowledge, innovations and practices.

This commitment is frequently overlooked or not adequately managed on a scientific basis. Consequently, there is a pressing need to safeguard traditional knowledge of both natural and agro-sylvo-pastoral biodiversity before it is irrecoverably lost.

The FAO also incorporates a socio-economic and cultural dimension into its definition of biodiversity [6], recognising traditional knowledge as an integral component of agrobiodiversity. This phenomenon can be attributed to the interaction between the environment, genetic resources, systems and management practices adopted by culturally diverse populations, which result in the utilisation of environmental resources in disparate ways.

The University of Genoa has been conducting ethnobotanical research for a long time, utilising internationally standardised methodologies to document the multifaceted applications of medicinal plants. This research has contributed to the establishment of small museums or structures dedicated to the topic in inland Ligurian villages. The University of Turin offers university courses whose curricula include the appreciation of historical varieties of food. In addition to the aforementioned motivations, there is the possibility of a recovery and reutilisation of degraded areas near areas or routes that are less frequented by visitors or even forbidden, within the Hanbury Botanic Gardens.

One of the project's objectives is to disseminate knowledge and awareness of the ecosystem services provided by plants utilised in the traditions of the Ligurian territory, with a particular focus on the Imperiese area (linking the Ligurian Alps hinterland and the coastal area of the Riviera di Ponente). These plants are employed for food, nutraceutical or medicinal purposes.

The project aims to contribute to the conservation of the components of biological diversity related to food and agriculture, as well as all the components of biological diversity that make up agricultural ecosystems (agro-ecosystems). This includes the varieties and variability of plants at the genetic level, which are necessary to maintain the key functions of agro-ecosystems, as well as their structure and processes. The reclaiming of a highly degraded area of the Regional Protected Area of the Hanbury Botanic Gardens, which still contains buried debris from the Second World War and is partly overgrown by weeds, while stabilising the escarpment of a path, is a further objective. The historical reconstruction of the Hanbury Botanic Gardens with regard to the Hanbury Garden and Vineyard is also a priority.

The action includes an initial detailed planning phase shared with the community, in particular with local schools and university students from the University of Turin. At the same time, genetic resources of food and agricultural interest that meet the criteria of Italian law 194/2015 [7] will be selected from checklists published in scientific journals and national and regional registers. This phase will be

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followed by the creation of a new garden exhibition area dedicated to traditional plants and products of food or nutraceutical interest, cultivated and spontaneous in a degraded area along a little-frequented pathway. This area is situated close to the area where the restoration of a wetland is planned and is worthy of being enhanced with didactic/educational functions with respect to the themes of Natural Capital, Ecosystem Services, together with those of historical and, more generally, cultural themes. The area in question has been historically documented as the site of the Hanbury family kitchen garden at the turn of the 19th and 20th centuries. As a result, a 'Kitchen Garden' will be created here, after a light consolidation using NBS techniques. This cultural-environmental showcase will represent a showcase of plants of alimentary or nutraceutical interest, which are widespread in the Ligurian tradition, particularly in the province of Imperia, both cultivated and spontaneous.

Additionally, plants will be planted along the recently reconstructed pergola on the eastern perimeter wall of the Regional Protected Area. The plants, which are indigenous to the area, belong to a historical variety of vines cultivated in the region. By incorporating this variety into the landscape, another route that has not yet been finished will be completed. In line with the themes and materials exhibited, educational experiences will be developed to be included in an updated catalogue of the annual educational offerings, which will be presented to schools and educational institutions.

4. EPISTEMOLOGICAL ISSUES AND RESEARCH METHOD

The research project will analyse the co-design process of the Nature-based Solutions (NbS) envisaged within the Hanbury Botanic Gardens (GBH), with the objective of applying the principles of Vegetal Geography [8] in order to overcome the main problems that have emerged from recent research on NbS in Italy.

There are now numerous projects concerning NbS financed in Europe, and specifically in Italy, thanks to public and private funds.

In particular, the EU has played a pivotal role in the realisation and study of significant NbS, both in terms of social impact and economic expenditure. The EU has made substantial funds available, especially through the Horizon Europe programme. Indeed, the programme has financed 76 projects over the past decade, with a total investment of 665 million euros. These projects have involved 71 countries and 1,391 partners [9]. Approximately one-third of the projects had a focus on urban areas, while seven projects involved marine and coastal areas. One project in which the University of Turin was actively involved was the 'Productive green infrastructure for inclusive urban regeneration' (proGIreg) project [10], which aimed to create experience and expertise in the implementation and management of NbS in the urban areas of Turin. Another project that took place in the city of Turin was CONEXUS [11], which enabled the University of Turin to observe and learn how other international realities approached the topic of NbS. The two projects mentioned above share an approach based on the quadruple helix model [12], where representatives from public institutions, society, academia and business come together to co-design and manage NbS.

Nevertheless, the implementation and management of NbS does not always result in the desired outcomes.

A recent study currently in the process of publication [13] has identified three key issues regarding the co-design and subsequent management of NbS. Firstly, NbS are considered 'diagonal green' (liminal space/solution), which means that they are not clearly recognised at the administrative level, making it difficult for anyone to take management responsibility for them. Secondly, the concept of NbS is not widely understood by the general public. Such initiatives are often perceived as experimental and not as a common good with a lasting impact. Some citizens argue that it would be more useful to allocate funds and time to the management of existing green spaces. However, this approach would not respect the principle of additionality of European projects, whereby funds are used for new initiatives that can bring progress, rather than for existing ones. This lack of

understanding and conflicting opinions highlight the need for more education and awareness on the benefits of NbS.

- NbS are sometimes designed primarily to meet human needs, while the needs of other living beings, such as the plants themselves, are only taken into account if time and funds permit. This can lead to plants being regarded as ‘living objects’ serving a human purpose, rather than as living beings that make up an ecosystem. This results in a lack of respect and understanding of the genuine needs of other living beings, particularly plant species. This approach is at odds with the One Health approach, which is promoted by the European Commission [14].

Nevertheless, numerous academic publications on urban green space and NbS demonstrate the significance of recognizing the value of all living beings within an ecosystem. However, there appears to be a discrepancy between academic communication and the reception and practical application in diverse contexts beyond the academic sphere.

In order to address the aforementioned gaps, it is proposed that a shift be made from a quadruple helix approach to a quintuple helix one. In the quadruple helix approach, the environment is one of the key actors involved in the decision-making process [15].

The following three macro-questions will be addressed throughout the project:

1. From the perspective of the actors, what are the benefits and political implications of transitioning from a quadruple to a quintuple helix?
2. How might such a transition occur, and what actions might be taken by those involved in the quadruple helix to facilitate it?
3. Who might represent the interests of plants and in what contexts?

5. PRIMARY RESULTS AND NEXT STEPS

The preliminary results indicate the responses of the actors in the project area. It is evident that experiments with NbS sustainability over time are necessary. However, the additional actor, the plant world, requires more time to be considered (due to the complexity of the co-planning phase). Furthermore, there is a need for technological adaptation to the entry of the plant world as a policy actor (such as the use of plant health monitoring sensors), and there must be a profit margin for companies from this. It is of the utmost importance to simplify the language used in academic contexts in order to facilitate communication and education of students and citizens about this change. Furthermore, it is essential to ensure that the results of design and management are accessible to all. The voice of the plants can also be represented by citizens at the earliest stages of the project, as they are often the most knowledgeable and experienced about the subject matter.

The subsequent phase of the project will entail the acquisition of further information through additional interviews and focus groups, with the objective of formulating a preliminary proposal for the co-design of NbS with an additional actor.

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Designing hinges. Stitching urban landscape in Montcada i Reixac, Barcelona

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Extended abstract

Landscape design of public space-with ecological and social emphasis and goals-can become a catalyst to improve livability and to reveal or reimagine a place's identity. Mobility infrastructures that used to disrupt continuities between fabrics and landscapes can be redesigned today as active connectors between neighborhoods, people and natural elements.

This paper aims to present the conceptual approach and the outcomes of a 2022-23 Landscape Design Joint Studio and its International Intensive workshop that had the opportunity to participate in ongoing discussions of the administration and in proposing landscape design strategies, for a real project currently under study. Studio's main aim was to redesign spaces generated by mobility infrastructures and to restore the disrupted continuities between people and its urban and natural landscapes. From the territory to the streetscape, this project can reclaim public spaces through landscape tools and methodologies. Through lectures, project discussions and participatory exercises, students and professors reflected on the increasing complexity of public space and the agency and roles of the disciplines that design it. Urbanists, architects and landscape architects—from policy-makers to practitioners and academics—brought some light to these new spatio-functional and disciplinary scenarios in guest class lectures.

The studio aimed to find new public space and landscape models and structures for the city of Montcada i Reixac, Barcelona that might link neighborhoods in the municipality and reinforce their morphological richness and their dynamic and connected condition, to become a local and territorial articulation, defined by a singular commitment in the city / nature relationship, capable of achieving optimal urban, social and ecological cohesion. The goal of the studio was to reconnect the urban fragments of Montcada i Reixac segregated by diverse infrastructures and to rethink the leftover spaces along the railway and under the viaducts of the C33 motorway that cross and divide the municipality as potential connectors. These spaces, currently barren or occupied mainly by parking, can be turned into new public leisure spaces for citizens, as well as into ecological stepping stones between the natural systems around: the river Ripoll and the Collserola and Serralada de Marina mountains. The proposals to be presented rethought urban space and its relationship to adjacent natural elements, increased ecological continuities, reestablished lost connections, reclaimed vacant neglected lots and enhanced the site's historical identity through urban landscape strategies and actions in a variety of scales.

Keywords: *landscape, mobility infrastructure, public space, ecology, identity*

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The ecosystem potential of peri-urban greenery

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Abstract

The effects of climate change are increasingly manifest on a global scale, with the growing intensity and frequency of extreme weather events, such as droughts and floods, cold and heat waves. The fundamental role of greenery in adapting to and mitigating climate change and, more generally, in improving the quality of urbanised contexts has long been recognised by scientific community and international policymakers. Peri-urban contexts are territorial areas in which it is possible to envisage structural and systematic mitigation and adaptation actions facing climate change and environmental pressures, with even substantial actions of green infrastructuring and ecological reconnection. These actions can contribute to improve the landscape quality of these areas, often abandoned and/or degraded, as well as to increase their usability (leisure time, sports, outdoor activities, etc.). The article presents some research experiences carried out by the ENVI-Reg research group, coordinated by Prof. Elena Mussinelli, that provided methodological and scientific support for the elaboration of plans and projects on an urban, metropolitan and territorial scale in Italy. The selected research projects provide contributions to the evaluation and quantification of the ecosystem potential of different green infrastructure solutions in peri-urban landscapes.

Keywords: *peri-urban greenery; peri-urban agriculture; territorial and urban planning; ecosystem services.*

1. INTRODUCTION

The effects of climate change are increasingly evident. Rising average temperatures and the increased frequency and intensity of extreme weather events – prolonged dry spells, heat waves, heavy downpours, floods, and frosts – are impacting ecosystems and progressively affecting daily life [1]. Urban areas are particularly vulnerable to climate change impacts due to high population density and the concentration of economic activities. In cities, the adverse effects of climate change are often exacerbated by microclimatic phenomena such as the urban heat island effect [2], characterized by local overheating of urban areas due to the morphological and material properties of the built environment¹. This issue is particularly critical in Italy during summer, significantly affecting comfort, accessibility, and usability of open spaces, and posing a considerable risk to public health, especially for the most vulnerable populations.

To address climate change, the international community has mobilized to implement mitigation and adaptation strategies² aimed at reducing greenhouse gas emissions. These strategies include the adoption of renewable energy sources, enhancing energy efficiency in the built environment, optimizing agricultural and industrial production processes in a circular manner, and improving land-use efficiency with the goal of reaching no net land take by 2050 (EU “Fit for 55%” plan). These

¹ In particular, the surface heat island (SUHI) is defined as the difference between the temperature of urbanised surfaces and the temperature of surrounding rural surfaces. This type of urban heat island occurs when the city is surrounded by wetlands or vegetated areas that tend to be cooler than the urban matt surfaces. The term Urban Canopy Layer Heat Island (CLUHI), on the other hand, refers to the difference in temperature of the air layer below the average height of buildings and the air temperature of the rural surroundings.

² Cfr. UN Sustainable Development Goals, Conference of the Parties (COP), IPCC reports and guidelines, European Green Deal, EU Strategy on Adaptation to Climate Change, Fit for 55%, ecc.

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measures aim to enhance the adaptability of local contexts to changing climatic conditions by implementing interventions that increase the resilience of both ecosystems and urban systems. The role of greenery and nature-based solutions (NBS) and green-blue infrastructure (GBI) in climate change adaptation and mitigation, and more broadly in improving urban environmental quality, has long been recognized by the scientific community and international, national, and local authorities with expertise in spatial planning and programming [3, 4, 5]. NBS and GBI provide significant ecosystem services, offering multiple direct and indirect benefits derived from the functions and processes of natural systems [6, 7].

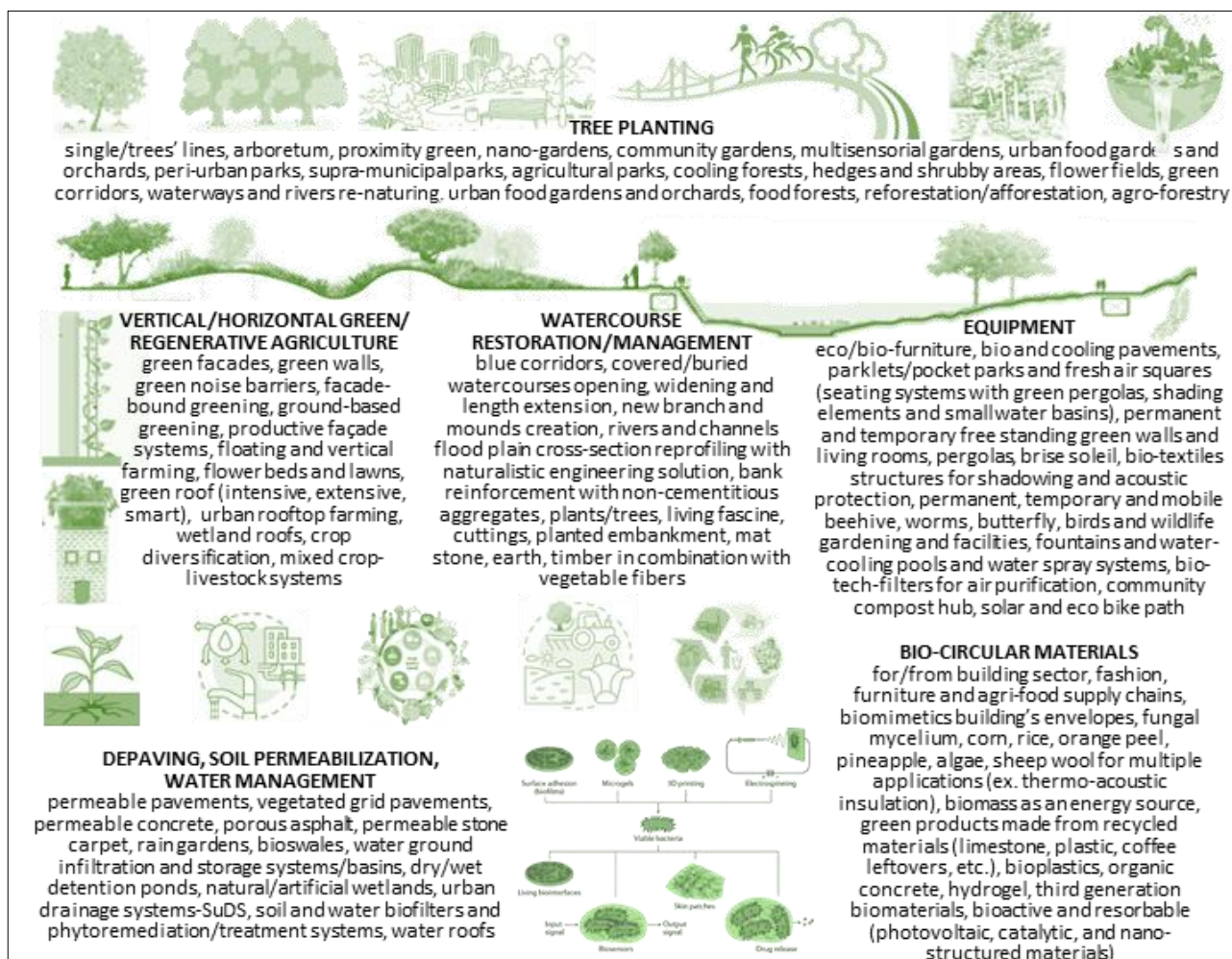


Figure 1. NBS and GBI for the quality of the built environment (authors' elaboration).

Peri-urban areas frequently represent strategic contexts for implementing structural and systemic mitigation and adaptation actions to address climate change and environmental pressures. These areas allow for significant green infrastructure and ecological reconnection interventions due to the greater availability of space and reduced interference with human activities [8]. Additionally, these interventions can enhance the landscape quality of these often neglected or degraded areas, increasing their usability by providing facilities for leisure, sports, and other outdoor activities, thereby benefiting the entire urban area of reference.

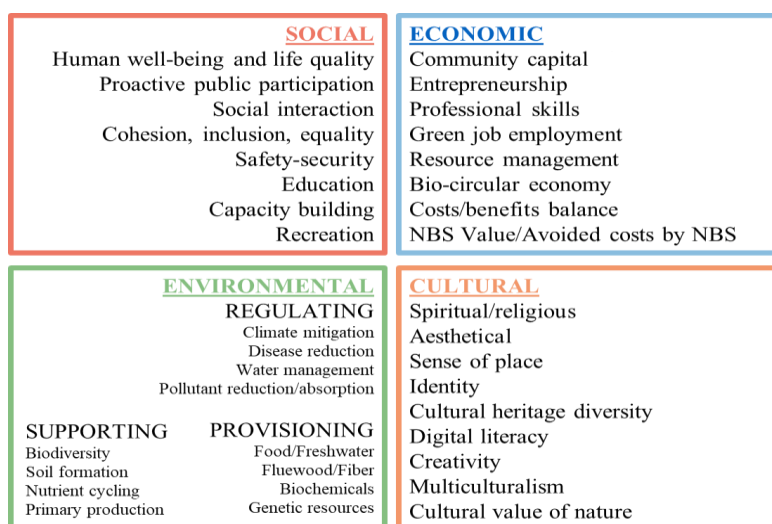


Figure 2. NBS' ecosystem services (authors' elaboration).

2. RESEARCH EXPERIENCES

The ENVI-Reg research group at the ABC Department of the Politecnico di Milano, coordinated by Prof. Elena Mussinelli¹, has been extensively involved in environmental design research. Their expertise lies in developing interventions aimed at transforming the built environment to generate ecosystem benefits at urban and territorial scales by integrating nature-based solutions (NBS) and green-blue infrastructure (GBI). Their work also focuses on enhancing the usability and quality of open spaces. This article presents three research case studies that explore the ecosystem potential of NBS in peri-urban contexts, detailing the methodological, analytical, and design approaches applied at three distinct scales of intervention: territorial, metropolitan, and urban.

2.1 Lodi Provincial Coordination Territorial Plan

The first research experience involves the activities conducted by ENVI-Reg² to support the drafting of the new Provincial Coordination Territorial Plan (PTCP) for the Province of Lodi.

In the Lombardy region, characterized by high population density and widespread conurbations, the Province of Lodi stands out due to its dispersed settlements and extensive agricultural system between the Adda, Po, and Lambro rivers³. This area, acting as a bridge between the Milanese metropolitan system and the lower Lombardy plain, boasts significant environmental and landscape resources⁴.

In recent decades, the locational advantages (proximity to Milan) and infrastructural assets (notably the motorway linking Milan with Bologna and southern Italy) have attracted numerous economic activities and expansions (production and logistics). These pressures have caused considerable soil

¹ Coordinator and scientific responsible: Elena Mussinelli; Working Group: Fabrizio Schiaffonati (Dean), Roberto Bolici, Daniele Fanzini, Matteo Gambaro, Andrea Tartaglia, Raffaella Riva, Giovanni Castaldo, Davide Cerati, Annamaria Sereni.

² Research Contract “Attività di Ricerca e analisi di supporto alla redazione e formalizzazione dei contenuti del nuovo PTCP della Provincia di Lodi fino all’adozione”, tra Provincia di Lodi e Politecnico di Milano-Dipartimento ABC. Research responsables: Elena Mussinelli e Andrea Tartaglia. Working Group: Raffaella Riva, Giovanni Castaldo, Davide Cerati, Annamaria Sereni.

³ 80% of the territory of the Province of Lodi is designated for agricultural use, compared to the regional average of 39%.

⁴ In the provincial territory, there is a regional park (Parco dell’Adda), established in 1983, which contains significant wooded areas. Additionally, there are two Nature Reserves (Monticchie and Adda Morta), four Local Parks of Supra-municipal Interest (PLIS) (fiume Tormo, del Brembiolo, dei Sillari, della collina di San Colombano), six Special Protection Areas (ZPS), eleven Special Areas of Conservation (ZSC), and a UNESCO MAB Biosphere Reserve (MAB Po Grande).

erosion and fragmentation of natural and agricultural systems. Between 2007 and 2018, over 1,200 hectares were affected by soil sealing, about 1.55% of the provincial territory¹. As of 2023, the urbanized surface of the Province of Lodi totals 10,216 hectares, while the urbanizable surface amounts to 8,424 hectares, including 4,131 hectares for residential and 4,292 hectares for other urban functions (commercial, productive, tertiary, services).

Over the past decade, the development model in Lodigiano has been ineffective socioeconomically. Unlike other Lombardy provinces, the Lodigiano population has remained stable over the last ten years, with negative indicators and poor economic performance². Additionally, this model has led to negative environmental impacts, as highlighted by ARPA Lombardia reports³ and the INEMAR inventory (2017), including problematic air pollution levels.

The updated PTCP addresses these issues by identifying six development objectives with specific targets: land consumption reduction; decarbonization-ecological transition; decarbonization-energy transition; territory and tourism attractiveness; agricultural excellence; and sustainable mobility.

The PTCP's soil consumption reduction measures – aligned with Regional Law 31/2014 and Lombardy Regional Territorial Plan (PTR) guidelines – were seen as an opportunity to develop a collaborative model among municipalities for efficient soil use, balancing transformation needs with environmental protection. By defining criteria for land consumption reduction and land use optimization (location, accessibility, functional and ecological-environmental compatibility, and soil ecosystem quality), the PTCP provides a framework for Lodigiano municipalities to update their urban plans, aiming to reduce urbanizable areas and detail the provincial ecological and green network at urban and peri-urban scales.

The PTCP identifies peri-urban areas as strategic for containing transformation pressures and ensuring the continuity of environmental networks (Ecological Network and Green Network). It designates several agricultural and natural areas around main urban centers to facilitate the redesign of peri-urban fringes, foresee the ecological and recreational reconnection of built and natural systems, and improve the territorial resilience to climate change. These “agricultural areas of interaction - buffer areas (AAt)” are governed by PTCP technical regulations (art. 47), prioritizing forestation, reforestation, afforestation and agricultural production enhancement.

Overall, AAt areas cover 4,660 hectares, 5.9% of the Province of Lodi's total area and about half of the Lodi area's urbanized surface. Maintaining these peri-urban fringes in a natural state or for agricultural production conserves and enhances the ecosystem services provided by these free soils, (with a CO₂ storage capacity of about 60 tons CO₂/ha⁴).

¹ Approximately one-quarter of the impermeabilized land is due to the significant expansion of mobility infrastructure (roads and railways). Another significant portion, nearly 30%, of land consumption is attributed to the development of productive activities and the establishment of large service facilities, both public and private.

² Per capita GDP has remained essentially unchanged over the last 15 years, while the regional GDP has increased by 18%. The provincial GDP marks the worst performance compared to other provinces in Lombardy. The number of active businesses has decreased by 9% in the last decade, and the per capita disposable income of households is the lowest in all of Lombardy.

³ “Rapporti sulla qualità dell'aria della Provincia di Lodi” by ARPA Lombardia (2022, 2021, 2020, 2019, 2018).

⁴ The calculations on carbon storage in provincial soils were developed using the InVEST “Carbon Storage and Sequestration” model, along with land cover data provided by the European service Corine Land Cover. The data were processed using the Simulsoil software in a GIS environment (<http://www.sam4cp.eu/simulsoil/>).

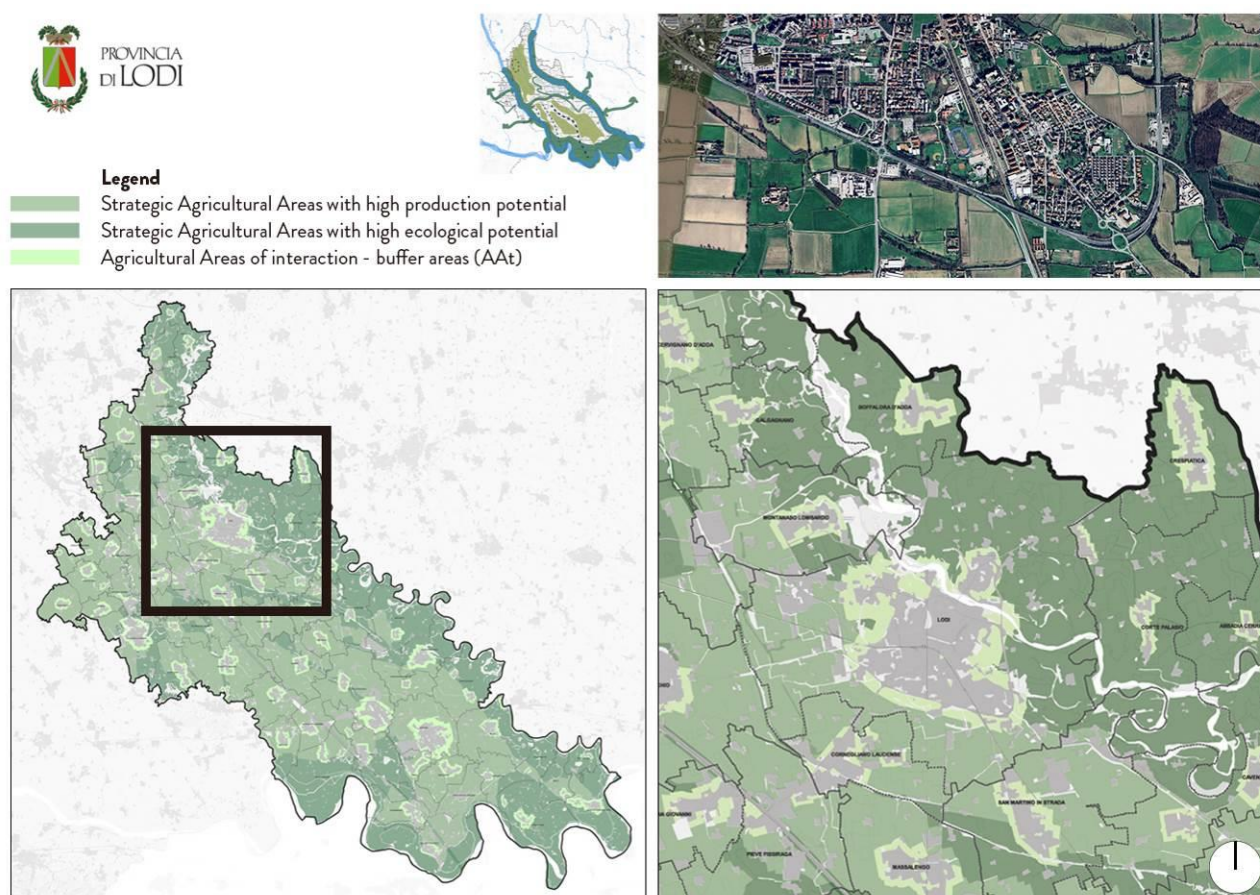


Figure 2. Agricultural areas, Tav. 13, PTCP Province of Lodi (authors' elaboration).

2.2 Studies and proposals for the environmental and landscape context of Porto di Mare in Milan

Since 2017, the ENVI-Reg research group has conducted several studies on the south-east quadrant of Milan, developing project proposals in collaboration with Municipality 4 of Milan and various cultural associations.

The large settlement system along the road axis connecting the city center to the south-east metropolitan area (corso Lodi) and metro line 3, with its peri-urban extensions, demonstrates a clear inter-municipal dimension. Due to historical and morphological factors, this area has exceptional characteristics: limited urban sprawl, large agricultural areas, and vast open spaces. Unlike other city quadrants, there is an absence of conurbative dynamics toward the hinterland municipalities. The potential for ecological connectivity is high, thanks to large parks such as Valle del Lambro (900,000 sqm), Forlanini (600,000 sqm), Monluè (100,000 sqm), Idroscalo (750,000 sqm), and Parco Agricolo Sud Milano. These parks integrate cultural and landscape ecosystem values from Porto di Mare to Vaiano Valle, Ticinello, Vettabbia Park, and the Cammino dei Monaci, connecting farmsteads and abbeys of Chiaravalle, Mirasole, and Viboldone.

In this context, multiple transformative pressures are emerging that may threaten these environmental and landscape features. Interventions for the Milan-Cortina 2026 Winter Olympics, such as the Olympic village at Scalo Romana and Palaitalia in Santa Giulia, add to the substantial transformations already carried out and planned real estate developments (e.g. transformation of the Porta Romana railway yard, A2A tertiary tower in Piazza Trento, Symbiosis project, PII via Lorenzini-Adamello, Vaiano Valle Nord plan, Porta Vittoria, Ortomercato, Ex Macello, Scalo Rogoredo, Santa Giulia Nord, Spark 1 and 2, Bosco della Musica). This list highlights the relevance of new volumes, the

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influx of new inhabitants and employees, and the significant economic and financial interests involved¹. These interventions often transform free areas without integrated assessments of their complex environmental impacts (anthropic load, heat island effect, mobility flows, energy consumption, resource use, etc.).

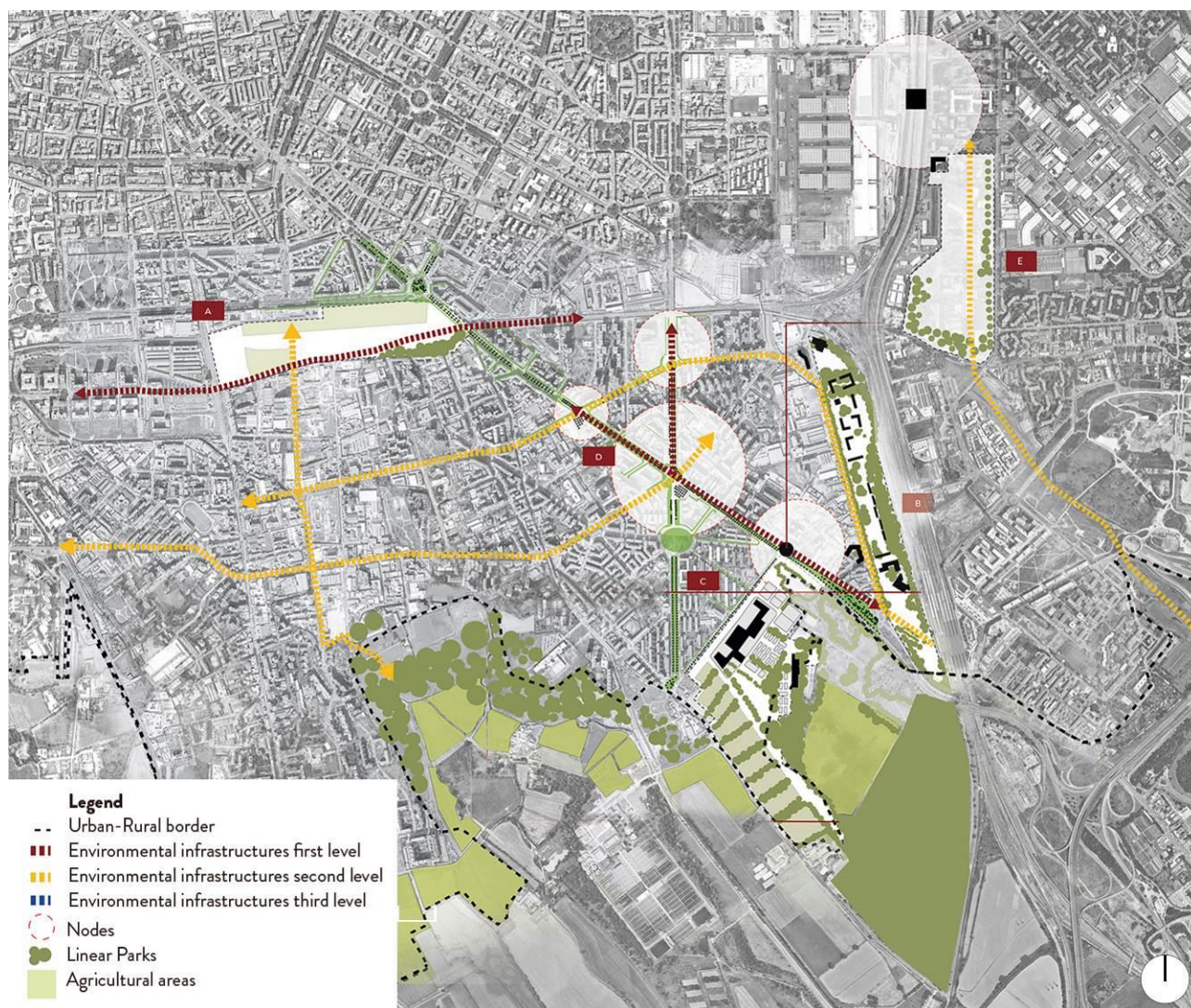


Figure 4. General masterplan for the South-East sector of Milan (authors' elaboration).

In addition to the previously described planning framework, the transformation program for the Porto di Mare area must be considered. Milan's Territorial Government Plan designates this area for the establishment of a Great Urban Function², including public services and strategic private functions, alongside other urban uses (art. 16, NTA, PdR, PGT of Milan). This area spans more than 1 mil. sqm and is primarily green (e.g., Parco Cassinis), but also includes mixed settlements on the northern and

¹ Overall, the listed interventions cover a territorial area of over 750,000 square meters, with a gross developable area of approximately 730,000 square meters.

² In the past, several transformation proposals have been made for the Porto di Mare area, ranging from the Palace of Justice to the establishment of tertiary-commercial activities. These proposals were inconsistent with the area's intended uses and incompatible with its landscape and environmental characteristics.

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western edges (historic farmsteads, sports facilities, craft activities, abandoned warehouses, and unauthorized settlements).

Given Porto di Mare's pivotal role as a transition between the city and countryside – connecting the Mazzini district to the Abbey of Chiaravalle and the Agricultural Park – its high ecosystem potential is crucial for enhancing the environmental and recreational quality of the peri-urban area. The ENVI-Reg research group conducted in-depth studies and developed proposals to redevelop, protect, and enhance the area, aiming to limit soil consumption and expand park areas.

In 2018, in collaboration with the Urban Curator TAT cultural association¹, a proposal was developed for a new sports facility, an Olympic swimming pool, aligning with the area's history and the city's needs [9]. The project includes landscape redevelopment through the removal of unsuitable structures, preservation of some existing sports facilities, allocation of areas for agricultural production, and enhancement of natural elements through new plantings [10].

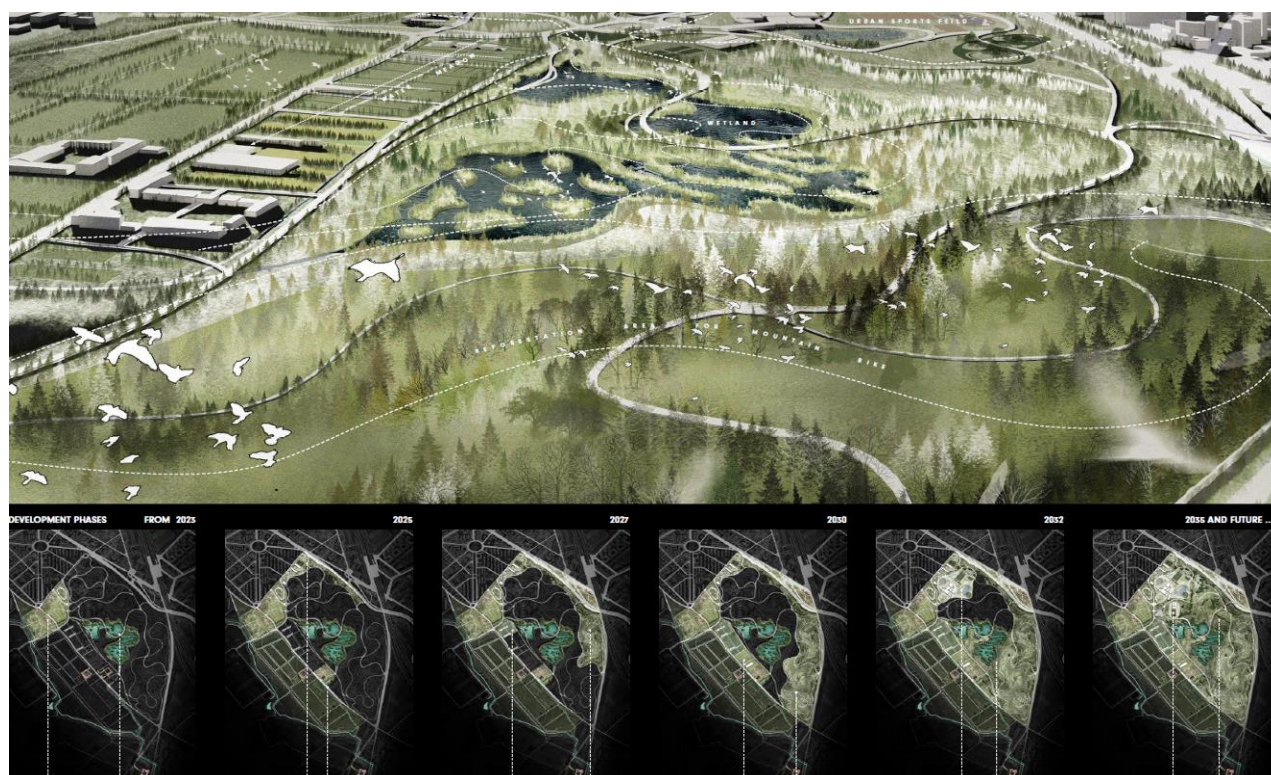


Figure 5. Masterplan for Porto di Mare Area developed by Li Yingkai, Hua Chuanwang, Hua Youchen, Dong Wenjing, Urban and Landscape Regeneration Studio, A.Y. 2022-23, Politecnico di Milano.

Further design experiments were conducted in the “Urban and Landscape Regeneration Studio” led by Prof. Paolo Debiaggi² (academic years 2022-2024) as part of the “Sustainable Architecture and Landscape Design” master’s degree course at the AUIC School, Politecnico di Milano. These proposals emphasized an ecosystem approach, focusing on soil de-sealing, conservation and recovery

¹ Urban Curator TAT is a cultural association based in Milan, that promotes studies, projects, publications, conferences and debates, with a particular focus on the regeneration of public space. It emphasizes active citizen participation and aims to raise awareness among institutional entities. It was founded in 2016 by university professors, architects, engineers, urban planners, and scholars of socio-economic issues.

² With proff. Paola Branduini and Paco Melià.

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of historical artefacts, and environmental enhancement for climate change adaptation. Recurrent elements include the use of NBS, formation of wetlands, integration of productive and equipped green areas, and valorization of rural landscape elements. The environmental interventions proposed include forestation, reforestation, and afforestation, with the planting of about 15,000 trees (capable of absorbing approximately 200 tons of CO₂ per year) and the de-sealing of 50,000 square meters of soil.

2.3 Strategies for the environmental development of Codogno

The third research experience involves the scientific and methodological support for developing environmental, social, and economic strategies underpinning the new Territorial Government Plan of Codogno, in the Province of Lodi¹.

Codogno, a city of approximately 15,000 inhabitants, is located in the agricultural heartland of Lodi. It is intersected by major road and railway infrastructures along the north-south (Via Emilia and the Milan-Bologna railway line) and east-west (Pavia-Cremona connection, Ex State Road SS 234, and Pavia-Cremona-Mantova railway line) axes. The urban fabric features a historical center surrounded by a tree-lined road belt and a residential and service expansion area developed since the mid-1950s. Since the mid-1980s, the area's tradition of artisanal and industrial production, combined with national infrastructure development (e.g., the two-lane variant of SS 9, the ring road on former SS 234, and the railway station between the Milano-Bologna and Pavia-Cremona-Mantova lines), has led to the creation of a significant production cluster (Mirandolina) west of the city along Provincial Road SP 126, covering over one million square meters and accounting for nearly one-third of the urbanized area.

While this production cluster has brought socio-economic benefits, it has also caused significant agricultural land erosion, putting pressure on the ecological-environmental system (e.g., the Local Park of Supra-Municipal Interest (PLIS) of Brembiolo).

The research developed a trans-scalar interpretative and planning approach to integrate superordinate policies (European, national, regional, and provincial) with Codogno's specificities. The "Codogno 2050" proposal promotes the systematic use of NBS to support carbon neutrality, mitigate climate change effects, and improve urban life quality, with a special focus on redefining the peri-urban area. This is the only area suitable for significant environmental and recreational enhancements and ecological reconnection with the broader ecological and green networks.

The result is an environmental master plan that redefines peri-urban green spaces for new uses and management through NBS, improving ecosystem services. It includes new plantations, water storage reservoirs, groundwater recharge wells, and forest areas for climate resilience. Additionally, it proposes new horticultural and renewable energy facilities, bicycle and pedestrian paths, and services for sustainable mobility and tourism. During development, the interventions' benefits were quantified using impact indicators to optimize solutions and maximize performance, integrating usability and landscape enhancement.

The master plan organizes peri-urban green areas into three parallel bands: an environmental mitigation band adjacent to the built fabric with concentrated plantations; an agricultural production band with integrated photovoltaic systems; and a final band for plantations and naturalistic engineering to improve Codogno's climate adaptation (e.g. sustainable drainage systems). Specifically, about 100 hectares are allocated for fruit and vegetable production (50 ha for fruit trees

¹ Research Contract between Municipality of Codogno and ABC Department of Politecnico di Milano, Research Group ENVI-Reg "Studi sulle dinamiche di trasformazione del territorio e ricerche per la costruzione delle strategie di sviluppo ambientali, sociali ed economiche". Research responsables: Elena Mussinelli e Andrea Tartaglia. Working Group: Davide Cerati, Giovanni Castaldo.

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and 50 ha for vegetable gardens), yielding approximately 2,500 tons/year of produce, matching the average annual consumption of nearly 17,000 inhabitants. These plantings can absorb about 75 tons of CO₂. Additionally, avoiding transport emissions for this produce saves about 30,000 tons of CO₂ eq, about 0.7% of total provincial emissions. Forestation, reforestation, and afforestation efforts over 150 hectares increase CO₂ assimilation capacity to 750 tons/year and biomass production to about 2,500 tons.



Figure 6. Masterplan "Codogno 2050" (authors' elaboration).

3. CONCLUSIONS

The research experiences presented in this article highlight the relevance of nature-based solutions (NBS) and green and blue infrastructure (GBI) in mitigating and adapting to the effects of climate change, as well as in improving the environmental quality of cities.

In relation to the different scales of intervention and context conditions, specific ecosystem functions of peri-urban green spaces can be identified. In the case of the Province of Lodi's PTCP, peri-urban areas are identified as strategic areas to guarantee the continuity of green ecological networks, contributing to territorial resilience. The approach adopted allows transformational pressures to be contained and agricultural and natural areas to be enhanced. In the proposals for the Porto di Mare area, the nature-based interventions aim at landscape redevelopment and the improvement of the environmental and fruition quality. In the "Codogno 2050" master plan, the systematic use of NBSs not only contributes to climate change mitigation and adaptation, but also demonstrates a specific function in terms of agricultural production services.

Moreover, these research experiences demonstrate the necessary close correlation between planning level and the project level of peri-urban green areas: only strategic visions of a vast area, then coherently declined at a closer scales, allow the ecosystemic potential of peri-urban green areas to be fully exploited.

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**CHALLENGING PLANNING AND DESIGN FOR A MORE
RESILIENT CITY**



Changing Cities VI, Rhodes, 24 - 28 June 2024

Organized and chaired by Prof. Dimitra Diana Babalis

Prof. Dimitra Diana Babalis, Department of Civil and Environmental Engineering, University of
Florence, Italy

Urban Greening and Urban Design. Driving Innovation for the Florence UNESCO Area

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Abstract

This paper is dealing with urban greening and urban design in the historic environment. To this end, the raised main question is: How we cope with urban changes and greening in historic cities?

To respond significantly to the current scenario sustainable planning and design can lead positively to these changes. On the other hand, issues on resilient strategies and the implementation of adaptable measures to mitigate climate emergency in historic environment must be clearly faced. Solutions that can be focused within the core of the city at risk to face urban heat islands as well as intensive rainfall leading to flooding must be planned and designed. At the same time, protection, and revitalization of the 'Urban Heritage' of outstanding value should be emphasized on properly climate change adaptation methods. However, opportunities exist to link Urban Greening with Urban Design to help maximize not only the aesthetic of the Historic City but also the functionality and quality of a space to satisfy community needs.

The paper identifies innovative strategies and proposals within the Florence UNESCO Area, to help greening public urban spaces and at the same time mitigate climate emergency.

Keywords: *Urban Greening, Urban Design, Urban Heritage, Florence UNESCO Area, climate change.*

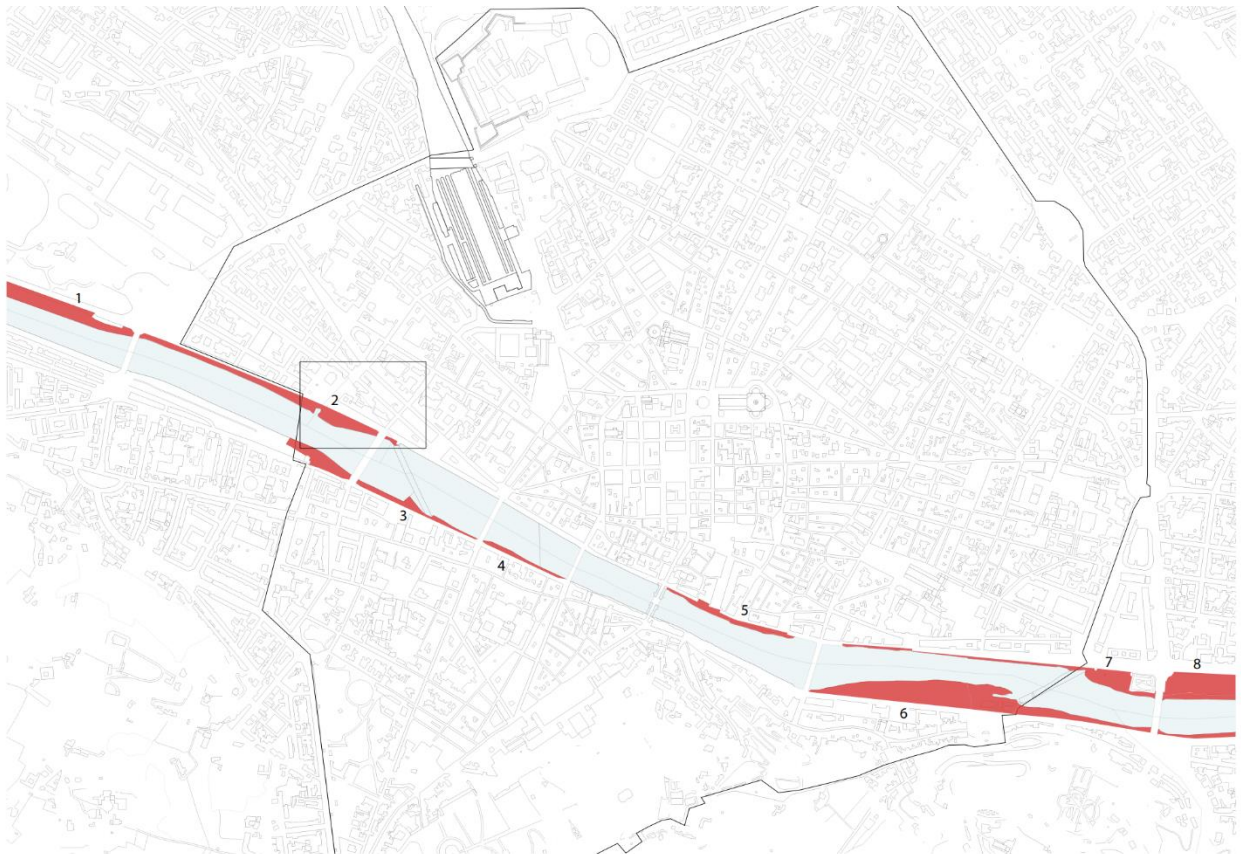
1. INTRODUCTION

In the Transforming City, to address ongoing gaps, public open spaces need to be re-designed to integrate green and blue infrastructure for everyday life. However, a balance needs to be found between functionality of an urban space in historic environment, historic value, and socio-economic revitalization of a context. Resilience design can provide placemaking for human activity while providing an effective buffer on the site. In turn, design strategy provides movement on routes and streets to encourage sustainable connectivity through core environments of great beauty and history. On the other hand, it is important to identify future challenges in relation to build environment and climate change, to ultimate proposals that would be more resilient and adaptable to recent issues whilst delivering high-quality planning and design.

It is only through resilient approaches that it can be delivered quality places for this emerging reality for historic environment at risk. In some instances, the need to work across different disciplines to incorporate expertise may create some difficulties. The integration of engineered solutions with contemporary thinking on nature-based infrastructures to support both urban quality, aesthetic and promote innovation can become desirable. For instance, we see Green Infrastructure, (GI) been used as a first principle to sustainable mobility. However, Urban Green Infrastructure, (UGI) must be considered as a framework of principles to link sensitive urban environment to support both long-term and short-term sustainability goals. But the main aim is to link urban policy

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1. Lungarno Parco delle Cascine



2. Lungarno Amerigo Vespucci - Lungarno di Santa Rosa



3. Lungarno Soderini



4. Lungarno Guicciardini



5. Lungarno degli Archibusieri - Lungarno Alessandro Medici



6. Lungarno Serristori - Lungarno Raffaello Cellini



7. Lungarno della Zecca Vecchia - Lungarno Galileo Galilei



8. Lungarno del Tempio

Figure 1. Florence Arno Riverfront. Proposed Plan of the sites involved within the *Green River Strategy*

and planning to urban and landscape design.[1] To this end, innovative thinking can be challenged for more integrative, innovative, and smart design for the next future. Moreover, there is the added value to attract investment in variations of place to promote interactivity, connectivity and maximize urban quality.



Figure 2. Florence *Lungarno Vespucci*: Before and after. The green-blue riverfront proposal with green spaces for enjoyment and well-being

2. URBAN HERITAGE AND SUSTAINABILITY. AN EVOLVING PROCESS

In 2011 the ‘UNESCO Recommendation on the ‘Historic Urban Landscape’, (HUL) in paragraph 3 clearly defines the notion of “Urban Heritage including its tangible and intangible components constitutes a key resource in enhancing the liveability of urban areas and fosters economic development and social cohesion in a changing global environment”. [2] For the future, in fact, the HUL notion includes concerns of a changing global environment and the possibility to manage built environment more sustainably within effective planning and design to achieve a balance between urban growth and quality of life. [3]

The expanding notion of cultural heritage led to a holistic contextual view to include the concept of landscape. (4) Accordingly, the HUL approach needs to be particularly considered for protection, urban quality and improvement for health and well-being of the environment of historic cities and historic city centres. Central to this thought, a HUL can be considered as a lived space, an urban environment with variations in time and space. (5)

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In turn, the main components for the new scenario in a sensitive urban environment are presented as follows: (a) *Heritage* (tangible and intangible) to be preserved and evaluated; (b) *Climate Change* (floods, rainwater, heat, pollution) to be faced and adaptation; (c) *Nature and Green elements* (process, aesthetic, function) to be inserted to add value, (d) *Time* (dynamics, evolution etc) to be considered for sustainability issues. Research findings [6] emphasized the need for integrated strategies between urban and nature to fully align with climate change emergencies and people needs.

3. GREEN INFRASTRUCTURE AND NATURAL APPROACH

In recent years different conceptualizations are developed regarding the definition of Green Infrastructure, GI such as: (a) *Facilities* to manage stormwater (rain gardens, bioswales and so on); (b) *Connected Ecosystems* with multiple functions and benefits; (c) *Planning approaches* to better match built environment and natural resources for social benefits. However, GI multifunctionality spatiality and location requires inevitably negotiation on planning decisions. Several studies demonstrated that GI can be integrated into strategic planning approaches. A more common European conception is focusing on classifies any vegetation, open space, and their ecological function, or the ecosystem services they provide. A more United States Conception considers a GI as an approach to natural drainage through engineered or natural systems to manage stormwater (permeable pavement or permeable surfaces, landscaping to store, infiltrate, or evapotranspiration stormwater, heat mitigation and so on). Often GI benefits and functions depend on how is sitting and design with urban ecological and infrastructures systems. [7]

For sure, GI refers to a natural approach that provide social, economic, and environmental benefits through urban design. As a strategy is to design an urban environment that tactically integrates a network of green spaces. The question is: How could be possible to gain the typical benefits of GI within a historic environment including green opportunities, vegetation, urban heats islands, improving health and well-being, providing social benefits, carbon sequestration, crime reduction?

To this end, investing in GI offers the opportunity to enhance the existing infrastructure and protect the environment while green technologies can revitalize urban core areas to meet climate change emergency. But major benefits are included in: (a) *Enhancing public open spaces* by designing and greening areas, streets, and squares; (b) *Creating liveable places* by landscaping open spaces for more safety and protection from urban risks; (c) *Improving urban image and connectivity* by good urban design and management of streets and spaces; (d) *Integrating policies, strategies and actions* by integrating strategic planning process. In a historic environment delivering sustainable and healthy places which allow nature-based systems can ensure more intimate spaces that locals and visitors can benefit from the value that nature brings. This provides the opportunity to create dynamic and resilient ecosystems that must also be controlled by a good City Action Plan. [8]

4. THE ADDED VALUE OF URBAN GREENING

Currently, Green Infrastructure, GI has been conceptualising extensively to address issues of climate change emergencies as well as supporting efforts to improve mental and physical health via access to nature The key benefits of Green Infrastructure approach is the ability to be adaptive to the spatial of a context. [9] This flexibility allows GI to move across the landscape, engineering and

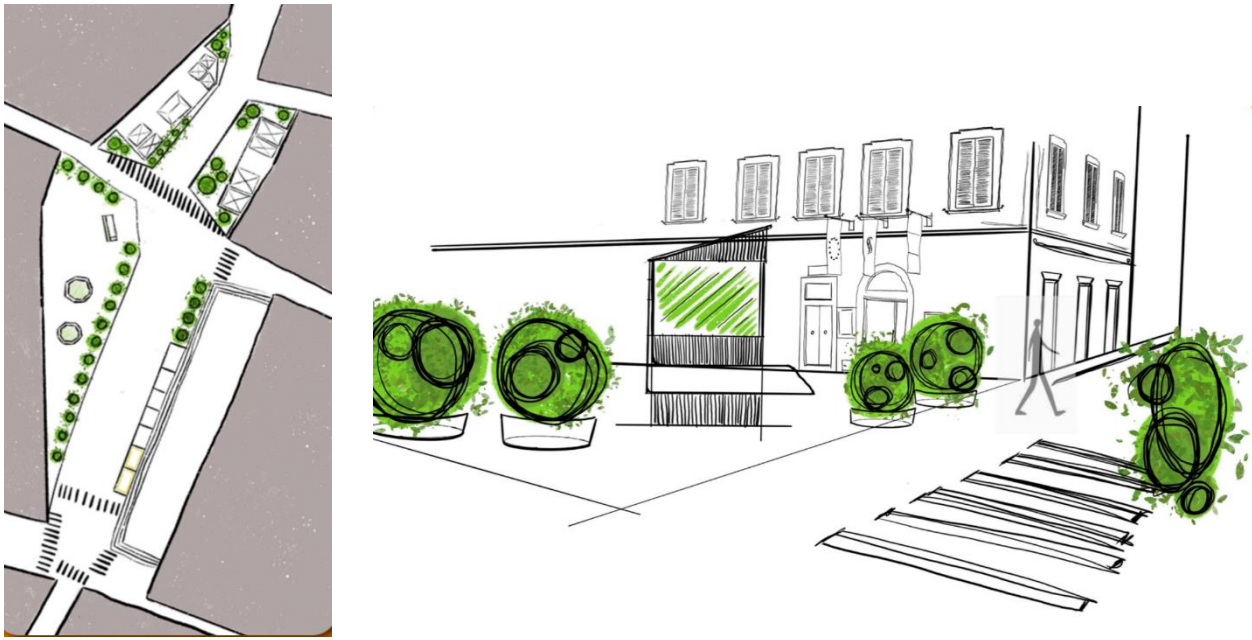


Figure 3. Florence *Piazza San Firenze*. Proposal for a Green Square. Urban design with planters and city-trees to mitigate climate change and city's pollution

planning processes in a more responsive way and in this adaptive way GI can be best linked to urban design. Good urban design allows people to deal with heritage and nature offering an added value and help to maximize aesthetic, quality, functionality, and protection of a space. At this point, urban greening has a positive influence on the design process. Solutions with contemporary thinking on nature-based drainage systems or tree-planting used to support both aesthetic quality, urban heat islands and green mobility to support short-term and long-term sustainability goals. In doing so, GI can be aligned with future-thinking urban design processes.

5. FLORENCE UNESCO AREA: URBAN DESIGN TO FIT LOCAL STRATEGIES

Florence UNESCO Area as a sensitive urban environment needs to implement strategies and projects that meet each district's specific needs. In the city centre historic patterns are clear such as Roman/Medieval/Renaissance areas of unique image, characteristics, and needs. Recently, the adoption of the new *Structural Plan* and *Action Plan* put the perspectives for a vibrant and innovative City Centre.[10] Additionally, to reduce City Centre's risks, improve historic context systems, and adapt to changes from overtourism, natural hazards, human-made disasters, climate change the new *UNESCO Management Plan* played an important role.[11] The Plan reflects on ongoing processes and is in a constant state of reinvention and reinterpretation to explore and promote the elements that make public space engaging and characterful. Among the new introductory issues, a *buffer zone* of 27ha has been introduced to extend preservation of 'outstanding universal value' and environmental sustainability. Opportunely, it encourages the comprehensive City's Planning processes to reinvent and protect historic and natural environment and regenerate public open spaces as the heart of placemaking focusing on social, cultural, and environmental significance. To address common issues in fact, the regeneration of small-used spaces and squares, or the development of less car-dominated streets can be a valuable tool to create quality; to adopt urban design principles for local distinctiveness while inspiring local people and visitors.[12]

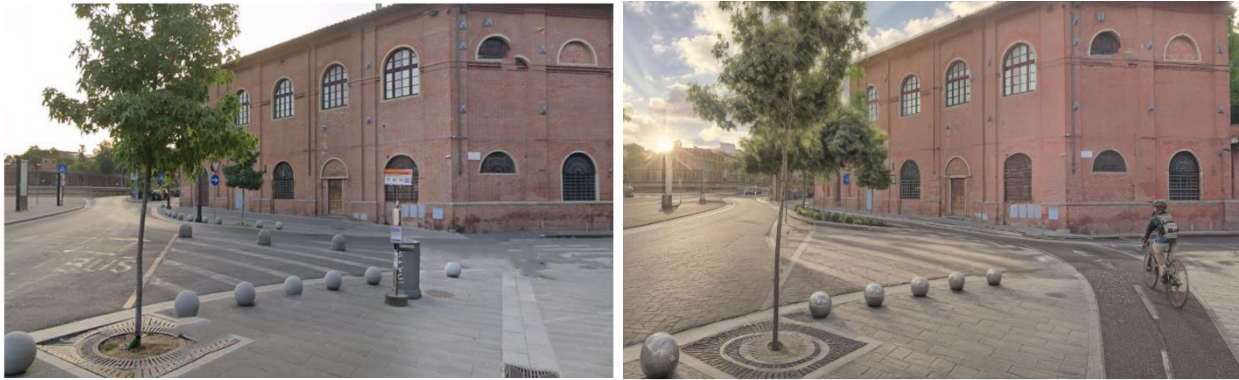


Figure 4. Florence *Fortezza da Basso*: Before and after. Proposal for a green cycleway

In addition to create spatial and visual landmarks, a resilient placemaking must be developed as a common strategy among planning and design decision-making. A sustainable and resilient approach means reducing the vulnerability to withstand challenges that may result from major urban risks. All current planning and design policies reflect on the preservation of cultural heritage of the Florence UNESCO Area but also on climate change emergency and how to face this with innovative thinking.

5.1 The Proposed 'Greening Strategy'

A comprehensive Green Strategy can work to improve City Centre's resilience. Urban Greening can fill the gaps and responsiveness to the different zones. The Florence City Centre faces many natural and human-caused risks, that can have environmental, social, and economic impacts such as:

1. *River floods* that can damage historic buildings and disrupt streets and transit services
2. *Climate change* effects that can put a serious threat characterized by hotter, drier summers and risks of flooding
3. *Extreme natural events* that can influence negatively people's health and well-being by increasing urban heat island phenomenon
4. *Lack of pedestrian and cycle movement* that can add value, comfort and greenery in the city centre
5. *Over tourism* that can create a lack of human scale and can have an unpleasant impact on human wellbeing.

Consequently, local population, including low-income people with disabilities, older adults may be less able to prepare from natural hazards and climate change impacts. But effectively managing of urban, one can avoid environmental degradation, cultural heritage damage and economic loss. To mitigate the effects of climate change, opportunities to manage the environment with more efficient and renewable technologies are essential. Similarly, to respond to climate change by protecting natural resource areas, maintaining tree canopy, ensuring protection of riverfront, and increasing the ability of greening is advised.

In particularly, to respond to the above-mentioned emergencies it is important to find specific urban strategies as follows:

1. *Green River* introducing Green Infrastructure, (GI) approach to evaluate and protect the built environment



Figure 5. Florence *Piazza dell'Unità*. Proposal for a Green Square

2. *Green Public Open Spaces/Squares/Small Open Spaces* to create urban quality and resilience
3. *Green Roads/Streets/little Streets/Green Gateways* for sustainable mobility and connectivity
4. *Active Travel* reinforcement of sustainable green pathways and cycleways and public transport for health and well-being
5. *Green overtourism* with introduction of green cultural open spaces to respect existing Cultural Heritage and introduce innovation on the selected sites. [13]

The proposed 'Greening Strategy' is firstly aiming to increase awareness, to experiencing the impacts of climate change such as flooding risks, urban heating, and pollution. To this end, trees and green spaces must be considered as essential infrastructure, that can help reduce temperatures on the ground. On the other hand, urban greening can improve health and well-being, reduce heat impact, and bring nature into the city. Achieving a greener historic environment by innovation must be considered an ambition programme for a more resilient city.

7. DISCUSSION

Urban Greening in sensitive urban environment can help to raise awareness and quality of space dynamics and can have a great significance in urban design processes. It also helps to mitigate climate change where a sustainable and resilient approach is undertaken. Urban Greening can address the urgency of an urban regeneration, not only from a spatial point of view but also a deep concern on the economic, social transformation of a city. On the other side, a Greening Strategy highlights the importance in transforming a historic environment that must be based on new challenging thinking. By using nature-based systems for protection and quality of the Heritage Urban Landscape, HUL as defined by UNESCO, a great opportunity is presented for a much-needed dialogue in urban renewal outcomes with local authorities, planners, urban designers, and local communities.

Regarding the proposed Green Strategy withing the Florence UNESCO Area, a key conclusion is that it requires support and clarity to sustain quality in the delivery of urban design processes. Therefore, a toolkit is needed to make the most of what has been defined and in term of goals by the City's decision-making. Nevertheless, in academic research and professional practice thinking, there is a great consideration on whether HUL is being applied in practice and due to the differences in regulatory systems at various planning levels.

Relevant to these considerations is that the HUL Approach in action can offer an innovative thinking to urban transformation. It can also encourage local authorities to face more easily challenging questions on urban emergencies.

Note

All proposed projects and drawings in this contribution have been developed in the framework of the Architecture Degree Course of "Fundamentals of Urbanism". The Design Studio was coordinated and held by Dimitra Babalis at the Department of Architecture, (DiDA), University of Florence, Year: 2022-2023.

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Open Architecture and Planning for a New Dialogue with Nature in Resilient Cities

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Extended abstract

Resilient cities embody a complex relation of interconnected elements, where the realms of economy, society, governance, and environment converge within the intricate framework of inhabited and open space configurations. Indeed, architecture and urbanism dwell in same space relations and temporalities that is associated with new modes of consumption and production. Although architecture as an autonomous discipline creates its own network of relations embedded in the design philosophy of the time and place it is always associated with the social, cultural, political, economic, technological, psychological and historical relationships of a community. Thus, as a discipline it tends to take an action to develop a better understanding of the emerging conditions that generate resilient cities within the context of changing power relations, social, economic and cultural contingencies. Architects and planners are exploring ways of rehabilitating the urban environment as they face the challenges of sustainability, the preservation of ecosystems and new modes of space consumption. These discussions focus on the performative qualities of the urban environment as well as the preservation of natural resources in cities. At the heart of the evolutionary discussions of resilient cities lies a quest for lively and sustainable living environments, characterized by safe neighbourhoods, vibrant social networks, and reduced poverty and scarcity. Within this context, the notion of "resilience" emerges as a key paradigm for modern urbanism, shaped by several factors including industrial diversity, demographic shifts, public sector imperatives, and the evolution of robust infrastructural frameworks encompassing transportation, distribution, culture, and knowledge dissemination. To maintain a healthy and active life people are in search of safe neighbourhoods where less poverty and active social network has the dominancy. This search has spurred a migration from dense urban cores towards suburban landscapes, where communities seek to establish new patterns of open space utilization, with green areas where *nature* plays the crucial role in the establishment of this new system.

This paper argues that *open architecture* and *open planning* can influence the future urban environment by questioning the physical space and social life associated with the changing patterns of public life and open space configurations. The consideration of openness to be more responsive to the needs, requirements, and desires of the public, to provide a system of responsive environments, equality in the distribution of open green spaces, and access to nature will be the discursive issue of resilience in the 21st century. The concept of openness in architecture not only corresponds to the physical qualities of space but it appears to mean so many different performances in architecture like to create a sense of freedom, flexibility, adaptability, accessibility, collectivity and participation. This paper will focus on the ways of design strategies developed with the discourse of "openness" enhancing urban vitality, improving living environments, and revitalizing public spaces with historical significance in the establishment of resilient cities and open space configurations. It will explore the formation of open spaces under four trajectories which are based on structural, performative, procedural and conceptual for understanding the dynamics of resilient cities.

Keywords: open architecture; open planning; resilient city; nature; responsive environments

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Open spaces' resilience within an urban waterfront landscape: the case of Patras waterfront, Greece

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Extended abstract

Waterfront areas have long been focal points of significant and often conflicting interventions, as well as hubs of economic and technological shifts, shaping the identity and landscape of cities.

"In recent decades, urban waterfront regeneration has emerged as a compelling global phenomenon, as these projects shape vital relationships between places, uses and future visions. Extraordinary opportunities revealed by changing functions, economic environment and social conditions. In addition to that, we must have also in mind the ten principles for a sustainable development of urban waterfront areas as declared in the 2000 Berlin Expo and the 2030 Agenda for Sustainable Development Goals, concerning on the crucial impact of climate change.

Urban waterfronts which were previously used as industrial facilities are becoming a field of ambitious architectural and landscape transformations. The restoration of such territories helps to improve the quality of urban space and improve its ecological properties. Many cities around the world create innovative waterfront projects, attempting to connect the city with the water environment and also to combine all the above with the constant improvement of public places and their social life.

In this paper, an integrated regeneration design of urban waterfront of the city of Patras is presented within the two steps of an open architectural competition held in 2021. Patras waterfront is a valuable economic, social and cultural element of the city. Although, there wasn't in the past a structured intention to formulate a coherent vision, unifying the fragmented pieces of the waterfront area, visually and spatially.

In this context, having in mind the international contemporary practices for restoration of the former industrial waterfronts and also the urgent need to contribute to the lost ecological and social balance of the city, the presented proposal of "green flowscapes" attempt to create a new unified image and personality for the city waterfront in terms of architectural, functional, social and environmental aspect. By a flowing, flexible, adaptable and accessible to all public space, the design proposal shapes a new continuous ecological zone for public recreation and daily social life, which positively added to the historical character of the city of Patras, giving also more chances for an urban resilient future.

Keywords: Patras waterfront; urban regeneration; urban resilience; smart city; sustainable development; sustainability; climate change

Landscape recovery in Naples Metropolitan City: a project for Mount Faito

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Abstract

Starting from the evidence of an alarming trend of land consumption and reduction of natural resources, the experience of landscape design and restoration carried out on Mount Faito (Naples, Italy) is presented and discussed. The reference context offers a significant example to reflect on the landscape value of natural areas in close proximity to densely populated urban areas. Moreover, the history of Mount Faito, its infrastructuring, tourism peak and then decline and abandonment suggests a critical reflection on human responsibility in its impact on fragile and rare ecosystems. The proposed landscape restoration project is based on the guiding principles of conservation and reuse, landscape continuity, nature-based education & learning, and accessibility & inclusiveness.

Keywords: landscape recovery, Natura 2000, Mount Faito, design competition.

1. Introduction

The anthropogenic transformations of the natural environment extend beyond the urban environment, encompassing a broader footprint and diverse modalities. Sparse urbanization and infrastructural expansion contribute to soil consumption, reaching in Italy a significant intensity of 76.8 km² of new artificial coverage of the soil solely in 2023, equivalent to 21 hectares per day [1]. This phenomenon represents a pivotal aspect in the path of adaptation to Climate Change: while policymakers are addressing the regulating aspects, researchers and designers have the responsibility of working towards the recovery of existing structures, to limit further unjustified consumption of land and resources.

In this scenario, surviving natural areas are invaluable to communities, especially those close to large, densely populated urban areas that truly act as an outlet and resource serving overpopulated neighborhoods. This contribution introduces a project focused on the recovery and landscape enhancement of Mount Faito, Naples, Italy. The project area is a mountainous region at approximately 1000 meters above sea level within the Metropolitan City of Naples. It holds significant environmental, historical, and cultural value and its strategic location has made it an exceptional mountain retreat close to the city. However, following intense tourist development between 1850 and 1980s, the area is currently experiencing a period of decline and abandonment.

The current situation prompts reflection on the need to reconsider the relationship between the city and its natural context, and human responsibility in leaving behind disused structures. The 9th edition of the design competition "Premio Convivialità Urbana" promoted by the association Napoli Creativa, proposed this theme for a call for projects aimed at envisioning potential processes for environmental and landscape regeneration and the rediscovery of this place. This contribution offers a detailed historical and landscape overview of Monte Faito to convey at least part of its complexity and richness. It then presents the guiding reflections that accompanied the project proposal developed by the author together with colleagues Architect Chiara Chionna and Architect Alice Cappello, which was awarded 3rd place in the aforementioned competition.

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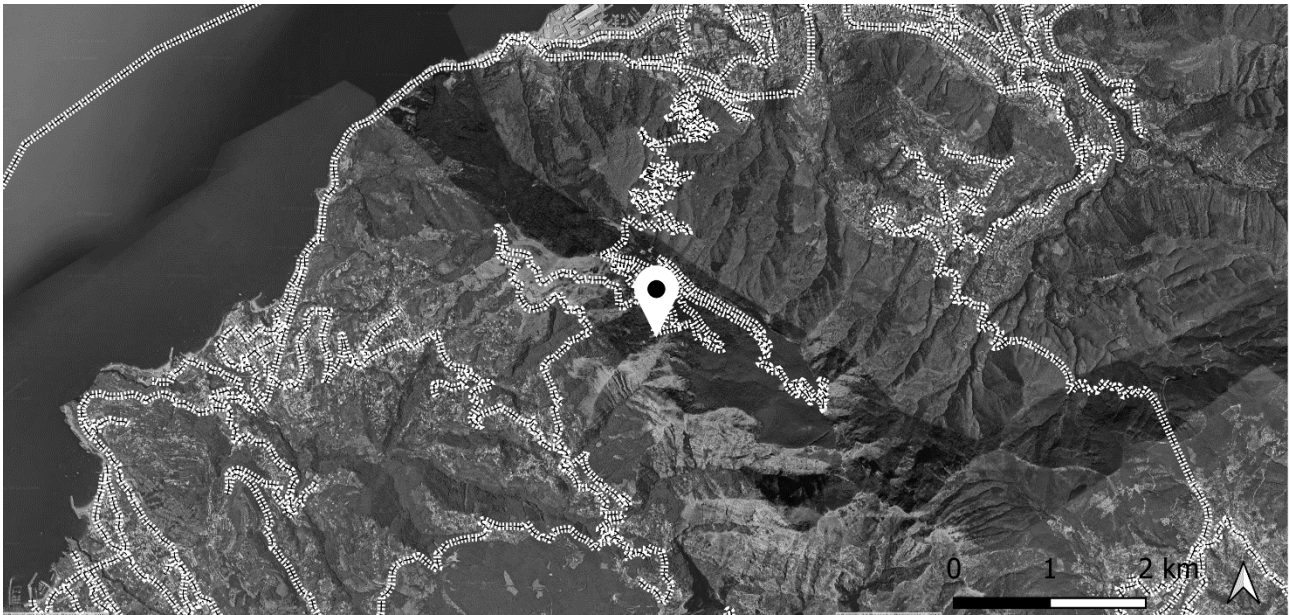


Figure 10. Territorial contextualization of Mount Faito in the system of the Lattari Mountains with the road and trail network highlighted

2. SHORT HISTORY OF MOUNT FAITO

Monte Faito is located on the Sorrento Peninsula, i.e., the landmass that separates the Gulf of Naples from the Gulf of Sorrento. The history of this place is ancient and intimately connected to that of the Neapolitan and Sorrentine coasts [2]. The earliest evidence found on Faito dates back to the Roman era (9th century BC), when the area was identified by the name "Monte Gauro", likely derived from the term *taurus*, or "Monte Lattaro" (Milki Mount), recalling the milk produced there. In any case, the terminology clearly refers to aspects of abundance and the presence of valuable resources for the human communities settled nearby. Another activity historically practiced in the area was the preservation of snow, known since the time of the ancient Greeks, and firstly testified in this area for the first time in the 17th century. Traces of the "snow industry" are still visible today, with large pits dug in the ground, where snow was alternately layered with beech leaves until the pit was full, to preserve the snow until the summer season and then bring it to the nearby towns.

In the 19th century, the Mount Faito became for the first time a favored destination for hiking within the Monti Lattari system, thanks to the connection via a carriage road with the city of Castellammare di Stabia. The key role of Count Girolamo Giusso should be recognized in this respect. He was one of the founders of the Neapolitan section of the Italian Alpine Club and he designed and personally funded the construction of a road that led from Quisisana in Castellammare to the top of the mountain based on an old mule track. Count Giusso also acquired several properties on the mountain starting in 1874, slowly transforming the landscape. For instance, he supported forestry experimentation, with sylvan transformations primarily inspired by economic criteria, as well as efforts to experiment with new species and to explore any possible uses of the mountain. In this area, Count Giusso attempted the cultivation of chestnut, altering the cutting cycle and planting new chestnut groves. Thus, even at that time, an intentional and conscious landscape management approach was observed, imparting an alpine character through the use of resinous plants, thus combining utility with the sense of landscape beauty. The forestry transformation was also accompanied by architectural work, with the construction in 1879 of a Swiss-style chalet that fully realized the utopia of making Faito "an alpine valley" [3].

It was only after World War II that Mount Faito was considered a tourist destination. The ownership was transferred to the Southern Secondary Railway Company, known as "La Vesuviana" and, in

1952, the cable car was inaugurated, connecting the mountain summit to the town of Castellammare in just 8 minutes. Also, a village for summer holidays was built.



Figure 11. Historical picture of the arrival of the cablecar (Source: Profaito).

3. THE LANDSCAPE SYSTEM

The Sorrento Peninsula is situated in the northern part of the Tyrrhenian-insular microclimate, and in particular in a climatic region classified as a “transitional oceanic Mediterranean bioclimate”, which is an oceanic Mediterranean climate transitioning from low and mid-altitude areas to mountainous zones. The morphology of the terrain, characterized by a sudden rise in elevation, stops the humid air masses coming from the west, resulting in increased precipitation and significant snowfall, which at higher elevations can easily reach 50 cm. However, the impact of climate change and global warming is clearly recorded in the area and both the frequency and intensity of precipitations and snowfalls significantly decreased in the recent decades. In this region, the proximity of the mountain to the marine coast concentrates a remarkable variety of different environmental systems within a relatively limited area, significantly increasing the biodiversity and botanical variety of this area. The spatial mapping of the different ecosystems involves the identification of species-specific clusters that may overlap to varying degrees, contributing to environmental complexity. In the case of Monte Faito, the main identifiable species-specific systems, or vegetational zones, include the beech forest, the coniferous forest, the chestnut forest, the holm oak forest, the mixed forest and the Mediterranean maquis. Each zone is characterized by dominant species (complete list in Table 1):

- the beech (*Fagus sylvatica*), accompanied by a rich undergrowth adapted to low light conditions with species such as Holly, Apennine Anemone, Wild Squill, and Bird's-nest Orchid;
- conifers such as Pines, Firs, and Cypresses, planted at different historical periods by humans for construction wood supply and to impart a distinctly alpine character, continuing to be planted in reforestation efforts by the State Forestry Corps and/or the Mountain Community;
- the Chestnut (*Castanea sativa*), with a rich undergrowth of herbaceous plants including Bracken Fern and Male Fern, and some tree-shrub species like the Hop Hornbeam and Downy Oak;
- and the Holm Oak (*Quercus ilex L.*), which tends to form dense forests, though it is more commonly present in mixed forests with other species;
- the evergreen shrubland with shrubs such as Myrtle and others, along with herbaceous plants.

In addition to its rich vegetation, Monte Faito hosts numerous animal species and serves as a significant habitat for various birds, that live and nest there. Human impact is also evident in this aspect, as it has significantly influenced the faunal composition through hunting and, more indirectly, by exploiting and encroaching upon natural habitats. The main bird species inhabiting these slopes include some common birds such as blackbirds (*Turdus merula*), sparrows (*Passer domesticus italiae*) and chaffinches (*Fringilla coelebs*), seasonal birds like robins (*Erithacus rubecula*) and swallows (*Hirundo rustica*), and birds of prey such as kestrels (*Falco tinnunculus*) and buzzards (*Buteo buteo*). The chestnut groves and beech forests are home to *Certhia brachydactyla*, *Troglodytes troglodytes*, *Aegithalos caudatus* and many others. Among the mammals, there are small rodents such as voles (*Microtus savii*), rats (*Rattus norvegicus*), and mice (*Mus musculus*), as well as larger animals like foxes (*Vulpes vulpes*), hedgehogs (*Erinaceus europaeus*), moles (*Talpa caeca*), and stone martens (*Martes foina*).

The specific characteristics of this landscape meant that it was subject to certain environmental protection measures established at both the European [4] and national levels [5]. Monte Faito falls within a Special area of conservation defined by Natura 2000 for habitat conservation, as shown in Figure 2.

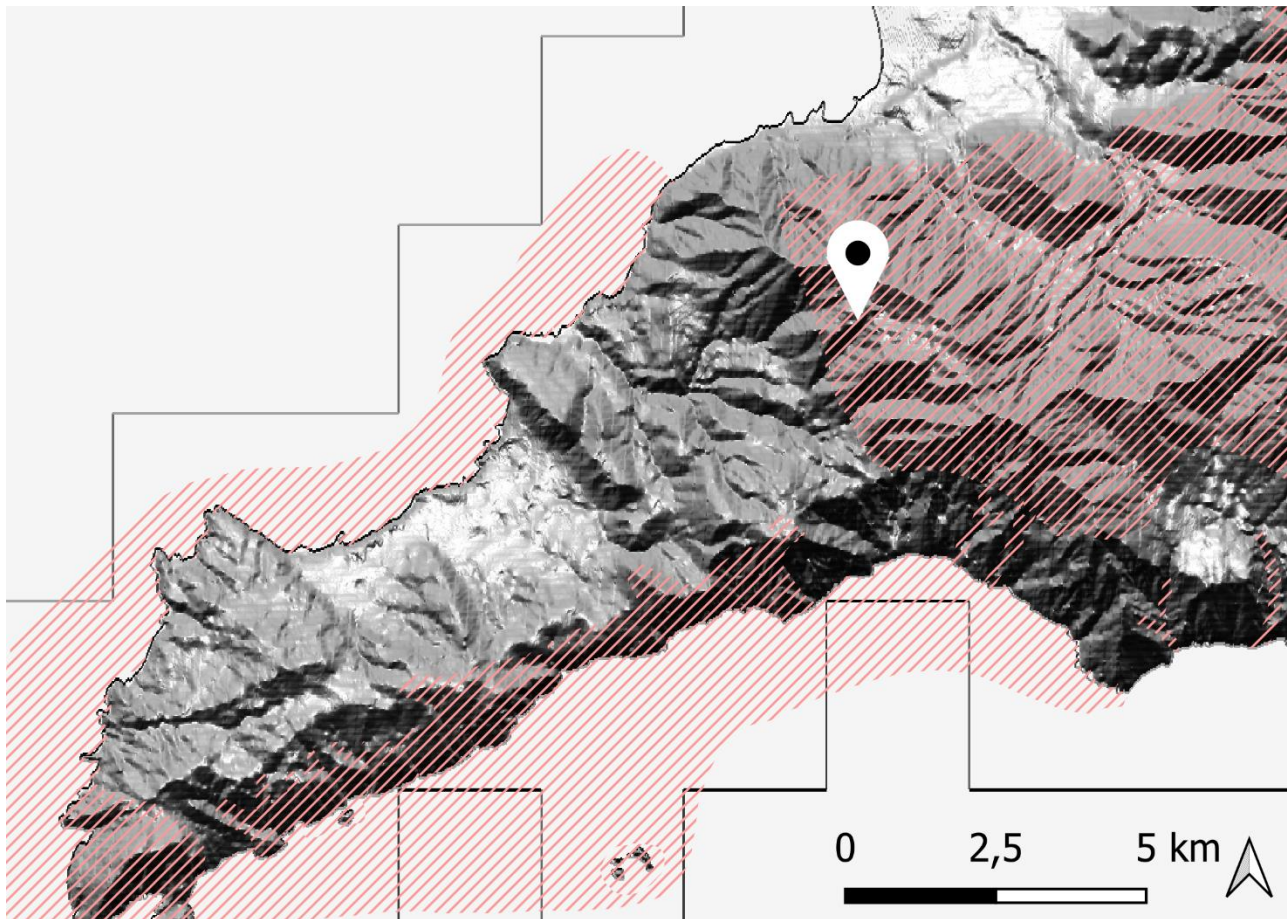


Figure 12. Mount Faito is part of the areas protected as part of Natura 2000 network.

Table 1. List of vegetation zones with the main botanical species

VEGETATION ZONE	BOTANICAL SPECIES	MINIMUM ALTITUDE (m a.s.l.)	MAXIMUM ALTITUDE (m a.s.l.)
beech forest	<i>Fagus sylvatica</i> <i>Ilex aquifolium</i> <i>Anemonoides apennina</i> <i>Scilla bifolia</i> <i>Neottia nidus-avis</i>	800	1800
coniferous forest	<i>Pinus sp.</i> <i>Abies sp.</i> <i>Cupressus sp.</i> <i>Larix decidua</i>		
chestnut forest	<i>Castanea sativa</i> <i>Pteridium aquilinum</i> <i>Dryopteris filix-mas</i> <i>Anthoxanthum odoratum</i> <i>Quercus pubescens</i>	750	900
holm oak forest	<i>Quercus ilex</i>	0	600
mixed forest	<i>Alnus cordata (Loisel.) Desf</i>		

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Ostrya carpinifolia Scop.
Quercus pubescens
Acer neapolitanum Ten.
Helleborus foetidus L
Ajuga reptans L.
Ruscus aculeatus L.
Cyclamen repandum Sibth. & Sm. e
Cyclamen hederifolium Aiton
Viola alba Besser

Mediterranean maquis	<p><i>Myrtus communis</i> <i>Pistacia lentiscus</i> <i>Arbutus unedo</i> <i>Viburnum tinus</i> <i>Cerantonia siliqua</i> <i>Laurus nobilis</i> <i>Cistus incanus</i> <i>Cistus salvifolium</i> <i>Rosmarinus officinalis</i> <i>Spartium junceum</i> <i>Smilax aspera</i> <i>Lonicera implexa</i> <i>Convolvulus elegantissimus</i> <i>Asparagus acutifolius</i> <i>Polygala vulgaris</i> <i>Euphorbia characias</i></p>
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4. THE ARCHITECTURAL SYSTEM

As mentioned in the historical introduction, Monte Faito has been a summer vacation spot and a location for winter sports since the post-war period. During the years of most intense anthropogenic activity, the area was enriched with a series of constructions and infrastructures, which were subsequently abandoned and left over. Today, remnants of this past represent a significant environmental challenge.

In particular, the area under consideration for the 9th edition of the design competition "Premio Convivialità Urbana" [6] features a large area for sports facility (Figure 4 – A), that includes various sports fields for soccer and tennis, as well as an outdoor swimming pool. These fields are still partially used but the overall condition in terms of maintenance and safety are very poor. Among the architectural structures, there is a chalet (Figure 4 – B), currently ruined and inaccessible, located near the sports fields, and a dairy (Figure 4 – C) where dairy products were once produced, situated in a short distance along the main road. In a more isolated position lies the gallop (Figure 4 – D) where horses were once bred and trained, which is now completely abandoned.

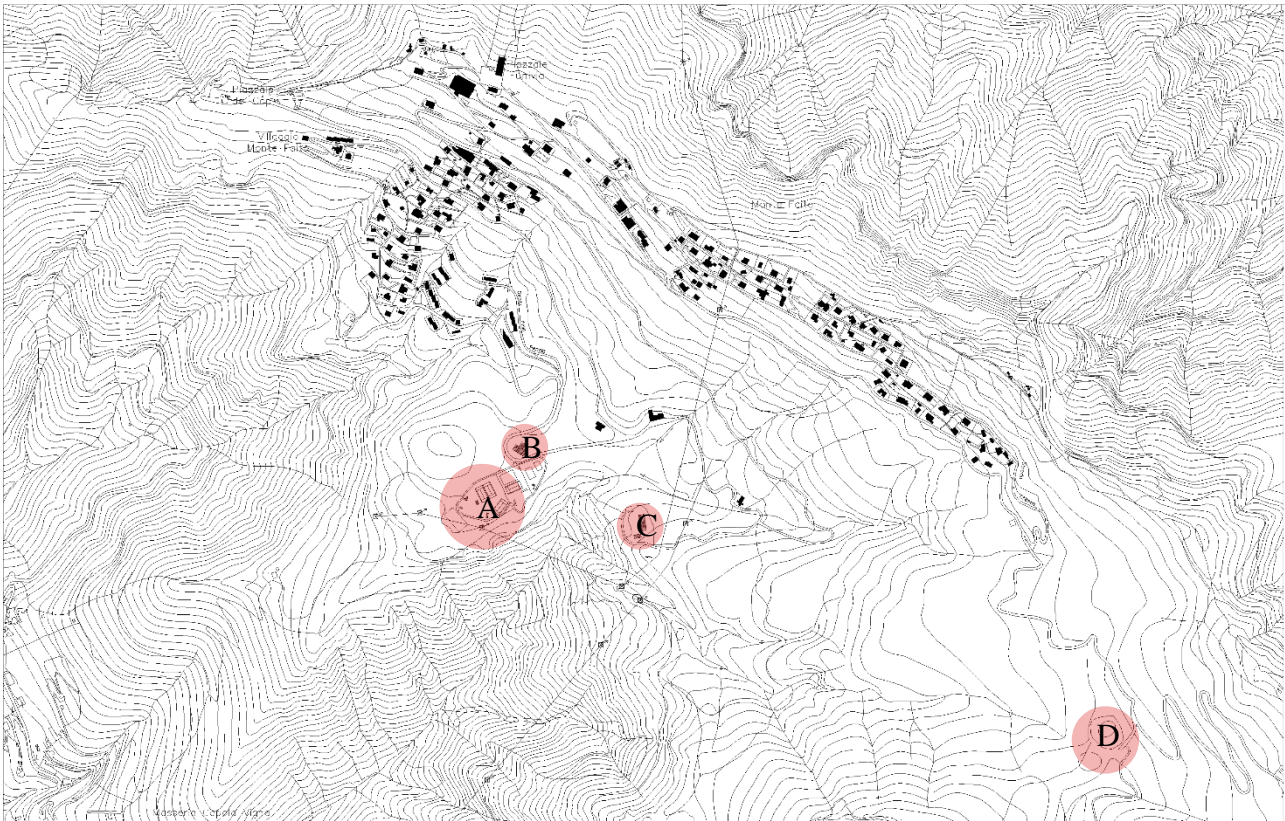


Figure 13. Area of Faito village and focus areas of the design competition: A-sports fields, B-the chalet, C-the diary, D-the gallop.

The competition call also required the participants to redesign the landscape system including a modern sports centre, a wellness area, an events area and a local food and wine culture centre, in order to make the place attractive all year round. More in details, the call specified the following requests for the reuse of the different areas:

- the sports centre, where spaces will be redistributed by creating a football pitch, a basketball court and a tennis court for the training of competitive teams and the swimming pool
- the chalet to be used as a wellness and conference centre.
- the diary to be used as a centre for local food and wine culture with a tasting and sales area.
- Finally, in the beech forest, the former gallop of Pian del Pero is to become, as it was once, a riding school with stables.

The call for projects required a redesign proposal considering the four areas as a unique landscape system.

5. THE “FAITO FRAME” PROJECT

The proposal developed by the author in team with C.Chionna and A.Cappello was presented to the competition jury with the title of “Faito Frame” (Figure 5). The Faito Frame concept arises from the need to integrate various functions and requirements while maintaining the recognizability and coherence of the project, even in physically distant locations. The Frame originates from the observation of existing structures, particularly from a redesign of a building type currently present in the sports center. In this new interpretation, the Frame is an asymmetrical wooden frame used to highlight and make key points of the project recognizable. Specifically, it highlights the entrances to the main functions (the wellness center and conference room in the chalet, the food and wine center in the diary, the riding school at Pian del Pero and the playground and outdoor sports areas).

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Additionally, the repetition of several frames outlines a promenade that characterizes the reorganization of the sports fields area.

The objective of the project is to recreate a coherent and interconnected landscape system, with particular emphasis on existing structure recovery, fostering education on nature awareness, expanding accessibility to a diverse audience, and employing sustainable materials. Active and sustainable mobility are promoted as well, with the enhancement of trekking and bike paths and thanks to the existing connection with a cable car. The value of the proposal lies primarily in redirecting attention to a place with high environmental qualities in close proximity to a city densely populated and lacking in green areas like Naples. The area already has the potential to offer significant Ecosystem Services to the surrounding urban areas, including recreational opportunities that have historically characterized the region's history and development. The project aims to restore a balance between the natural qualities of the location and human presence, guided by a new awareness of its ecosystemic value.

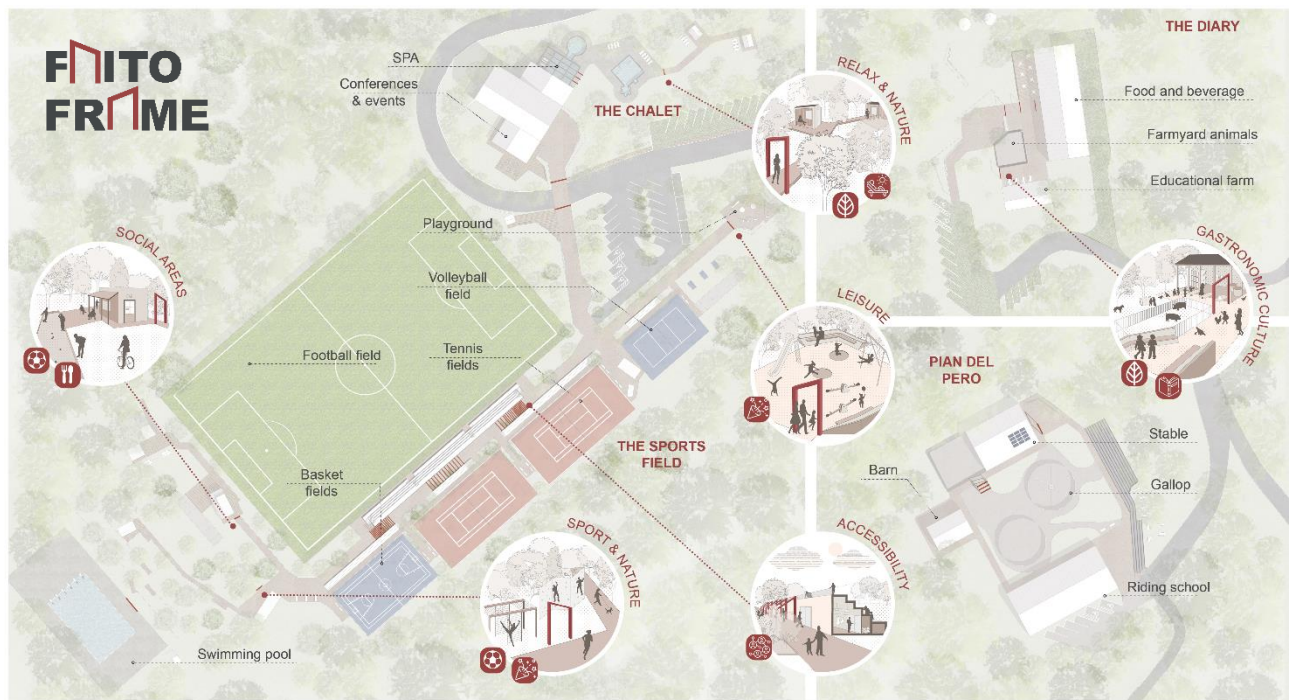


Figure 14. The masterplan of "Faito Frame" project (Source: M.S.Lux, C.Chionna, A.Cappello)

The guiding principles of the project are discussed hereafter and can be of inspiration for similar projects.

CONSERVATION AND REUSE | In both the chalet and the diary, the inclusion of new functions is based on the restoration of existing structures with the intent to preserve their architectural characteristics. The additional structures, such as the indoor pool of the wellness center and the riding school structures, have been designed to balance functional needs, reversibility, and architectural coherence. The service buildings scattered among the sports fields have also been maintained and repurposed to host ancillary functions, such as ticket offices and storage spaces.

LANDSCAPE CONTINUITY | The project aims to enhance and expand the use of the existing facility on Monte Faito without drastically altering the perception of those familiar with the area, while also attracting a potentially broader audience. The proposed approach is based on the recognition of the value of preserving and enhancing the perception of the landscape, in defense against the negative possible disturbances produced by new infrastructure [7].

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NATURE-BASED EDUCATION & LEARNING | Various measures have been adopted in the project to encourage users to adopt a respectful and attentive attitude towards the natural environment. The adopted measures include the change in paving at the pedestrian crossing to encourage car-drivers to slow down and give priority to pedestrians and cyclists in a space where nature asserts its prominence. Similarly, parking areas have been strategically placed near access points in all project areas to establish a boundary beyond which users can fully immerse themselves in nature. Seating areas along the main paths invite users to stop and observe their surroundings. Finally, the educational farm near the Latteria offers a practical opportunity to learn about and experience nature and animal respect, educating users of all ages.

ACCESSIBILITY & INCLUSIVENESS | Accessibility to all users is the main criteria guiding the choice to redesign the sports fields reorganizing the spaces along a central promenade. The promenade is designed to allow access for emergency and service vehicles to all sports fields. Internal spaces have been designed to facilitate use by users with reduced mobility, not only by meeting regulatory requirements but also by simplifying paths and distribution.

Additionally, the architectural project was developed in order to provide a good flexibility of use, in order to optimize the interventions and justify the costs. Last, a specific attention was given to the choice of materials. The project prioritizes the use of sustainable materials that align with the context. Wood has been used for new architectural volumes and cladding, while external paving choices have focused on draining materials with minimal impact, ensuring the area remains easily accessible without compromising environmental quality (green pavers for parking areas, stone, earth floors, wooden planks, and draining architectural concrete).

6. CONCLUSIONS

The design experience on Mount Faito offered a broader opportunity to consider the landscape value of natural areas in close proximity to densely populated urban areas. The history of Mount Faito, its infrastructuring, tourism peak and then decline and abandonment suggests a critical reflection on human responsibility in its impact on fragile and rare ecosystems. The situation described, which recurs in numerous other contexts in a similar way, also offers a significant working cue for planners and landscape architects to devote their skills to addressing the complex issue of landscape recovery and management of the remains of past uses, which cannot simply be forgotten.

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Resilient Sugar Heritage: Design Strategies for Post-Industrial Site and Unmarked Cemetery Sugar Land 95

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Extended abstract

Sugar Land flourished as a model company town for the Imperial Sugar Company, the first sugar refinery in Texas and the oldest extant business in the state. But before it became in the 1920s one of the “best planned and equipped communities” in Texas for its size, Sugar Land had been called the “hell-hole of the Brazos,” defined by its dependence on convict labor and its identity as a segregated community. The latter continued even after the improvements of the early twentieth century. In its heyday, Sugar Land demonstrated industrial and residential characteristics like other sugar towns in South America, the Caribbean, and the United States. Now considered “one of the fastest growing cities in America,” Sugar Land has fading out its historic identity and is easily mistaken as one of Houston’s suburbs. Its industrial core, closed in 2002, and included in the National Registry in 2017, has been on the cusp of several redevelopment plans. The Sugar Land 95 are the 95 African-American individuals unearthed during a construction in Sugar Land. Archaeologists found evidence that the 95 individuals belonged to the state of Texas' convict leasing system and were buried in the unmarked gravesite. The first bone was found in February 2018, by a backhoe operator clawing through the dirt on land owned by the Fort Bend Independent School District. By the summer, the remains of 94 men and one woman, all African-American victims of convict leasing, had been recovered on the future site of a career and technical education center. Ranging in age from 14 to 70, the inmates had muscular builds but were malnourished, their bones misshapen from back-breaking, repetitive labor. They were buried in plain pine boxes sometime between 1878 and 1911. In a design studio project, students are encouraged to reflect on the African-American heritage and to design a "memorial chapel" for the Sugar Land Heritage in the former industrial core of Imperial Sugar, on the waterfront to the Oyster Creek (on the right) and across Hwy 90 Alt and Kempner St. The post-industrial historical site includes three landmarks (designated structures of historical significance: the Char House (1925), Three Bays Warehouse, and a water tower), the Children's Museum, two smokestacks and the Imperial Sugar Silos. The project scope includes a memorial for the Sugar Land 95 heritage. Each student departed from a conceptual project informed by an analysis of precedents and critical thinking. Students would then work individually or in teams to design a memorial in the industrial heritage core, addressing the post-industrial site, its heritage and the connection to the sensitive urban area of the newly discovered cemetery, known as Sugar Land 95.

Keywords: Industrial heritage; urban regeneration; African-American landscape; sensitive urban areas

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Land use planning and spatial plans: A crucial parameter for the energy transition.

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Extended abstract

The European Commission's green transition policies are setting increasingly ambitious energy and climate targets, which directly impact the spatial policies of the Member States. At the European level, in response to the recent energy crisis following Russia's invasion of Ukraine, a specific action plan for the Union's energy autonomy, known as REPower EU (COM(2022) 230 final), is being introduced. This plan, along with the revised Energy and Climate Plans of the Member States, aims to significantly increase the penetration of renewable energy sources. It achieves this through more simplified and rapid planning and licensing procedures, as well as predefined areas known as RES go-to areas.

Similarly, under the Union's Green Industrial Plan (COM(2023) 62 final), new priorities and commitments are outlined to ensure strategic autonomy in certain critical manufacturing and mining sectors. Among other things, Member States should incorporate specific provisions into land use plans. These provisions aim to create an industrial ecosystem for producing clean technology products (as outlined in the Net Zero Industry Act) and to facilitate the exploitation of critical raw materials (as per the Critical Raw Materials Act).

In the case of Greece, the framework for implementing the spatial dimensions of the European policies related to the green transition, remains an issue. On the occasion of the current implementation of the ambitious program for the country's urban and spatial planning reform, this paper aims to highlight the multiple challenges that spatial planning, both on land and at sea, particularly within Greece's industrial and renewable energy sector, faces today. These challenges are crucial for the country to successfully meet its ambitious energy and climate goals.

Among other specific issues, the paper explores the following:

- a) Impacts of specific EU Initiatives on spatial planning policies: The influence of specific European Union energy and climate initiatives on the spatial policies of Member States.
- b) Readiness of the Greek Planning System: Assessing the degree of readiness of the Greek planning system to adapt to and address new developments.
- c) Planning Tools for Implementation: Identifying the planning tools that can be effectively utilized to implement policies in Greece.

Among the main conclusions, it is noted that spatial planning is expected to play a key role in the timely and integrated implementation of the ambitious energy and climate policies of the European Union. Additionally, at the national level, there is a need to continue efforts in the complex task of reviewing existing spatial frameworks and developing, for the first time, maritime spatial frameworks. These developments are crucial to achieve the required harmonization of spatial plans with the modern European framework for energy transition.

Keywords: *RES go-to areas; Spatial Planning Frameworks; Green transition; Green Industrial Plan;*

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Go the Market! Strategy for the Regeneration of Market Places in Poland – GOSPOSTRATEG Project

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Extended abstract

This paper addresses the research issue of city transformation towards resilient cities facing climate change and the development of strategy for the regeneration of marketplaces in Poland. It introduces a manual and toolbox designed to develop and implement a comprehensive action plan for marketplace regeneration.

Marketplaces, comprising separate areas or structures such as squares, streets, and market halls, serve as vibrant public spaces that play a crucial role in urban settings. They enhance the quality of life for residents and contribute to the overall attractiveness of a locality. Managing marketplaces is central to addressing problems related to sustainable development, encompassing economic, environmental, and social considerations. The regeneration of marketplaces necessitates an integrated approach, encompassing organization of work, space modernization, image transformation, and community activation. These efforts should also respond to contemporary challenges and incorporate pro-environmental solutions.

In this context, the “Go the Market!” strategy aims to make a significant contribution to resolving a various issues affecting Polish cities. These include the maintenance and new use of public spaces, their environmental and structural regeneration, social integration, protection of cultural heritage, and enhancing the quality of life in cities.

The paper presents outcomes of the GOSPOSTRATEG project, that include the pilot design and implementation of market regeneration and a regeneration strategy document as a tool. The manual is built upon that implementation experience. The strategy is developed by the consortium of three institution participating in the project City Initiative Association, Gdansk University of Technology and Academy of Art in Gdańsk, Poland. It is funded by the Gospostrateg programme from the National Centre for Research and Development in Poland.

Go the Market! strategy was developed based on the pilot implementation project of market regeneration in Gdańsk-Oliwa district in Poland, known as the “*Market in Oliwa*”. This initiative was a research endeavour supported by a scientific program and stands as a significant outcome of the broader research project titled: “*The public markets revitalisation strategy with the use of the social catalyst entrepreneurship method, brand repositioning and placemaking as a tool for local development policy*” project number: Gospostrateg1/392278/6/NCBR/2018, conducted within the framework of the GOSPOSTRATEG program financed by the National Centre for Research and Development in Poland. Presently, the strategy is accessible to institutions interested in understanding and implementing it at either the city or national level.

Keywords: urban planning, public space, urban regeneration, placemaking, social integration, interactive public participation, marketplace, Gdansk

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**ADAPTING TO CLIMATE CHANGE: THREATS AND
OPPORTUNITIES FOR LANDSCAPE AND CULTURAL
HERITAGE MANAGEMENT**

**CHANGING
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The correlation between urban and regional planning and the vulnerability of cultural heritage sites in climate change.

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Extended abstract

Climate change has direct and indirect effects on archaeological sites, monuments, historical buildings, historical towns, and villages. The rise in temperature, as well as extreme weather phenomena, such as excessive rainfall, wildfires, and storms, pose significant threats to the above heritage sites and elements. The paper investigates the potential contribution of urban and regional planning to mitigating the effects of climate change on cultural heritage sites, and the need for a policy framework and a management plan that will promote and monitor the spatial planning proposals, having in mind that adaptive planning and management plan is based on the cycle of analysis, application, evaluation, and revision.

Reference will be made to three case Studies that have been implemented within the framework of the program LIFE-IP AdaptinGR – Boosting the implementation of adaptation policy across Greece. First case study will be the archaeological site of Messina which interact directly with the immediate natural environment and landscape, second one will be the old town of Corfu which is a typical example of a historical urban landscape, and the last one will be the historical villages of Zagorochoria which have a strong relationship with a rural and forest landscape.

A general conclusion that will arise from the above is that the ability to manage any Heritage site and to adapt it to climate change impacts, depends on the legal and policy support given by government, and to the will of local communities to review their practices, in the light of climate change. The relationship between the broader landscape and human activity determines the degree of resilience of the larger area in which a heritage monument or site is located.

Keywords: *climate change; cultural heritage sites; urban and regional planning*

Using Spatial Planning as a Tool for Climate Change Adaptation: Evidence from Greece.

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Extended abstract

Climate change is widely acknowledged as one of humanity's most critical challenges. The European Union (EU), recognising the criticality of the issue, was mobilised to enhance the adaptation of its Members-States to climate change. In April 2013, the EU endorsed a strategy on adapting to climate change.

The Greek National Climate Change Adaptation Strategy (NCCAS) was adopted in mid-2016 (L. 4414/2016) along with establishing a National Council on Climate Change Adaptation. It has a 10-year time horizon and outlines broad policy directions and adaptation actions in vulnerable sectors. The main objectives of the NCCAS are to estimate the immediate and long-term expected impacts of climate change on the Greek territory based on vulnerability assessment analysis; identify the priority areas that need climate change adaptation measures to be taken; outline the measures requiring legislation to ensure the adaptation to climate change is effective. These objectives are thoroughly analysed through the Regional Climate Change Adaptation Strategies (RCCAS).

The concept of resilience was introduced in urban and regional planning theories in the late 1990s. Urban resilience could be acknowledged as a dynamic process of adaptation based on the ability of cities to learn and adapt to these new conditions. Other researchers point out that resilience in urban and regional planning refers to the ability of cities to respond to challenges such as complexity, uncertainty and insecurity, to create a new approach or priority for adaptation and survival.

This paper focuses on highlighting (a) the principles, priorities and tools of the Greek spatial planning system so that it can fully respond to the new challenges climate change introduces, (b) the need to put resilience against the effects of climate change at the centre of spatial planning policies in Greece, (c) the challenges spatial planning needs to meet to achieve the resilient development of Greek cities, (d) the proper design of spatial planning guidelines to enhance the adaptive capacity of Greek cities to the effects of climate change, (e) the need to use the capabilities modern technologies provide in investigating the above issues.

Keywords: *Climate change, Adaptation, Urban Resilience, spatial planning*

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Flood risk mapping in areas of archaeological interest. Methodological approaches and challenges encountered in Greek case study areas.

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Extended abstract

Flood risk mapping is an essential precautionary measure for identifying areas vulnerable to floods that need protective infrastructure and specific risk management plans. Areas of important cultural and natural heritage are among the zones of high priority for protection when they are prone to natural disasters but various challenges exist for studying and implementing antiflood mechanisms in these areas. In the specific research effort different flood risk mapping approaches have been tested in Greek cultural heritage sites to analyze the local risk factors and propose protective measures. The results indicated that the current climate change models do not provide enough information to assess efficiently future flood risk since daily precipitation predictions are only available, which can be used by a limited number of flood risk assessment models. Nevertheless, multi-criteria, hierarchical mapping methods proved to be efficient in areas that classical hydraulic models are not applicable due to high terrain variability and spatially dense constructions. Modern technologies such as the use of Unmanned Aerial Vehicles (UAVs) to produce Digital Elevation Models (DEMs) of high accuracy with photogrammetric algorithms can contribute to the improvement of the flood risk assessment framework in areas of cultural heritage where physical interventions and extensive in-situ measurements are under restrictions.

Keywords: *flood risk; climate change; cultural heritage sites; risk assessment, modern technologies*

Sustainable construction technologies and materials as tools for mitigating the impact of climate change.

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Extended abstract

In recent years, we have been confronted with the effects of climate change in various areas, including the protection of cultural heritage sites. The increase in temperature and the increasing occurrence of extreme weather conditions resulting in fires and floods are factors that, on the one hand, accelerate the deterioration of monuments and, on the other hand, make their maintenance more complex, since climate change should be considered in planning their restoration. Compatibility, reversibility, and sustainability are additional requirements that should be met when choosing materials and techniques for monument conservation and restoration. Therefore, monument deterioration can be mitigated by using cutting-edge materials and new technologies, as well as by studying traditional building materials that have proven to be incredibly durable over time. This study will present four pilot case studies that involved cultural heritage adaptation studies conducted within the LIFE-IP AdaptInGR Project framework. The study focused on four traditional towns in the archaeological area of ancient **Messini**, the old town of **Corfu**, the traditional villages of **Zagorochoria**, and the archeological site of **Delos**. Every research location has unique characteristics with regard to the historic period and condition state of the monuments as well as the local climate. Ancient **Messene** is a significant archaeological site dating back to the fourth century BC that is under threat from climate change due to the relief and materials of the structures (porous sandstone). Cleaning, repairing, and waterproofing sensitive surfaces using UV- and moisture-resistant compounds can help prevent surface damage to exposed columns and sculptures. Furthermore, compatible conservation joint mortars will be proposed to consolidate the structures. Listed as a UNESCO World Heritage Site, **Corfu's** old town is a dynamic "organism" that is always in use. To reduce the impact of climate change on architectural surfaces, it was proposed to apply compatible ecological cement-free coatings and mineral paints, as well as the use of cool materials in buildings and paving to reduce temperature. Another important mitigation of the climate change effects deals with the management of the rainwater. The usage of native stone has contributed significantly to the preservation of **Zagorochoria's** traditional settlements. This observation was an important part of the study on preventative methods against climate-induced deterioration of architectural surfaces. It was also suggested to utilize cement-free mortars that are frost resistant, to clean open spaces from agricultural residues and to maintain the flood protection natural systems, such as the traditional paths of cobblestone. The case of the Archaeological Site of **Delos** is the most iconic illustration of the effects of climate change, as part of the ancient port is below sea level while another part is in imminent danger. Based on this degree of risk, it was proposed to carry out the necessary restoration and consolidation studies with compatible materials and the installation of a real-time monitoring system (GIS) to assess the condition of the monuments. To conclude, in all the cases studied, comprehensive recommendations for precautions against fires and floods, which inadvertently shield architectural surfaces from meteorological events, were presented; those measures that can be combined with the restoration materials can safeguard architectural surfaces from environmental events.

Keywords: *cultural heritage, Climate Change Adaptation, material damage prevention*

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A methodology for developing studies on the adaptation of cultural heritage sites to expected climate change impacts.

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Abstract

This paper presents the development of an integrated methodology tailored for examining the adaptation of cultural heritage sites to projected climate change impacts. This methodology enables the assessment and prioritisation of risks expected to affect and exacerbate the vulnerability of cultural heritage sites. Furthermore, it enables the formulation of a comprehensive strategy aimed at bolstering their resilience. Originating from the collaborative efforts of the ELLINIKI ETAIRIA - Society for the Environment and Cultural Heritage (ELLET), this methodology constitutes a pivotal component of the “LIFE-IP AdaptInGR programme”. Structured into four sequential steps, it commences with a comparison of climate data spanning the reference period 1971-2000 and two future intervals: 2031-2060 and 2071-2100. This examination is conducted under three distinct emission scenarios: RCP2.6, RCP4.5, and RCP8.5. The data are derived from a selected regional climate model that reflects the climate characteristics of the wider area of the cultural heritage site under consideration. This analysis is followed by an evaluation of extreme weather events and climate changes posing the greatest dangers to the cultural heritage site. The second step involves understanding the intrinsic characteristics of the site, alongside potential non-climatic issues, focusing on geological and topographic features, monument structures and materials, site infrastructure, and the institutional protection framework. The third step pivots towards a qualitative assessment of the site’s vulnerability, synthesising the findings of the preceding phases and utilizing the methodology outlined by the Intergovernmental Panel on Climate Change. Finally, the fourth step describes a series of illustrative actions that could contribute to the cultural heritage site’s adaptation to the most severe climate changes anticipated to impact it by 2100. This methodology has already been applied to the archaeological sites of Ancient Messene and Delos, the Old Town of Corfu, and three traditional settlements in Zagori.

Keywords: *cultural heritage; climate change; climate data; adaptation; vulnerability.*

1. INTRODUCTION

According to the findings delineated in the Sixth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC), it is unequivocally established that climate change exerts its impact across all inhabited regions. Substantiated evidence supports the assertion that anthropogenic emissions and human activities stand as the principal drivers behind the surge in extreme weather occurrences, encompassing heavy rainfall, droughts, abrupt temperature fluctuations, sea-level rise, and wildfires [1]. Projections indicate that the sustained escalation in greenhouse gas emissions will invariably exacerbate the climate crisis and foster a conducive environment for the perpetuation of such phenomena [1].

At the same time, climate change is predicted to have intricate and dynamic effects on cultural heritage sites, comprising archaeological sites, historical settlements, historic cities, and individual monuments, along with the intangible values they represent [2]. The array of climatic variables precipitating these effects, alongside with the different rates of occurrence in different geographical areas, correspondingly alter the severity and duration of these impacts. Extreme events such as

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torrential rainfall, fires, and storms pose palpable and substantial threats [3]. Equally consequential, though less obvious, is the latent danger that besets cultural heritage entities due to the incremental alterations engendered by the constantly changing climatic environment (e.g., accelerated evolution of material deterioration, such as corrosion, chemical deterioration, cracking, or impact on daily living conditions, changes in the ecosystem, etc.) [3].

To the aforementioned, the existing situation and possible non-climatic issues, such as urbanisation pressures, infrastructure development, industrial activities and tourism inflows that may burden a heritage site should be added. These factors, combined with climate change, have the potential to increase the susceptibility of heritage assets to accelerated deterioration, jeopardizing their long-term preservation [4,5].

The objective of this paper is to outline a methodology for evaluating the anticipated effects of climate change, applicable to various heritage sites, with a focus on identifying and prioritising the potential risks that may heighten their vulnerability. By adhering to this methodology, it becomes feasible to delineate a set of proposals for adapting to climate change. This methodology has already been applied to the archaeological sites of Ancient Messene and Delos, the Old Town of Corfu, and three traditional settlements in Zagori. These cases were chosen because of their different geographical location, their monumental character, their regional importance, and the sensitivity they are believed to have to the expected impacts of climate change.

The above studies are part of the wider work of ELLET in the eight-year «LIFE-IP AdaptInGR - Boosting the implementation of adaptation policy across Greece» program, in which it participates. Among others, ELLET is responsible for investigating the effects of climate change on cultural heritage and proposing appropriate adaptation measures in order to strengthen domestic cultural heritage's resilience.

2. ADAPTING CULTURAL HERITAGE SITES TO CLIMATE CHANGE: A METHODOLOGICAL APPROACH

To formulate a methodology applicable to the adaptation of domestic cultural heritage sites to climate change, an initial examination was conducted encompassing European and international experiences in monitoring and addressing climate change impacts on cultural heritage. For instance, within the European Union (EU), significant efforts have been made to develop frameworks and initiatives aimed at assessing and addressing the vulnerabilities of cultural heritage sites to changing climatic conditions. Through programs like Horizon 2020, the EU has funded numerous research projects focused on understanding and mitigating climate change impacts on cultural heritage. One of these is the Climate Heritage project, which has facilitated collaboration among researchers, policymakers, and heritage practitioners to develop innovative strategies for climate adaptation in cultural heritage management [6]. Internationally, organizations like UNESCO have spearheaded efforts to raise awareness and develop strategies for safeguarding cultural heritage from climate-related threats. The UNESCO World Heritage Centre, in collaboration with the International Council on Monuments and Sites (ICOMOS), has published guidelines and reports emphasizing the importance of integrating climate change considerations into heritage management practices [7]. These initiatives underscore the significance of adopting a proactive approach to monitor and address the multifaceted impacts of climate change on cultural heritage.

Furthermore, to develop a methodological approach for the adaptation of cultural heritage sites, the strategies of both the European Union (EU) and Greece in response to climate change were examined [8, 9, 10]. It is noteworthy that the EU's Climate Change Adaptation Strategy delineates measures aimed at enhancing resilience and adaptive capacity within cultural heritage management practices across Europe [8]. Moreover, the EU-funded Climate-ADAPT platform offers an array of resources, including case studies and best practices, to bolster adaptation efforts across various sectors, including cultural heritage [11].

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Similarly, the Greek National Adaptation Strategy (NAS) encompasses a series of proposed actions and measures for adapting cultural heritage to climate change. The primary thrusts of these proposed actions include: a) enhancing knowledge and evaluating risks associated with climate change impacts on cultural heritage, b) managing climate change risks, c) integrating protective measures for cultural heritage and adaptive policies into broader national strategies, and d) providing training and education for both professionals and the public [10].

At the same time, the concept of 'vulnerability' as a key step in any adaptation planning process was explored, and various approaches to this concept were evaluated [12, 13, 14]. It was decided to incorporate the IPCC's proposal, as formulated in the Third Assessment Report [15].

The above review resulted in the development of the definitive methodology for conducting studies on the adaptation of cultural heritage sites to climate change. This methodology is outlined in four sequential steps. The initial step comprises a climate data analysis, while the subsequent step entails comprehending the intrinsic characteristics of the cultural heritage site, alongside potential non-climatic stressors. The third step involves a qualitative assessment of the site's vulnerability, and the final step outlines a series of illustrative actions aimed at enhancing the cultural heritage site's adaptation to the most severe climate changes. The methodology has been already applied to the archaeological sites of Ancient Messene and Delos, the Old Town of Corfu, and three traditional settlements in Zagori.

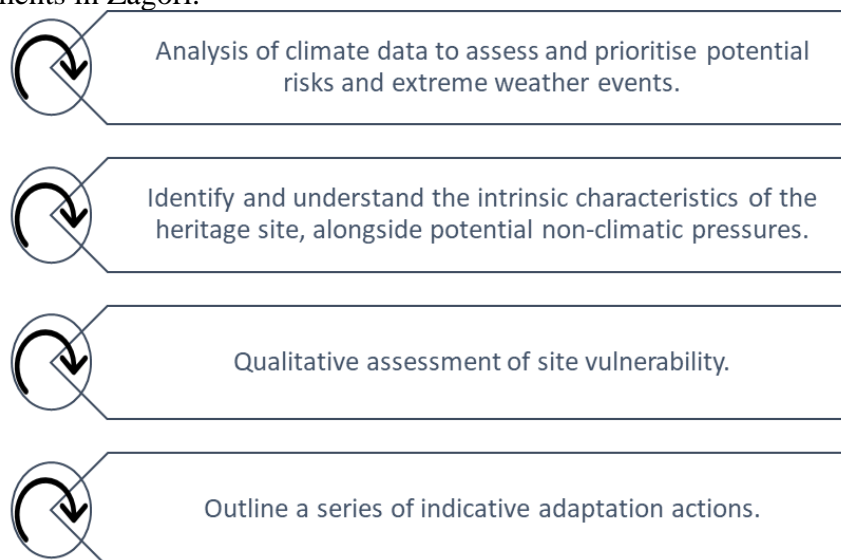


Figure 1. The basic steps of the methodology developed for studies on the adaptation of cultural heritage sites to expected climate change impacts.

2.1 Climate data analysis

The initial step for any study on the adaptation of a cultural heritage site is the analysis of several climate data in order to assess and prioritise potential risks and extreme events related to climate change.

The methodology developed used variables and indicators that have already tested on the IPCC assessment reports [15, 16, 17, 18, 19, 20, 21]. For the case studies of the archaeological sites of Ancient Messene and Delos, the Old Town of Corfu, and three traditional settlements in Zagori, in which the methodology was applied, the National Observatory of Athens (NOA) provided time series data in the form of climate variables and indicators. The original data were retrieved from 2 state-of-the-art RCM simulations carried out in the frame of EURO-CORDEX (Coordinated Regional Climate Downscaling Experiment), with a horizontal resolution of about 12 km (0.11°) spanning three periods:

the control 1971-2000, the near future 2031-2060 and the distant future 2071-2100 periods. The regional climate model (RCM) used for simulation and data analysis was selected by comparing precipitation and temperature records from 1974 to 2004 with simulations from different RCMs with a spatial resolution of 12 km (0.11°).

Climate projections were analysed for three of the four representative concentration pathways (RCPs) described in the IPCC reports as critical for the formulation of mitigation and adaptation policies [15, 16, 17, 18, 19, 20, 21]. Specifically, the analysis focused on the climate emission scenarios RCP2.6, RCP4.5, and RCP8.5. These scenarios include emission and concentration time series for all greenhouse gases, aerosols, and chemically active gases, in addition to land use data [15]. Population growth rate, economic activity, lifestyles, energy sources, technological development, future land use, and climate change policies are the primary criteria that influence the RCPs. RCP2.6 is a scenario with significant mitigation that seeks to keep global warming below 2°C above pre-industrial levels, RCP4.5 is an intermediate scenario (the same applies to RCP 6.0, which was not used in the analysis) and RCP8.5 is a scenario with extremely high GHG emissions.

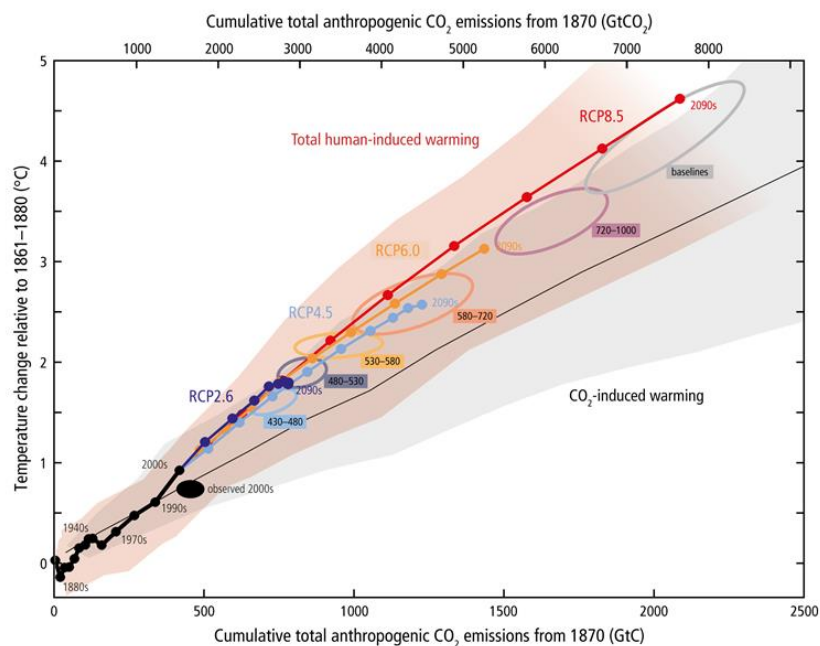


Figure 2. Global mean surface temperature increases as a function of cumulative total global carbon dioxide (CO₂) emissions from various lines of evidence. Multi-model results from a hierarchy of climate carbon-cycle models for each RCP until 2100 are shown (colored lines). Model results over the historical period (1860–2010) are indicated in black. The colored plume illustrates the multi-model spread over the four RCP scenarios and fades with the decreasing number of available models in RCP8.5. Dots indicate decadal averages, with selected decades labeled. Ellipses show total anthropogenic warming in 2100 versus cumulative CO₂ emissions from 1870 to 2100 from a simple climate model (median climate response). Temperature values are always relative to the 1861–1880 period, and emissions have been cumulative since 1870. Black-filled ellipse shows observed emissions to 2005 and observed temperatures in 2000–2009 with associated uncertainties [19].

The statistical significance of differences between the values of climate variables and indicators derived for the reference period and those for the two future periods and the three emission scenarios was assessed using the z-test. The null hypothesis H_0 that the difference between the means of the two samples is not statistically significant was tested for each sample. When the result was z critical two-tail z and $P (Z = z) 0.05$ at a confidence level of 95%, it indicated that H_0 was invalid and that the differences between the samples compared were statistically significant.

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Through this process, the statistically significant expected climate changes up to 2100 for each cultural heritage case study were documented. The analysis of climate data and exploration of the most prominent climate changes and risks can be replicated at other sites.

2.2 The intrinsic characteristics and potential stressors of the cultural heritage site

In light of research conducted at archaeological sites like Ancient Messene, Delos, the Old Town of Corfu, and traditional settlements in Zagori, alongside climate data analysis, it's vital to document the intrinsic features and non-climatic stressors impacting cultural heritage sites comprehensively. Each case study faces a range of pressures beyond climate change, necessitating thorough examination alongside climate data analysis. Important factors include the site's geographical location, geological and topographic features, monument structures and materials, site infrastructure, and the institutional protective framework. Furthermore, cultural heritage sites often face stressors arising from contemporary lifestyle demands, rapid tourism expansion, and challenges related to mobility.

According to Mason and Jouhki [22], understanding the interplay between climatic and non-climatic stressors is essential for effective heritage conservation. This entails considering various factors such as socioeconomic dynamics, urbanization, and land use changes alongside climate-related vulnerabilities.

The integration of existing conditions and potential non-climatic pressures affecting each heritage site is critical. When coupled with the impacts of climate change, these factors can significantly undermine resilience over time, jeopardizing the integrity of the heritage asset. This underscores the urgent need for holistic assessment and the development of mitigation and adaptation strategies that encompass both climate and non-climate stressors.

Fatorić and Seekamp [23] emphasize the importance of incorporating non-climatic stressors into conservation strategies to ensure the long-term sustainability of cultural heritage sites. By addressing both climatic and non-climatic threats, heritage managers can enhance the resilience of these sites to future challenges.

2.3 Vulnerability assessment analysis

To evaluate the threats posed by climate change to a system or cultural heritage site, it is essential to assess its vulnerability. This process enables the identification of the site's needs, facilitates the proposal of an integrated adaptation strategy, and helps prioritize mitigation measures.

Following the publication of its Third Assessment Report in 2001, the IPCC introduced vulnerability assessment as a methodology for evaluating the risks of climate change [15]. In this paper, the vulnerability assessment is presented as a crucial initial step in developing or implementing measures to address the impacts of climate change across various human activity sectors. This approach offers advantages over traditional risk analysis, as it not only examines the system's exposure and sensitivity to one or more risks but also considers its capacity to adapt to changing conditions and establish equilibrium within them.

McCarthy [24] describes system vulnerability as the degree to which a system is likely to be severely affected by climate change. This approach is based on exposure, sensitivity, and adaptive capacity.

Exposure is the extent to which a system may be affected by a hazard due to its geographical location [24]. For instance, a coastal area embodies a multifaceted and perpetually evolving social, spatial, economic, and environmental framework, rendering it inherently more susceptible to the impacts of severe weather occurrences in comparison to an inland locale [25,26]. Sensitivity is the extent to which a system is negatively or positively affected by climate-related events due to its intrinsic characteristics (i.e. the sensitivity of the building materials and structures; 3) the sensitivity of the native and/or cultivated vegetation) [24]. There may be direct or indirect effects. Adaptive capacity is related to human activities (institutional provisions, technology, infrastructure, management practices, land use management), but it can also be a system attribute [24].

According to the following equation, vulnerability (V) is a function of exposure (E), sensitivity (S), and adaptive capacity (AC):

$$V = (E + S) - AC$$

A system's high vulnerability arises from its high exposure, sensitivity, and limited adaptability. In contrast, the vulnerability of a system decreases as adaptive capacity increases and exposure and sensitivity parameters decrease.

In this methodological step, the linkage between the initial two methodological steps is established: 1) identification and prioritisation of primary climate risks up to 2100 across various RCPs, and 2) examination of the intrinsic characteristics and potential non-climate-related challenges the cultural heritage site is facing. Figure 3 depicts an application of qualitative vulnerability assessment to the Old Town of Corfu. This illustration enables the determination of the extent to which climate change will impact its resilience and identifies the most vulnerable features.

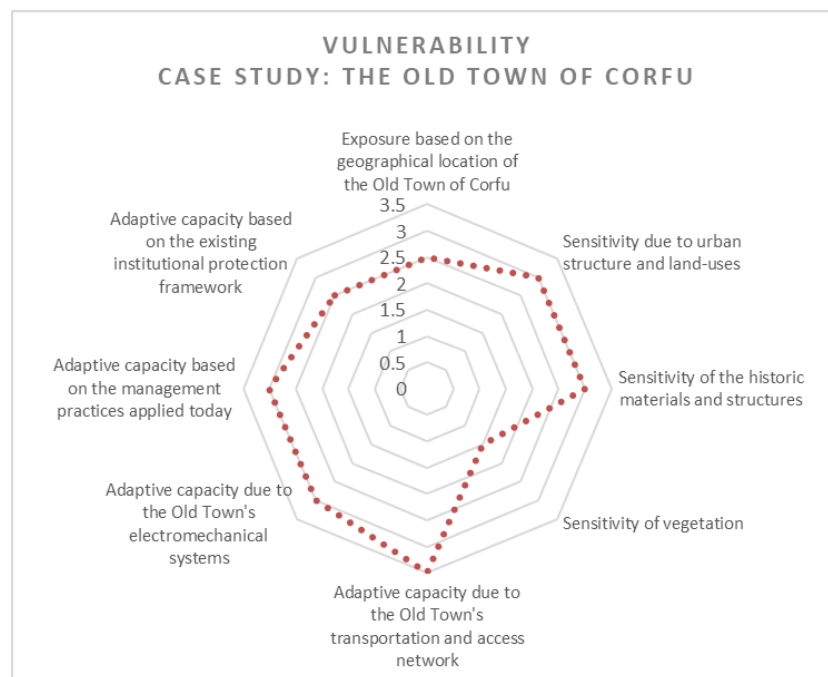


Figure 3. Assessment Analysis of the case study of the Old Town of Corfu [4].

2.4 Adaptation strategy plan

Building upon the literature review of the proposed adaptation strategies (see Section 2) and applying the methodological steps presented in Sections 2.1, 2.2 and 2.3 for the analysis of the case studies of the archaeological sites of Ancient Messene and Delos, the Old Town of Corfu and the traditional settlements in Zagori, an integrated strategic adaptation plan can be developed. This strategic adaptation plan aims to strengthen the resilience of these sites against anticipated climate change impacts. The plan's structure may encompass the following dimensions:

- Adaptation measures to address climate change: Various proposals can be devised to enhance resilience and optimize the functionality of each cultural heritage site.
- Institutional strategies: Recommendations for institutional tools should be proposed to enhance the protection of each cultural heritage site from climate change effects.
- Emergency Preparedness Action Plan: Formulation of proposals is necessary for timely response and effective management of emergencies arising from climate change and extreme weather events.

- Information, education, and awareness: A series of proposals should be crafted to disseminate information, educate, and raise awareness among the public, students, and professionals.
- Spatial Monitoring System: Proposals should be developed to better understand the impacts of climate change on the materials and structures of the monuments within each cultural heritage site and to monitor the effectiveness of implemented measures

3. RESULTS AND FURTHER DISCUSSION

The methodology employed in this study, applied to case studies encompassing archaeological sites such as Ancient Messene and Delos, the Old Town of Corfu, and traditional settlements in Zagori, has brought to light three critical concerns.

The first concern centers on the formidable challenges inherent in collecting data regarding the current state of cultural heritage sites in Greece and the additional stressors they face, such as visitor impacts and traffic. Evaluating this complex situation demands continuous monitoring and meticulous recording of the condition of cultural assets, conservation efforts, and restoration interventions. An accessible database for both administrative and scientific stakeholders is essential to effectively address these challenges.

The second concern arises from the intricate task of discerning between hazards induced by climate change and those inherent to a cultural site itself. The occurrence of extreme weather events and environmental changes is closely interlinked with a site's existing condition, including its level of conservation, urban layout, land use, infrastructure, and management practices. Thus, addressing this issue necessitates a multidisciplinary approach to concurrently research and tackle both climate change impacts and site-specific vulnerabilities.

The third concern pertains to the transition of sites to new management systems, necessitating collaboration among multiple services and institutions. This underscores the imperative of developing integrated and comprehensive management plans aimed at safeguarding cultural heritage sites against diverse pressures and threats. Such plans should encompass tasks ranging from maintaining and restoring historic building stock to protecting cultural resources and natural environments, as well as ensuring the efficient operation of infrastructure, traffic, transport, and electromechanical systems. Achieving these objectives demands coordinated efforts and the active involvement of relevant stakeholders.

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Assessing Landscape Vulnerability in Climate Crisis: A Monitoring and Evaluation Framework for Adaptation Strategies in Greece

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Extended abstract

Climate change constitutes a multifaceted threat for the Greek landscapes, as for those of the Mediterranean in general, intensifying the need for a systematic approach to adaptation. Developing the methodology for this approach at the Regional level has been the task of subproject A2D2 of the LIFE-IP AdaptInGR project. It is this comprehensive framework of methodologies for climate change adaptation that is presented. The framework provides interrelated guidelines based on four pillars. It begins with landscapes, and their overall understanding and classification at the scale of a Region, followed by an assessment of these landscapes to determine their characteristics, their value, and their vulnerability to climatic hazards. It continues with climate impacts, monitoring, assessing and identifying the regions most vulnerable to hazardous phenomena, such as flooding, drought, desertification, wildfires and sea-level rise, utilizing geospatial data, climate models and fieldwork, while considering topography, land cover, land use and socio-economic conditions. The resulting data base is organized based on specific targets. Building upon the first set of measures, the framework implements a series of planning scenarios, incorporating previous studies, resilience projects and emergency preparedness action plans, to evaluate the efficacy of proposed adaptation strategies and prioritize actions based on estimated risks. A key component of the framework is the enactment of the resulting protective measures for monitoring, preventing and updating data, in the national policies. Lastly, enabling the involvement of stakeholders, local communities, government agencies, NGOs, and scientific experts in raising climate change awareness of the public and the authorities (through seminars, and educational activities), holds a crucial role in this process. In summary, the proposed framework employs a holistic approach to climate change adaptation in landscape and land use, by prioritizing vulnerable regions and proposing measures that integrate available tools, scientific knowledge, public and private actors, policies and information dissemination to enhance landscape resilience.

Keywords: *M&E Framework, Climate Change, landscape vulnerability, National Adaptation Plans*

The Transect Method for Landscape Adaptation to Climate Change: A Case-Study in the Southern Peloponnese

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Extended abstract

The dynamic nature of landscapes, as a result of complex natural processes and human activities, provides the ideal ground to study the multidimensional impacts of climate change. In recent years, a few methods have been proposed that allow for rapid landscape-scale assessment. Despite that, there is a lack of implementation of said methodologies in the Greek region, which is characterised by great landscape heterogeneity. In the context of the ongoing LIFE IP AdaptInGR (LIFE 17 IPC/GR/000006) project, the Society for the Environment and Cultural Heritage, in collaboration with the National Observatory of Athens, carried out a study using the transect methodology, aiming to assist climate change adaptation efforts. A holistic landscape appraisal was conducted at three spatial scales: a transect zone at the Southern part of the Peloponnese peninsula, extending from Pylos to Monemvasia (240 km long, 1.416.6 km²), 35 landscape areas and their respective landscape views. An assessment of the threat climate change poses on landscape integrity was materialized, taking into consideration climatic parameters, phytoclimatic, wildfire, erosion indices and human activities. The indices were calculated on a daily basis for the reference period 1971-2000 and two future periods (near-future 2023-2060 and end-of-the-century 2071-2100) under three emission scenarios namely RCP2.6, RCP4.5 and RCP8.5). The results of the study indicate climatic shifts, which, in combination with land-use pressures will lead to landscape degradation, due to increases in wildfire frequency and intensity, flooding and soil erosion. The already imposed preservation measures have not yet set a comprehensive framework for anthropogenic activity, which may further exacerbate the effects of climate change. This study provides useful input for the introduced regional and national climate change adaptation plans, highlighting the importance of landscapes in the identification of knowledge gaps and the prioritization of regions vulnerable to climate related hazards. The transect method facilitates landscape evaluation, conservation and planning for climate change adaptation.

Keywords: *landscape assessment, Climate Change Adaptation, bioclimate, Representative Concentration Pathway, transect*

A high-resolution analysis of the De Martonne and Emberger indices under different climate change scenarios in East Macedonia and Thrace, Greece. Implications on the natural and agricultural landscape

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Extended abstract

To investigate climate change risks in Northern Greece, this study employed a multi-scale approach utilizing landscape analysis methodologies and two aridity indices in different climate change scenarios. Landscape Character Assessment and Regional Unit Analysis were developed and adapted for rapid landscape description and evaluation in Eastern Macedonia and Thrace regions. Using literature review, geographic databases, field work -involving survey protocols and UAV technology- and GIS, the delineation of 104 distinct Landscape Description Units (LDUs) and twenty-three landscape character areas was performed. Thereupon, De Martonne and Emberger bioclimatic indices, along with related climate indices, were utilized to project climate change impacts in the whole region under different climate change scenarios (RCP4.5 and RCP8.5) and future time periods. The results show that the largest part of the rural areas in the southern and eastern parts of the study are characterized by semi-humid and Mediterranean bioclimate. These categories reflect intense evapotranspiration, and successively lead to increased irrigation requirements for crops. Nonetheless, the largest part of the study area ranges from humid to extremely humid, mainly due to the high elevation and northern geographic location. Still, a shift towards arid bioclimatic conditions is expected in the near future. While there are notable predicted impacts of climate change in the area, they are quiescent and of less immediacy compared to areas in Southern Greece. However, combined with anthropogenic pressures, these impacts may lead to landscape and ecosystem degradation prior to the expected time. Hence, water management is of central significance when delivering proposals for climate change adaptation, particularly in relation to ever-expanding irrigated crop intensification. In addition, safeguarding vulnerable landscapes and controlling urban sprawl constitute priority measures. In conclusion, Emberger and De Martonne indices, combined with rapid landscape assessment methodologies, comprise reliable tools to identify the areas most threatened by the changing climate and anthropogenic activities and propose tailored adaptation measures.

Keywords: *aridity, Climate Change Adaptation, bioclimate, De Martonne, Emberger, LCA, Regional Unit*

CLIMADAT-hub: High resolution gridded CLIMate change DATAsets for Greece

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Extended abstract

High resolution climate information on both seasonal and long-term timescales is an essential component of a country's comprehensive framework for responding to the risks of climate change and for the implementation of its adaptation policy and strategies. The availability of climate projections on high spatio-temporal resolution is necessary to assess regional climate change signals and their impact over the complex topographical area of Greece, thus contributing to national adaptation policies. The lack of local high-resolution seasonal forecast predictions and long-term climate change projections prohibits the assessment of risks and vulnerabilities and the effective development of local adaptation measures.

CLIMADAT-hub is a 2-year project implemented in the framework of H.F.R.I (Hellenic Foundation for Research & Innovation) call "Basic research Financing (Horizontal support of all Sciences)" under the National Recovery and Resilience Plan "Greece 2.0" funded by the European Union – NextGenerationEU. The project aims to bridge the gap between available climatic information and the information required for assessing climate risks at the local scale by creating high resolution observational gridded datasets, as well as statistically downscaled seasonal forecasts and climate change projections for Greece. CLIMADAT-hub will produce high-resolution (1km) daily observed gridded datasets for several meteorological variables utilizing data from multiple observational meteorological networks in Greece. These observational datasets will serve as reference datasets to statistically downscale seasonal forecasts and long-term climate change projections under various emission scenarios. All produced datasets will feed a public data repository and an online data visualisation tool enabling the assessment of local, regional and national climate change risk, vulnerability and adaptation potential. This output is of key significance for a variety of sectors and socioeconomic activities that are most vulnerable to climate change in Greece, including human health, energy demand, tourism, forest and peri-urban fires.

Keywords: *long-term projections, seasonal forecasts, online data visualisation tool, adaptation potential*

**MNEME: TANGIBLE AND INTANGIBLE EXPRESSIONS, THE
RELATIONSHIP WITH PLACE IDENTITY AND SUSTAINABLE
PLANNING & DEVELOPMENT**



Changing Cities VI, Rhodes, 24 - 28 June 2024

Organized and chaired by Assoc. Prof. Elena Konstantinidou & Prof. Em. Konstantinos Moraitis

Assoc. Prof. Elena Konstantinidou, National Technical University Athens, School of Architecture, Greece

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Quest for historic memory in landscape context

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Abstract

In our presentation landscape, cultural and historic landscape, in cities or outside them, will be interpreted as the important substratum of the mnemonic inscriptions. Arcadia could be used as a par excellence analogous paradigmatic landscape, to which post-Renaissance and neoteric Western societies returned, using it as an example of primordial absolute physical, bodily, and political liberty, as an example of landscape, where continuous, unrestricted joyance exists. Arcadia was thus described as a place of idyllic imagery, as a paradigmatic visionary phantasy of pastoralism to which poetic metaphor and symbolic art depictions were continuously directed. Nevertheless, analogous correlations could be addressed to the Hellenic landscape in general. “The essence of beauty”, Helen of Troy affirms to fictional doctor Faust in the second volume of Goethe’s well-known magnum opus, “could be presented through a pilgrimage to the landscape of Greece”, being at the same time in immediate association not solely to aesthetic qualities but, moreover, to the neoteric post-Enlightenment aspirations for political democratic formations. A “pilgrimage” Helen of Troy suggested, analogous to those that the Western Europe intellectuals attempted during 18th and early 19th century, analogous to the one that John Gordon Byron ventured, going back to the historic roots of social freedom and European cultural formations.

It is in the previous described context that we shall present, in our proposal, landscape guidance as a possible museographic proposal to the precious Hellenic landscapes, as a “re-invention of memory”, organized through mnemonic landscape networks, in cities or outside them, in association to historic, cultural, and political narrations. It is in the same context that we may also present examples of the didactic usage of the urban open-air public places, urban squares, or urban gardens as didactic cultural and historic formations, offered to the citizens or visitors of the designed landscape in question.

Keywords: *historic memory; cultural landscape; landscapes of memory; landscape museographic guidance; urban didactic landscape formations.*

1. INTRODUCTION: MNEMOTECHNICS AND “LANDSCAPES OF MEMORY”

It is well-known that Francis Yates in her famous analysis of *The Art of Memory* in her homonymous book, intensively correlated memory, mnemonic inscriptions, with place references and explained that this was a key mnemonic method for “mnemotechnics”, the method used in previous historic societies, to organize and preserve remembrances [1]. We could thus speak of “landscapes of memory”, being completely immaterial, creating the imaginary, mental scenography where memory references may be installed, or we may speak of “real”, material landscape formations, where tangible indications reveal memory references and intangible values as well.

It is in this context that we may refer to the term “Arcadia”, using it as an imaginary reference that was accepted for millennia as the illusionary landscape of absolute pastoral social freedom and erotic primordial liberation, as an unspoiled landscape of harmonious wilderness [2]. In correlation to the previous imaginary, idealized landscape reference, the real visiting guidance to Arcadie, to the geographic region of the central and eastern part of the Peloponnese peninsula in Greece to which the archaic name “Arcadia” refers, could bring the traveler in contact with real monuments, or we could present the whole area as a monumental extended landscape of material mnemonic inscriptions and seductive phantoms of the past.

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In a broader cumulative sense, public architecture and even a large part of urban landscape formations have to do with cultural values, presented and promoted not only in specific monuments but also in a larger sense, in building and urban design. We may thus insist on the landscape formations, designating them, in many exemplary cases, as cultural and political indications of historic “mneme”, as the largest place formations presenting the cultural and even political identity of the human societies.

2. CULTURAL AND HISTORIC LANDSCAPE: THE EXEMPLARY REFERENCE TO ARCADIE

We have already clarified that in our presentation landscape, cultural and historic landscapes in cities or outside them will be interpreted as the important substratum of the mnemonic inscriptions. Arcadia and Arcadie, already presented in the first introductory paragraph of our text, could be used as a par excellence analogous paradigmatic landscape, to which post-Renaissance and neoteric Western societies returned, regarding it as an example of primordial absolute physical and political liberty, as an example of continuous, unrestricted joyance.

Arcadia was thus venerated as a place of idyllic imagery, as a visionary landscape to which poetic praises and symbolic art depictions were continuously directed, in many cases correlating primordial wellbeing with cultural excellence. It was in this sense that Lorenzo Dei Medici, the famous statesman and de facto ruler of the Florentine Republic, appreciated as the principal patron of the 15th-century Renaissance culture in Italy, used to describe the Villa Fiesole in Tuscany (where the head house of the famous Renaissance Academia Neoplatonica was installed) as the realm of Pan. Pan, the ancient Greek god of shepherds and flocks, of rustic music and the impromptu free-form musical improvisation, companion of the nymphs, was imagined inhabiting in the wilderness of the Arcadian mountains. Lorenzo, moreover, identified metaphorically the illustrious philosophers of the Academia Neoplatonica with Arcadian shepherds [2].

In the succeeding centuries, European historical references, in literature and art depictions repeatedly returned to imaginary visions, analogous to the previous, as expressions of unrealized cultural and political desires. Famous baroque painter Nicolas Poussin presented his approach to the Arcadian imaginary through his famous paintings under the title “Et in Arcadia ego”, a Latin statement that may be translated in an explanatory way as “I too, was born or lived in Arcadie” [3]. In this proverbial sentence, it was supposedly death which was speaking, explaining that in the context of the Arcadian beatitude, even there, the end of human life is unavoidable. Poussin’s symbolic indications were closely accompanied by a succession of painting presentations, associated with images of political inspiration or fantasies of body liberation. Arcadia was thus correlated to the lost primordial pastoral condition of social equity, or as presented in Johann Wolfgang von Goethe’s *Faust*, to the correlation to ancient classical Greece, the latter being regarded as the natal place, the natal political landscape of democracy.

3. A “LOVE AFFAIR” OF TOTAL FREEDOM: MNEMONIC EMBLEMATIC INSCRIPTIONS AND THE HELLENIC LANDSCAPE IN GENERAL

In the second part of Goethe’s *Faust*, the central fictional hero of the narrative, Dr. Faust visits the Teutonic devil, Mephistopheles, asking him for the revelation of the essence of beauty [4]. The devil explains that Faust must direct his aesthetic search to ancient Greece and helps him to meet the phantom of the legendary Helen of Troy, who finally returns to life as a guiding companion of the fictional German protagonist of the book. Helen and Faust, during the narration, will declare their love for each other, love that would be associated with the Arcadian dream. There, in Arcadia, Faust declares, that their love would be absolute and free. “Arcadia, near to Sparta’s lands. / Allur’d to this bless’d region, hither / Hast fled to brightest destiny: / Thrones change to bowers that never wither; / Arcadian be our bliss and free!” [5].

Nevertheless, analogous correlations could be addressed, as we already implied to the Hellenic landscape in general. The essence of beauty could be presented, Helen of Troy affirms to fictional doctor Faust in this second part of Goethe's well-known magnum opus, through a pilgrimage to the landscape of Greece, being at the same time in immediate association not solely to aesthetic qualities but, moreover, to the neoteric post-Enlightenment aspirations for political democratic regimes. This second part of Goethe's narration was written during the period of the 1821 Greek Revolution, and the pilgrimage that Helen of Troy suggested, seems to be analogous to the Grand Tour that the Western Europe intellectuals attempted in Italy and later on in Greece, during the 18th and early 19th century; analogous to the one that John Gordon Byron ventured, going back to the historic roots of social freedom and European cultural formations [6]. The literary "love affair" that Goethe described, was in its most important essence the metaphor for the "love", the metaphor for the desire for freedom that Western intellectuals were projected on the symbolic substratum of the Hellenic "chora", of the politically and culturally constitutive apperception of the Hellenic landscape [7].



Figure 1. "Pericles' Funeral Oration" by Philipp Foltz (1852). Pericles delivers his speech in favour of the war and, in extension, in favour of the Athenian democracy is depicted in the context of the Athenian monumental landscape, being presented as the emblematic reference for the neoteric political desire for democratic regimes.

4. MNEMONIC LANDSCAPE NETWORKS, AS A POSSIBLE MUSEOGRAPHIC PROPOSAL

Could we neglect the political and ethical connotations of the Hellenic landscape, as previously presented in our text, or have we to insist on its mnemonic value in association with the contemporary need for the re-evaluation of natural or urban Greek landscape, for the contemporary re-evaluation of their place identity? As an answer to this rhetorical question, we shall choose to continue our presentation, indicating that the mnemonic importance of Greece in general as the cradle of the first formation of democracy may probably be projected to the natural Hellenic landscape on the whole, to sublime mountains as Olympus and Parnassus, where the ancient Gods or the Muses, the inspirational goddesses protecting literature, science, and the arts, inhabited. Nevertheless, it could also be projected to the urban landscapes of Greece, to Athens for example, where Pericles, the ancient Athenian politician was depicted by neoteric art reminiscence, glorifying Athenian democracy.

It is in the previously described context that we shall propose, in our presentation, landscape guidance as a possible museographic approach to the precious Hellenic rural landscapes, as an approach for the "re-invention of memory", organized through mnemonic landscape networks in extended regions of the country, in association to historic, cultural, and political narrations. It is in the same context that

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we may also present examples of the didactic usage of the urban open-air public places, urban squares, or urban gardens as didactic cultural and historic formations, offered to the citizens or visitors of the designed landscape in question.



Figure 2. What seems to be even more important for the history of Greece is probably not the earthly consistency of the surrounding countryside, of the surrounding ‘Arcadias’, but the historical or even the legendary navigation in the undulating continuity of the inscribed seascape. “Et in Arcadia Ego” by Nicolas Poussin (1637-38, on the left), and “Ulysses and the Sirens” by Léon Belly (1867, on the right).

4.1 Presenting mnemonic landscape networks in an extended regional context.

Following our previous schematic proposals, we could present several indicative mnemonic itineraries in rural areas, as applied in Arcadie, the peri-urban territory of the city of Sparta, and the coastal zone of the Greek city of Nafplio. In addition, a fourth itinerary could be presented, a navigation approach to the insular network of the North Aegean Sea. In the first case, implementing the theoretical rhetoric previously presented in our text, several visiting networks were investigated. They were designed in reference to the different historic layers of the Arcadian past, to the ancient and Byzantine nodal monumental places or the settlements of the Greek tradition. Then we proposed, as part of our university lessons [8], as an object of a research project, the designation of a palimpsest, composed of the previous superimposed historic layers; a palimpsest that could be used as a system of organized guidance for the future visitors [9]. An analogous visiting network was also proposed for the peri-urban territory of Sparta, being important for its well-known ancient history [10], and a third network was designed for the coastal zone of Nafplio. This last network would be promoted under the title “Landscapes of Hercules”, correlated with neighboring places to the city of Nafplio, associated with legendary references to the “Hercules’ Labors” [11].



Figure 3. The network of traditional villages in Arcadie (upper left) and the important places of historic reference at the peri-urban zone of Sparta, in correlation to river Eurotas (upper right). The important wetland of the coastal zone of Nafplio and its correlation to Hercules’ Labors, to Hydra of Lerna in particular (middle) and finally a proposal of sailing and visiting itineraries to the isles of North Aegean (bottom).

Finally, a network of sailing itineraries was proposed, directed to the islands of the North Aegean, associating portal destinations at the periphery of the islands, with visiting networks in the interior [12]. Visiting networks in many cases associated with important historical references. In the verses of *The Isles of Greece*, Lord Byron poetically commented, “Where burning Sappho loved and sung, / Where grew the arts of war and peace, / Where Delos rose, and Phoebus sprung!” [13].

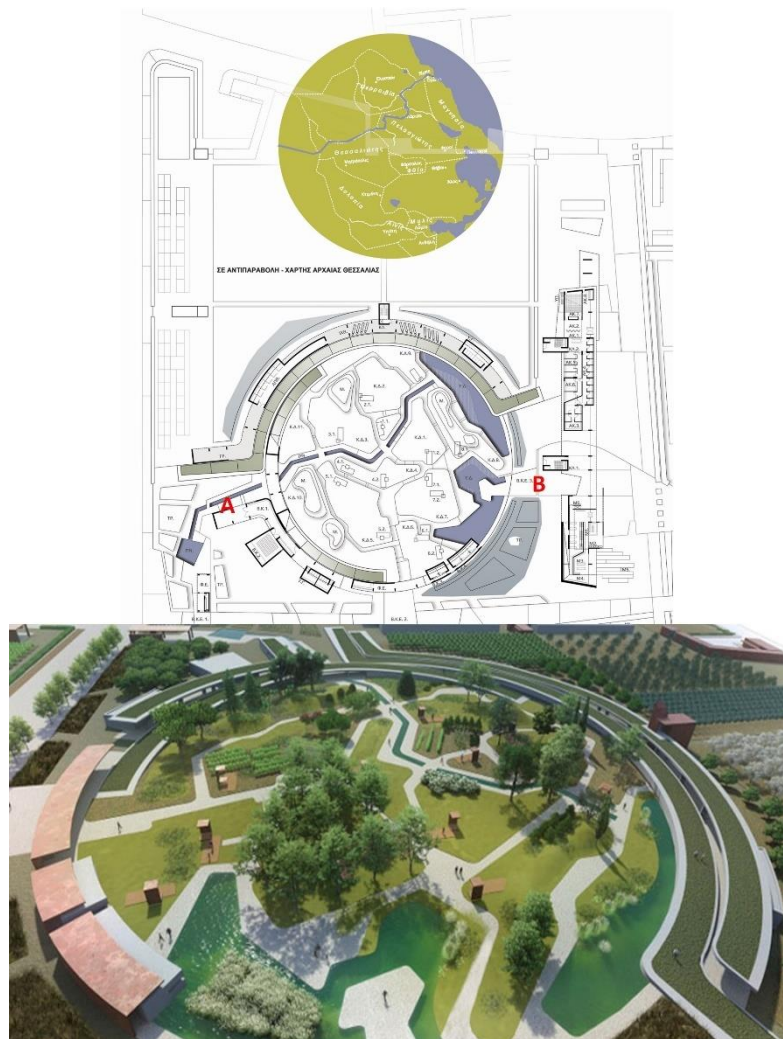


Figure 4. Binary correlation of the waterscape and the green landscape design proposals in a project awarded in a panhellenic architectural competition; the circular Historic Botanic Garden of Thessaly in the city of Larissa, under the title “Deucalion’s Cycle.”

4.2 A first case study of a mnemonic landscape network, in the urban context of Larissa Thessaly

Analogous proposals associating landscape design to historical mnemonic references were proposed in the three projects of intervention in an urban context, which would be presented subsequently. The first of them refers to the reinterpretation of the historic identity of the Greek region of Thessaly, as inscribed in an urban landscape intervention in Larissa, the capital city of Thessaly. A circular botanic garden was designed, under the name “Deucalion’s cycle” (14). It represents, in the form of the garden proposed, the map of ancient Thessaly, planted with the indigenous species supposed to exist during antiquity, in each part of the region presented. We refer therefore to a historical botanic garden correlated, moreover, to the legend of the ancient flood, wherefrom only two humans, Deucalion and Pyrrha, survived. The association with the legendary cataclysm would be restricted to a neutral narrative, if not associated with a recent analogous delusive incident that turned Thessaly from a landscape of agricultural wealth to a landscape of environmental destruction. Accordingly, the

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mnemonic references presented in this garden design project may acquire an important environmental didactic validity. In addition, metallic totems placed on the points of the map where important ancient cities existed, offer the visitor the possibility to approach digital narratives, presenting to him the cultural and historical past of the city of Larissa and Thessaly.

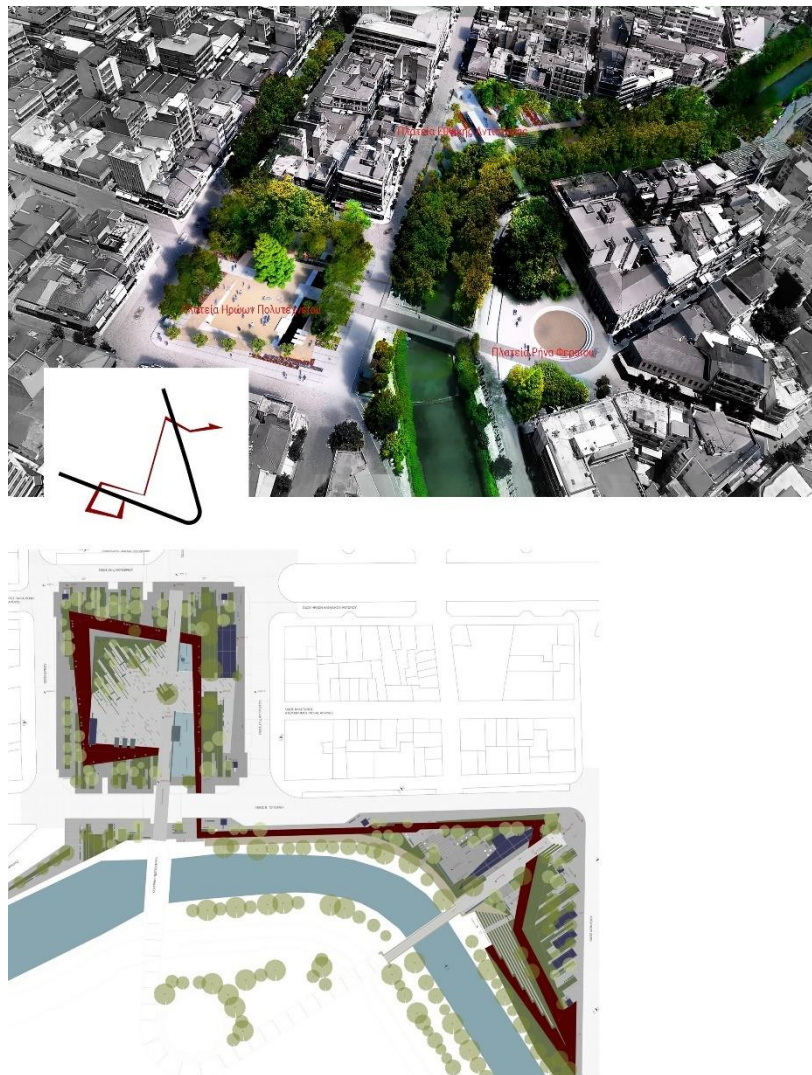


Figure 5. A second project, awarded in an architectural competition, for the redesign of a complex of two central urban squares in the city of Trikala (upper part). What must be explained in addition is the design of the reddish-colored pedestrian corridor (middle and lower part of the figure), on which metallic totems offer the visitor the possibility to encounter digital narratives.

4.3 A second case study of a mnemonic landscape network, in the urban context of Trikala Thessaly

Let us present a second project, relative to the previous, a rehabilitation project for the complex of two squares in the city of Trikala, next to the river Lytheus, again in Thessaly (15). The correlation of the waterscape formation to the green urban landscape, as presented in Figure 5, is obvious. On the surface of the two squares, and the intermediate pedestrian zone connecting them, a reddish-colored pedestrian corridor was designed, as a possible itinerary of hybrid guidance. Metallic totems, analogous to those proposed in the previous project of the circular Historic Botanic Garden of

Thessaly in the city of Larissa, present to the visitor the cultural and historical past of the city and Thessaly, as in the project previously described.

4.4. A third case study of a mnemonic landscape network, in the urban context of the municipality of Kaisariani in the metropolitan area of Athens

The third project to be presented refers to the redesign of the two central urban squares of the municipality of Kaisariani in the metropolitan area of Athens, proposing again as in the two previous projects, a hybrid guidance system combining a real place designed visiting itinerary with digital offered narrations (16, 17).



Figure 6. Maps of the western Minor Asia coast and the Black Sea region, wherefrom the first inhabitants of the contemporary municipality of Kaisariani arrived, as refugees, in 1922, would be formed on the floor of the central square of Kaisariani municipality. QR codes inscribed on metallic plates inlaid on the square floor, at the exact locations of important Minor Asia origin places, would offer to the visitors, passing by, narratives concerning the historical and political past of the municipality.

The contemporary municipality of Kaisariani was created in the place of a refugee camp, formed in 1922, to house refugees from the Greek cities of Minor Asia and Pontus (the eastern Black Sea Region of Turkey); refugees that were trying to survive under conditions of extreme poverty. Later, the first built structures were produced and a municipality at the periphery of Athens was created. Nevertheless, the important historic adventures of the territory did not stop. During the Second World War, the installations of the Rifle Range, existing in the municipality of Kaisariani as an athletic center, were used by the Nazi forces occupying Greece as an execution place. There on the 1st of May 1944, two hundred members of the Hellenic Resistance were shot; we refer to an incident able to inscribe its place of reference in the historical and political memory of the world.

In association with the previous historical memories, maps of the western Minor Asia coast and the eastern Black Sea Region of Turkey would be formed on the floor of the central squares of Kaisariani

municipality; maps of the regions wherefrom the first inhabitants of the contemporary municipality of Kaisariani arrived, as refugees, during 1922. QR codes inscribed on metallic plates inlaid on the square floor, at the exact locations of important Minor Asia origin places, would offer to the visitors, passing by, narratives concerning the remote historical and political past of the municipality, as well as the closer to us period of the Nazi occupation of Greece.

Those narratives would also refer to the contemporary conditions of the refugees' flux arriving nowadays at the southern Mediterranean part of Europe, and, in addition, they could create a multilevel communication among inhabitants of Athens with differentiated ethnic, cultural, or religious origins and language differences. The central message of this contact would refer to the realization that cultural formations are scarcely uni-ethnic, and that multicultural coexistence has to be accepted as a possibility of positive osmosis.

5. CONCLUSION

We have just reached the conclusive part of our presentation, navigating through important historical landscapes of Greece; "navigating", metaphorically, through the Hellenic "terra firma", the Hellenic solid ground, or even proposing a real navigation itinerary in the seascape of North Aegean Sea. We proposed possible mnemonic pilgrimages that may return to previous centuries, closer to us or more remote, or even to the fascinating realm of Hellenic mythology. Finally, we decided to visit the urban landscape of three different Greek cities, Larissa and Trikala in Thessaly, and Kaisariani in the Athenian metropolitan area. In those projects, urban public space and urban cultural landscape were considered as the par-excellence "topos", in Greek, the par excellence place of collective memory, of historic mneme as an important condition for the invigoration of social, cultural, and political conscience.

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Figure 1: Public Domain -

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The role of place in the formation of collective memory of Cypriot villages

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Extended abstract

This paper aims to highlight the ways in which the emergence and evolution of a place is linked to "memory". Given that the spatial dimension of the landscape (both the natural and built environment) constitutes the field of projection of memory, the paper deals with the relationship of collective memory with the place as an important, determining factor in its formation. Thus, it highlights the correlations of memory with spatial references, the "emplacement" of memory, its spatial imprint and expressions, and its relation to the formation of "place identity" across time through the concepts of continuity and spatial memory.

The field of research concerns settlements in the Larnaca region of Cyprus, focusing on Kalavastos and its neighboring villages (Choirokoitia, Tochni, Psematismenos, Maroni). The study area is of great interest as it covers a wide field of historical reference, monuments and landscapes of cultural and historical importance, traditional settlements, as well as interesting geomorphology, richness, and variety in the natural landscape. Thus, an area with unique physical, spatial, and social characteristics featuring a strong historical, cultural, and political identity.

The exploration and analysis of the research area is implemented with different methodological tools (morphological analysis and space syntax analysis). "Mapping" focuses on the structure and composition of the settlements, exploring the creation and evolution of settlements, their development in place and time, and the relationship with the natural environment and geomorphology.

The comparative analysis, between Kalavastos and neighboring villages, concerns spatial relations, references, correlations, interactions, and differences, aiming to discuss issues concerning the ways that different methodological tools of "reading" the place unveil its character and identity. Specifically, the analysis explores the memory-related components of the place, the correlations of memory with spatial reference, the relationship of collective memory with place, the ways in which the emergence and evolution of a place are linked to "memory" and the importance of the mnemonic function for forming "place identity", highlighting how this might interact with sustainable development.

Keywords: *memory; place identity; space syntax; village settlements; Cyprus*

The Prospect of a Home - Communities in Transition

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Extended abstract

Recent history is characterized by abrupt and extreme changes such as, wars and climate change which raises the need for a more flexible and adaptable definition of spaces on all scales and therefore requires a fast response for the unexpected needs created by crises conditions.

This paper introduces a strategy to better navigate unexpected conditions that are likely to occur more often in upcoming years. The strategy is based on observations into changes occurring on various sites across Israel during recent months, in which the power of community and civil organizations took central roles.

On October 7th, many communities in southern Israel were significantly damaged within a few hours, resulting in the evacuation of the survivors. The refugees were scattered all over the country, temporarily staying in hotels, guest houses, boarding schools and office buildings as the war began. This abrupt change of reality created unexpected situations, where new needs and response programs emerged. Support and aid centers were spontaneously created by civilians, in public, religious and academic buildings, existing public institutions were repurposed as kindergartens and schools for the evacuated children, hotels housed uprooted communities, and existing kibbutzim doubled their size, becoming a temporary home for the displaced. The transition revealed networks and movements between the new "spontaneous residential neighborhoods" and improvised public spaces, outlining new urban qualities in the existing cities - innovative, flexible, and dynamic space, both in private and public realm.

The next phase was a search for longer-term responses of a period of three to five years, required for rebuilding the disrupted living environments and restoring the community and the lost sense of home. Some of the responses considered by evacuated agricultural communities in this phase were as surprising as housing whole communities in high-rise buildings in the big cities.

This paper will claim that cities have the capacity to evolve and adapt to changing needs with dynamic typologies, and a non-rigid design methodology. We will showcase the recently acquired knowledge, based on observation, documentation and mapping of the spontaneous changes and evolving typologies, to outline a set of design tools for various scales, fitting fast and abrupt transitions, relevant for a changing reality, as a basis for an alternative adaptable architectural language.

We believe that current events, while a hundred million people are forcibly displaced worldwide, prove the need for adaptive and flexible systems, in which community and civil organization can assume a pivotal position. The proposed strategy is a layout for such a system, which might be needed anywhere, sooner than we can comprehend.

Keywords: *adaptability, flexibility; transition; home; refugees; wandering*

The case of the Albanian immigration: memory as a present political matter

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Extended abstract

The abstract proposes an anthropological research of the Albanian immigration, focusing on the historical, cultural and political dimensions of the immigration experience. It is crucial to state in advance that we do not intend to represent or evaluate the experiences of all those who crossed the Albanian-Greek borders, but rather to highlight these experiences as a significant political matter. From this point of view, the phenomenon of immigration is not understood through a dichotomy of good/bad but instead seen as a crucial formation process of our present societies. Thus, our aim is to reveal a reality that is, actually, already there. The main concepts of this proposal are mneme, place, identity, and immigration. Before we describe how these concepts interact, we should first question the meaning we place upon them. Mneme stands here as a relation of past and present time, a constant recreation of our cultural and political reality through history. Therefore, it is not considered a field of the past nor a static condition unchanged through time. On the contrary, it continuously forms, interferes and clashes with our present ways of being. Mneme is not only a ‘per se’ living history, but a vibrant living reality, which connects our past with our present existing spaces.

The connection of “mneme” with space and place could be described as an interdependent relation. As stated at the description of the session, “Memory ‘needs’ place; ... to be projected on it”. If we attempt an instant exploration of “mneme” in place, we can highlight museums, monuments, or statues and buildings of historical significance. In the context of a deeper analysis, we can extend the perception of place and invoke memory in the spaces of our cultural behaviour, our political choices, and the ideologies. All these previous spaces contribute to the formation of “place identity” and “collective identity”, as they remind us of our common past and request our common present. Thus, memory, identity and place are significant and co-related, precisely because they demand and simultaneously cover our need for collectivity.

Nevertheless, I have not yet posed the crucial questions of this proposal: What happens when collective memory and identity do not have a place to be projected on? What happens when ethnic groups cross their homelands and move to places with no spaces of their own? What happens when immigrants cannot find museums, historical buildings and neighbourhoods that carry their memory and identity? What happens when collective memory and identity do not have the cultural space to be expressed? Through the history of Albanian immigration in Greece, we shall look for “mneme” and identity in places which were not - and maybe still are not - visible. We shall investigate these concepts as political and cultural demands - not as given facts. We may try to find how collective “mneme” and identity could be transformed when a place is missing and maybe hope to re-“view” our reality through our history.

Keywords: *politics of mneme; Albanian immigration; place identity; collective identity; minorities.*

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The concept of the monument in the age of the Enlightenment: Towards a genealogy of mnemonic structures

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Abstract

The relation between architecture and memory, between the built environment and its mnemonic function for people and society, attains an exemplary character in the concept of the ‘monument’, and, especially, in the idea of a ‘public’ or ‘historical monument’. Nevertheless, as Françoise Choay has shown in her study titled “L’Allégorie du Patrimoine”, the concept of the ‘monument’ is constantly transformed through historical time and is receptive to different interpretations by antiquaries, philosophers, historians, travellers, and architects, according to the worldview and the spirit of the age.

Consequently, as the concept of the ‘monument’ changes over time, the relation between architecture as a material structure of the past and the social function of memory is transformed as well. In other words, the ‘memory of the stones’ as an immaterial, intangible cultural heritage and its various semiotic forms and manifestations are subject to radical metamorphoses through history.

The 18th century, when the new spirit of the Enlightenment started to unfold itself, was a turning point for those transformations. The explosion of archaeology as a systematic study of ancient monuments led to emergent Neoclassicism and was intimately connected with various changes in the understanding of historical time. During the era of the Enlightenment, architecture became an allegory of time and a symbolic space of mnemonic values, norms, and epistemic ideas that could bridge the past, the present, and the future.

What were the main concepts of the ‘monument’ in the 18th century? The aim of the present paper is to investigate this question through the elaboration of a genealogy of selected transpositions of the concept of the ‘monument’, as these are articulated in various textual sources of the Enlightenment discourse. In that way, we hope to understand the ‘book of stone’ through the ‘book of paper’ (Victor Hugo’s conceptual duality from his novel “Notre-Dame de Paris. 1482”) in order to shed some light on the values attached to architecture as a mnemonic structure. The working hypothesis behind this research is John Ruskin’s intuition, expressed in the ‘Lamp of Memory’, from his major book “The Seven Lamps of Architecture”: “We may live without architecture and worship without her, but we cannot remember without her”.

Keywords: *mnemonic structures; genealogy; historical monument; antiquities; regimes of temporality*

1. INTRODUCTION: TIME, SPACE, AND ARCHITECTURE

The relation between architecture and memory, in both its material and immaterial aspects, is a complex one. Architecture is a prime example of a type of heritage where material remains and immaterial ideas merge into dialectical fusions that are value-laden. The dialectic between the built environment and the mnemonic identity of people and societies attains an exemplary character into the concept of the monument, and, especially, into the idea of a ‘public’ or ‘historical monument’. However, in order to formulate epistemic principles concerning the preservation, renewal and careful animation of historical monuments, there is an absolutely essential prerequisite: a concept or an idea of *what is* a ‘historical monument’ must be already constituted within the architect’s or the historian’s

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mind. The above proposition might seem to be a tautology, a quite obvious statement, but, actually, it is not. I will try to show that a concept or a notion of a historical monument is not a natural, given fact of consciousness: it is, rather, an ideological and cultural construction [1].

Françoise Choay writes: "...the concept of a 'historical monument' is not a cultural invariant but a specifically occidental, western invention" [2]. This invention began during the Renaissance, which constituted Antiquity as a historical object, and was brought to completion in the era of the Enlightenment, when a monumental and national heritage acquired didactic, patriotic and esthetic values for the establishment of ethnic identities [3]. This ideological structure involved complex interrelations and dynamic interactions between memory,[4] norms and significations [5].

The working hypothesis behind this claim could be an intuition of John Ruskin, expressed in the crucial chapter called the 'Lamp of Memory', from his major book *The Seven Lamps of Architecture*, written in the middle of the 19th century, in 1849. Ruskin believed that, 'We may live without Architecture, and worship without her, but we cannot remember without her' [6]. In other words, one of the major ethical functions of architecture relates to memory, collective as well as individual. I argue that architecture is a vehicle through which structures of time, such as memory and history, become space. Through architecture, time is crystallised into permanent spatial symbols of mnemonic and historical values.

However, an introductory clarification and elucidation is necessary. The focus of the present talk is on the concept of the 'monument' in its general meaning, which denotes any remnant or building of the past that is considered to have a *historical value for a subsequent era*. Therefore, a conceptual distinction is needed between a 'monument in general' and a 'monument in particular'. The latter refers to all the buildings that were 'living monuments' *by definition or par excellence*: namely, those that were conceived, designed and realized with a deliberate mnemonic function and destination from the very beginning. Ancient trophies, steles and altars with epigrams, triumphal arches are all monuments with a mnemonic function *by destination*. Alois Riegl uses the term 'intentional monuments' (*gewollte denkmal*) to characterize them [7]. He then proceeds to make an important conceptual distinction, writing: '*In contrast to intentional monuments, historical monuments are unintentional...Since those who fashioned the works which we have subsequently termed 'historical monuments' wanted primarily to satisfy their own practical and ideal needs...without as a rule intending to leave testimony of their artistic and cultural life to later centuries, when we call such works of art 'monuments', it is a subjective rather than an objective designation. It is not their original purpose and significance that turn these works into monuments, but rather our modern perception of them*' [8]. In other words, an 'unintentional' monument or a 'monument in general' or a 'historical monument' has a commemorative value as a result of an *interpretation* that is taking place independently of its original conception or intention. Riegl believes that the Italian Renaissance marked the beginning of this complex process, which involves valuations, ideologies and a certain historical sensibility [9].

I therefore will focus my attention on the subsequent phase of this process, during the Age of the European Enlightenment. And I will attempt to trace the conceptual evolution of the ideas referring mostly to the 'unintentional' monument, as defined above by Riegl, for two main reasons: firstly, because 'unintentional' monuments display the dynamic interaction between matter, history and memory in an exemplary way and, secondly, because they reveal the Modern value conflicts regarding the meaning of architectural remains more clearly. Indeed, as Manolis Korres has shown, the various ideologies for the preservation, conservation and restoration of ancient monuments, as they were codified since 1883, display a complex articulation of divergent values in many layers of meaning: truth claims regarding stylistic integrity, age, authenticity of material or structure, and emotional, aesthetic, artistic and picturesque qualities that can be attributed to a building, its parts or its environment [10]. According to Korres, some of those values are 'transferable' or 'reproducible', while others could be characterized as 'intransferable' or 'irreproducible'. Memory-value, emotional

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value and the value of the monument as a symbol triggering off spiritual, social, political or religious associations can be both, depending on their conscious interpretation by the beholder, their subjective readings and appropriations [11]. The pioneering study titled “*The Modern Cult of Monuments*”, written by Riegl in 1903, is still probably the best systematic analysis of the conflicts between memory-values of the past and functional and artistic values of the present that a monument, as a bearer of identity and continuity, can induce [12].

Consequently, as Choay has shown in her book, *L’Allégorie du Patrimoine*, the concept of the monument is constantly transformed through historical time, especially in European Modernity, and is receptive to different interpretations by antiquaries, philosophers, historians, travellers and architects, according to the social worldview and the cultural spirit of the age [13]. Choay claims that the concept of ‘heritage’ (patrimoine) is a late 20th century invention, which replaced the organic memory of the ‘intentional’ monument, and the abstract intellectual construction of the ‘historical monument’. This last idea took two ‘cultural revolutions’ in order to emerge as a western narrative: the Renaissance and the Industrial Revolution [14]. The notion of heritage, as it surfaced after the 1950’s, reflects a ‘third cultural revolution’, which Choay calls ‘electro-telematic’, and Eero Tarasti, ‘techno-semiotic’. According to Choay, ‘heritage’, in its contemporary use, denotes mainly an economic dimension, which commercializes the historical past and transforms culture into a fetishized object of commodity, destined to be consumed by globalized, homogenized tourist flows [15].

Charalambos Bouras aptly wrote, ‘*The value of the remnants of the past is transformed when the value-system of life changes*’ [16]. As the concept of the ‘monument’ changes in different historical periods, the relationship between architecture as a material condensation of space-time and the social function of memory is also modified. For example, as Manolis Korres argues, during Antiquity ‘...consideration for the “authenticity of the material” was subordinate to consideration for the “integrity of form”, and the concept of “historical memory” was applied to the whole object and not the individual blocks’ [17]. In other words, the ‘memory of the stones’ as an immaterial cultural heritage and its various semiotic forms and manifestations is subject to radical metamorphoses throughout history.

I claim that Modernity, and especially the 18th century, when the new spirit of the Enlightenment started to unfold, was a turning point for those transformations [18]. The explosion of archaeology as a systematic study of ancient ruins led to the emergent Neoclassicism, and was intimately connected with radical changes in the understanding of historical time. During the era of the Enlightenment, architecture often became an allegory of time and a symbolic space of values and epistemic ideas that could bridge the past, the present and the future. This is evident in the various connections and interrelations between archaeology and Neoclassicism, between the architectural remains of the distant past, and the formation of a new ideal for a ‘modern’ architecture of the future [19]. In other words, architectural monuments during the 18th century play a complex role in articulating ideas of time and philosophies of history with social and spatial projects which express an orientation towards the future. It seems that architectural monuments and architectural ruins in space could function, not only as a reminder of a distant past, but as an instigation of a new way of life for the future.

This epistemological shift of the Enlightenment attitude towards archaeology and space is related to that which Jochen Schlobach has named ‘the Discovery of Cultures’, namely the re-evaluation of the plurality of different civilisations which belong to distinct spatial and geographical environments. According to Schlobach, this new cultural understanding is due to a radical historical thought that was developed during the Enlightenment, a change of paradigm in the concept of historical time, which sought to combine the theory of cycles with the theory of progress. Schlobach sees such a combination in Voltaire’s philosophy of history, which enables the bridging of the Enlightenment ideal of the universality of human reason with the given variety of cultures in different spatial and geographical circumstances [20].

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What were the core concepts, the main conceptions of the idea of the monument in the 18th century? The aim of my talk is to investigate this question, through the elaboration of a brief genealogy of basic conceptual transpositions. Those transpositions are articulated in various textual sources of Enlightenment discourse, written by architects, philosophers, antiquaries and historians of art. According to Michel Foucault, a genealogical research, contrary to a search for the origins and the continuous evolution of certain ideas or events, focuses on the provenance of historical concepts. This provenance is characterised by radical discontinuities, ruptures and heterogeneity [21]. In that way, I hope to understand the ‘book of stone’ through the ‘book of paper’ (Victor Hugo’s famous conceptual duality from his novel *Notre-Dame de Paris* from 1832) [22], in order to shed some light on the values attached to architecture as a mnemonic structure.

2. TWO DIVERGENT CONCEPTS OF THE MONUMENT DURING THE ERA OF THE ENLIGHTENMENT

Following a preliminary investigation of various textual sources, I propose the working hypothesis that during the ‘long 18th century’ (from around the 1670s to the early 19th century) we can trace *two distinct ideas and concepts* of the monument in Enlightenment discourse. I prefer to call them ‘ideal types’ of the monument, following Max Weber’s term from his *Methodology of the Social Sciences*. According to Weber, an ideal type ‘...is formed by the one-sided accentuation of one or more points of view and by the synthesis of a great many diffuse, discrete, more or less present and occasionally absent concrete individual phenomena, which are arranged according to those one-sidedly emphasized viewpoints into a unified analytical construct (*Gedankenbild*)’ [23]. In other words, an ideal type is a conceptually pure mental construction which acts as a logical norm for the general description, analysis and classification of reality [24].

The first ideal type of Enlightenment discourse conceives the monument as a concrete and unique object destined for private pleasure and arousing individual curiosity. This approach is evident in writers such as Jacob Spon and Bernard de Montfaucon. It is condensed in a very specific textual expression: ‘antiquities’ or ‘*antiquités*’, coming from Varro’s term ‘antiquitates’ [25]. The antiquarian approach towards the monument is directed to an aesthetic and sensuous observation, registration, description and accumulation of the various remnants of the past. This empirical approach is passive and psychological.

The second ideal type of the monument conceives it as an abstract and general field of historical relations, meanings and values that aim at a collective instruction and education, which can serve public knowledge. This approach can be traced in writers which belong to various public committees after the French Revolution in France, such as Aubin-Louis Millin and Félix de Vicq d’Azyr. It is significant that, to designate this new concept of the monument, those writers usually refrain from using the old type antiquities and adopt new expressions, such as ‘public monument’ (or *monument public*), ‘historical monument’ (or *monument historique*), or even ‘national monument’ [26]. This second idea displays a more energetic and active relationship to the past, which it classifies and organises into wholes based on types, series, species and abstract criteria, with an educational purpose for the present and the future. This rational approach is intentional and logical. The monument ceases to be thought of as an isolated, empirical, curious and unique object and becomes part of a totality of historical meanings, an organic component of a structure of conceptual relations. New feelings and values are connected with the second ideal type of the monument: the glory of a nation, the idea of human progress, the public space of a common and collective knowledge.

Antiquities belong to the past. Historical and public monuments, through their didactic and paradigmatic nature, belong to the present and the future. In other words, I claim that, during the 18th century, a radical transformation, a Foucauldian genealogical discontinuity, took place: memory became an indicator of the future and history catered for utopian visions. And this happened through

a very precise medium: architectural space. Étienne-Louis Boullée's utopian projects for an ideal city made up of various public monuments is a characteristic proof of the above transformations [27].

Those two basic ideal types of the concept of the monument were not successive in a linear and clear logic. There was a transitional phase, where the two concepts co-existed and mingled. Those transitions are the most difficult to analyse in the history of ideas. Let us refer briefly to some examples highlighting our main thesis.

3. ANTIQUITIES

The first ideal type of the monument, namely its antiquarian approach under the concept of antiquity, was clearly codified in the work of Jacob Spon *Voyage d'Italie, de Dalmatie, de Grèce et du Levant*, published in 1679. In the Preface to this work, Spon lists the main reasons that instigated his journey: the satisfaction of his personal curiosity and the desire to accumulate more inscriptions of the various antiquities than all previous writers on the subject [28]. Reading Spon's account, we gain the impression that the term 'antiquities' signifies a random accumulation of curious singular objects, destined for a cabinet of curiosities [29].

Bernard de Montfaucon's *L'Antiquité expliquée et représentée en figures*, published in 1719, is only a more systematic exposition of the same empirical logic: antiquity here means the sum of all visible objects that can be represented through sensible images [30]. The concept of the monument under the aegis of antiquities can still be felt in James Stuart and Nicholas Revett's *Proposals for Publishing an Accurate Description of the Antiquities of Athens*, circulating from 1748. The categories through which ancient monuments are evaluated are still private curiosity and individual taste. But the glimpse of a new idea can also be discerned. Those antiquities do not solely refer or belong to the distant historical past. They can serve as models and examples for the artistic and architectural creativity of the present [31].

This same idea features prominently in the Preface to *The Antiquities of Athens*, published by the same authors in 1762. But the empirical logic that sustains this first ideal type of the monument still prevails: Stuart and Revett conceive their work only as a material accumulation of further examples of antiquities, as an '...addition to the former Stock' [32]. The work and thoughts of Stuart and Revett mark the transitional phase between the monument as an antiquity and the concept of a historical monument. The work of Julien-David Le Roy *The Ruins of the Most Beautiful Monuments of Greece* (firstly published in 1758 and re-issued in 1770, as an expanded second edition) belongs to the same ideological transition, which it articulates in a more rational, systematic and theoretically informed way [33].

The passage from the first ideal type to the second can also be attested in the various articles and writings of the *Encyclopédie* published by Diderot and D'Alembert from 1751 onwards. In the first volume, the authors of the *Encyclopédie* are still making use of the term 'antiquités', thus revealing their adherence to the first ideal type of the monument conceived of as an isolated and concrete object. For example, after the famous *Discours Préliminaire* written by D'Alembert, in the *Explication Détaillée du Systeme des Connoissances Humaines*, where the three modes of human understanding are correlated with the classification of the various contents of the *Encyclopédie*, antiquities are grouped under the faculty of memory which surveys facts. More specifically, they form one of the three subdivisions of civil history (*histoire civile*). We read, 'If it is true that History is the painting of past times, the antiquities are their projects almost always devastated...' [34].

The association of antiquities with the ravages of time and private memory reveals a melancholic and deterministic attitude towards the past: those antiquities seem to be forever entangled within the labyrinths of fate, destruction and loss. In the same volume we encounter the direct connection between the ruined and deformed state of material fragments and the concept of antiquities, in the eponymous article [35]. The emphasis on the partiality of the ruin, on the aesthetic autonomy of fragments and antiquities seen as isolated objects that we encounter in the early volumes of the

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Encyclopédie is probably related to the ‘poetics of ruins’ inaugurated by Diderot. Roland Mortier has adequately analysed this new attitude of Diderot towards the past, where the mutilated fragment of the ruin is preferred to the state of entirety of a well-preserved monument [36].

Nevertheless, 14 years later, in the 14th volume of the *Encyclopédie* published in 1765, in the article ‘*Ruine*’ we read that we can apply this expression to palaces, tombs and ‘public monuments’ [37]. Contrary to the first volume of the *Encyclopédie*, dating from 1751, and the predilection of Diderot for the partiality of the ruined fragments of the past, we encounter a novel tone, through the reference to the ‘public monument’ which replaces the old term of ‘antiquities’. The new idea of a public monument carries a connotation of completeness and refers to a state of wholeness that the term antiquities lacked. Moreover, in the article ‘Monument’ of the tenth volume, also published in 1765, the term now designates whole buildings such as mausoleums, pyramids and triumphal arches. In order to characterise those edifices, the author of the article uses the term *monument historique*, probably for the first time [38].

4. HISTORICAL MONUMENTS

In this new perspective, the historical monument is not only a means for a solitary and subjective *rêverie* on the destructive character of time, but also a vehicle towards precise knowledge, an objective appreciation of great events of history, a didactic instrument for the present. During the 15 years from 1750 to 1765 we can trace a conceptual and gradual transition and transformation inside the *Encyclopédie* from the first to the second ideal type of the monument, namely from a devastated ruin or fragment, a unique object of curiosity, to an indicator of a set of historical events or relations which serves a didactic purpose. As Choay writes, ‘historical monuments’ became those: “...sets of buildings not deliberately erected for memorial purposes but endowed with this status due to the value attributed to them by national history” [39].

This change of conceptual tone and emphasis is evident after the French Revolution of 1789. The monument ceases to be thought of as an isolated, empirical, curious and unique object and becomes part of a totality of historical meanings. The new concept of the monument attains its value as an organic part of a historical nexus and structure of logical relations. At the same time, since this second ideal type of the monument is now public and belongs to the nation and the state, it acquires a new paradigmatic-didactic value as a space of common, collective knowledge. New expressions are used to describe the feelings and concepts that a historical monument (as it is now called) can arouse: the glory of a nation, the idea of human progress, the general history of an empire, or the public space of a common and collective knowledge [40].

The above transformation of the attitude towards the concept of the monument is evident in the text *Antiquités Nationales ou Recueil de Monuments* written by Aubin-Louis Millin in 1790. Millin urges the revolutionary government to protect the historical monuments of France as a living testimony of the nation’s general history, as an educational material precious to the citizen of the future [41]. Four years later, Félix de Vicq d’Azyr develops in detail this educational and national concept of the monument in his seminal text *Instruction sur la Manière d’inventorier et de conserver, dans toute l’étendue de la République, tous les objets qui peuvent servir aux arts, aux sciences et à l’enseignement*, presented before the Commission of Monuments. Vicq d’Azyr proposes a novel subject as the real protagonist of a national education delivered through the monumental heritage of France: the French people themselves (*le peuple français*), who are friends of the country. Here, the historical monument becomes an organic part of a general politics of equality, of a public instruction through libraries, museums and temples [42].

The new concept of monument, serving a national and public education, requires novel methods of classification, a systematic re-ordering of the material objects of the various arts and sciences into abstract types of conceptual relations [43]. Architecture is not exempted from this fervour of classification: according to Vicq d’Azyr, the exemplary character of certain monuments of

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architecture can serve public education perfectly [44]. This ideology is already apparent in Armand-Guy Kersaint's *Discours sur les Monuments Publics* dating from 1792. Kersaint proposes the erection of a National Palace and the inauguration of a Public Museum, thus transposing the idea of the monument from the past to the present and the future, proving our main argument [45]. In Kersaint's discourse, the monument becomes a living symbol of public ideas, a vehicle for the education of civic virtues, a moral machine for the establishment of democratic values [46].

Kersaint's concept of the public monument found in Etienne-Louis Boullée's utopian drawings and projects the perfect architectural expression. Boullée, in his text *Architecture. Essai sur l'Art*, written around 1790, connects the concept of the public monument with an ideal city of the future which serves educational, moral and civic values and needs [47].

5. THE MUSEUM, THE CABINET OF CURIOSITIES, AND TWO PHILOSOPHIES OF HISTORY

I propose that the second ideal type of the monument, namely the historical monument as an abstract system of knowledge and national education, led to the inauguration of a completely new spatial and architectural type of modernity: the museum. Nikolaus Pevsner has shown how the idea of the museum was a completely modern concept and has delineated its history [48]. Andrew McClellan has further contributed a crucial idea: the museum as a public institution, open to all citizens, with classified and organised collections of monuments and works of art was a creation of the French Enlightenment after the Revolution. More specifically, the opening up of the Louvre in 1793 marked the inauguration of the first truly modern public museum [49].

This new spatial type and its specific symbolic functions could not have emerged if the concepts of the historical or public monument had not been forged by the Enlightenment discourses of Armand-Guy Kersaint and Aubin-Louis Millin, and by various utopian visions. For example, as Anthony Vidler has demonstrated, the utopian and monumental project for an ideal public museum by Étienne-Louis Boullée has greatly influenced the evolution of the new building type [50].

The modern type of museum replaced an older concept for the display of objects: the cabinet of curiosities. Whereas the cabinet was an empirical piling up of unique and bizarre objects in a random fashion [51], the modern museum is a rational structure and constitution of historical space and time according to principles of classification, which possess a highly abstract nature. Behind the cabinet of curiosities lies the concept of antiquities. Behind the modern museum lies the concept of a public monument.

I will conclude by formulating another working hypothesis which needs further studies to be confirmed. I claim that those two distinct ideal types of the monument which characterise 18th century thinking have a specific philosophical background. This background is related to the philosophy of history which was developed during the long 18th century [52] and closely connected to that which Trevor-Roper named the 'philosophical history' of the Enlightenment [53]. Ernst Cassirer proved that the Enlightenment possessed a keen sense of historicity, inaugurating the modern process of '*the conquest of the historical world*' [54].

Panajotis Kondylis has shed light on this process, in his major study, *Die Aufklärung im Rahmen des neuzeitlichen Rationalismus* [55]. There, he identifies two major strains of the Enlightenment attitude towards historical time: the normative and the causal. The normative ideal puts an emphasis on man's moral freedom, his intellectual ability to control time according to his rational purposes and plans. The causal ideal is more focused on necessity and man's incapacity to transcend the chain of natural factors that pre-determine his behaviour, his actions and his sense of time. According to Kondylis, those ideals correspond to two divergent tendencies in the philosophy of history of the 18th century: the universal-normative and the causal-relative.

6. NORMATIVITY AND CAUSALITY: TWO REGIMES OF TEMPORALITY

The universal-normative philosophy of history is optimistic and believes in human progress, in the existence of a normative goal which governs a general and paradigmatic historical sequence of a totality of events that lead towards the future. The causal-relative philosophy of history is pessimistic and recognises the partial and unique character of every historical cycle of events, the inevitable growth and decline of human civilisations [56]. Those two distinct philosophies of history, like their corresponding concepts of the monument, sometimes co-existed, in a state of a slow transition from the causal-empirical to the normative-rational ideal. The thought of Voltaire and Montesquieu prove that normativity and causality, teleology and determinism, optimism and pessimism could create tensions and ambiguities inherent even within a single work of the same author [57].

I propose the following idea: the causal approach to historical time is related to the concept of antiquities whereas the normative approach to historical time ties up with the concept of the historical monument. In other words, behind the two basic concepts of the idea of the monument during the 18th century, lies a deep philosophical structure of reading time and history. The two ideal types of the monument correspond to two distinct philosophies of history. According to R.G. Collingwood, those two philosophies of history can be codified as backward-looking and forward-looking, respectively, the first exhibiting past history as a ‘*play of irrational forces*’, the second forecasting to bring about a millennium where ‘*the rule of reason shall have been established*’ [58].

In the first instance, time is a random and passive sum of events outside the rational control of man. In the second instance, time is a rational and active sequence of aims and purposes, a logical chain of ideas that man can create and control [59]. Time-one is subject to faith and fate. Time-two is subject to reason and prediction, organisation and prevention. Can we trace the exact place and author where the transition from time-one to time-two occurred?

According to Kondylis, the real father of a normative concept of historical time is not Voltaire but Turgot. By assuming as a principle an obligatory ethical telos of the historical evolution, Turgot managed to subjugate natural causality to the demands of human and social reasoning. Thus, he formulated the mature idea of a theory of progress, where time can be designed and controlled to fit human aims [60]. This concept of time that is orientated towards the future corresponds to the second ideal type of the public monument as an agent of future progress, as a symbolic carrier of morality and rationality. The Enlightenment philosophy of historical progress can be considered as the ideological counterpart of a metamorphosis in the concept of the monument.

In other words, the new era ushered in by the Enlightenment could be felt when causal time was surmounted by normative time, when antiquities were overcome by historical monuments, when the cabinets of curiosities were replaced by the public museum and when ‘*vanitas*’ gave way to hope for the future. The transition from time-one to time-two was mediated by the power of architecture to transform ideas into living traditions and to condense philosophical worldviews and mnemonic structures in stone.

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Architectural Heritage as a parameter of sustainable development of the place. The case of Chora

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Abstract

The subject of this presentation is the decoding of the 'special' and unique identity of the island of Folegandros in the South Cyclades and the importance of highlighting and protecting its cultural heritage as a parameter of sustainable development. Especially, in the face of the threats posed in recent years by hurried, uncontrolled and unsustainable tourism development within the context of unconstrained consumerism and an escalating climatic change. At international level, it has been observed that 'the Greek islands have taken a battering since the late 60's and many have lost the simplicity that attracted musicians, writers and famous architects who found inspiration in the landscape and the Aegean Sea. As Folegandros remained self-contained for many years, it has not yet witnessed a similar level of 'development' as other islands (i.e. Mykonos and Santorini) in the region have. Technological developments mainly in transport services and the internet access reduced the distance between the island and the rest of the world, which has resulted in a big change. Its authentic architectural heritage and landscape, reflect the timeless historical and socio-economic conditions in combination with the peculiar stone and natural rock formations that constitute its distinct geological environment. They form the basic expressions of the island's identity that transpire its important and characteristic comparative advantage. Heritage preservation and urban development should no longer be considered contradictory or incompatible. Consequently, we aspire to guide both, state and local authorities, as well as residents, engineers and craftsmen, in the direction of the correct management and conservation methods.

Keywords: *Folegandros; Kastro; landscape identity; architectural heritage; sustainable development*

1. INTRODUCTION

In the aftermath of a protracted, laborious and extremely painstaking scientific research, with an in-depth analysis of the historical, architectural and urban planning identity of the Folegandros Chora settlement in the context of the wider local environment, we derived the conceptualization of the parameters that made it 'unique'. The current settlement of **Chora** (or Folegandros), which impresses the visitor with its architectural physiognomy, is undoubtedly the result of an evolutionary process of development and structural transformations. However, a decisive parameter in its architectural design was the rebuilding of its fortified core (the Castle) from scratch that continues to be inhabitable to this day, making it one of the few rare and well-preserved castles of the Cyclades. Subsequently, safeguarding its conservation and well-being is pivotal. Values that are timeless and compatible with the human condition, such as plasticity, human scale and intimacy are the qualitative characteristics of the settlement while the staggered arrangement of its volumes due to its gentle adaptation to the slope and the morphology of the area, contribute to the general harmonization of the residential complex with the wider impressive landscape. It is admirable of the residents of Folegandros (*Folegandrites* in Greek) that over the centuries, despite the unfavourable ground conditions, including the barren landscape which was extremely difficult to cultivate, having yielded twice as much work effort they managed to tame the soil rough texture, thus surviving as an autonomous productive unit. This viable system model of self-sufficient sustainability, that they had created and

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has been long-established is nowadays superseded by the influx of new trends and traits. This fairly new 'modern model' of life that is mainly based on easy and profitable tourism entrepreneurship, has been encouraging residents to relinquish the former traditional subsistence practices. By thoroughly examining the successive phases of the development of the settlement, from its genesis as a fortified core, combined with the typological and morphological evolution of the residence and the public space, we aim to 'read the geometry' of the place and its architectural landscape, as well as to decode the dynamics of the relationship between them. This presentation has been based entirely on the author's PhD study [1]. The thorough and highly detailed architectural design of an entire settlement, assisted by digital applications that is the only systematic digital data collection and research currently available for the building stock, compelled by numerous systematic and inexhaustible in situ site-investigations- has become the key to a better understanding of the settlement that allows for making inferences and drawing certain conclusions along with -proposals for sustainable development. Research material from rare bibliographic and archival sources, was of pivotal importance to the process of investigating the development phases of the settlement, as well as to the identification of the corresponding changes that occurred in its urban and architectural structure over time.

2. FOLEGANDROS' IDENTITY

Methodologically following a global holistic view of the residential development of the settlement of Folegandros Chora we have endeavoured to unveil its 'special' architectural heritage, through its 'dual' nature: as a fortified settlement (Castle-Kastro) and as a traditional settlement (Village-Chorio) together, in the framework of its viability towards a sustainable development. The location of the Castle as the first residential core, was not accidental. It is built on a geographically strategic position overlooking the sea, on the sharp edge of a vertical 'freak' cliff, which rises about 210 meters above sea level. Sailing in a boat, the view of these cliffs, glistening in the light, was seen by Bent [2], when he visited the island. Ecstatic by this sight, he likened them to a huge strip of rust stretched along the coast, thus confirming the reputation of Folegandros for its 'iron' form. According to one version, Folegandros' internationally known name 'Polycandros', is due to the Phoenician word 'Phelekguduri', which means 'made of stone' signifying also its rocky geomorphology. Thus, the Castle was practically inaccessible from the sea, whilst at the same time its location offered the advantage of a full view of every sea vessel, considering also that it only takes a glance to visually travel to the neighbouring islands (Milos, Kimolos, Siphnos, Serifos, Antiparos, Paros, Naxos, and up to the uninhabited Cardiotissa nearby). It is worth mentioning that the term "castle" in the historical area and time of the Cyclades mainly refers to a form of settlement organization rather than to typical fortified constructions. This specific one (Figure 1) belongs to the category of castles whose outer enclosure is made up of dwellings in a row and where their outer wall constitutes the outer wall of the overall castle, a system of Greek origin [3]. The geometry that characterizes the general arrangement of its elements indicate that it satisfies all the specifications of conformity and organization of the basic defensive elements that constitute a castle, i.e. the walls with ramparts, the gates (3 in total, though only the central one 'loggia' and the 'Paraporti' are visible today) and its towers, while from the latter only parts of some or traces at the base are preserved, thus documenting similar assumptions.

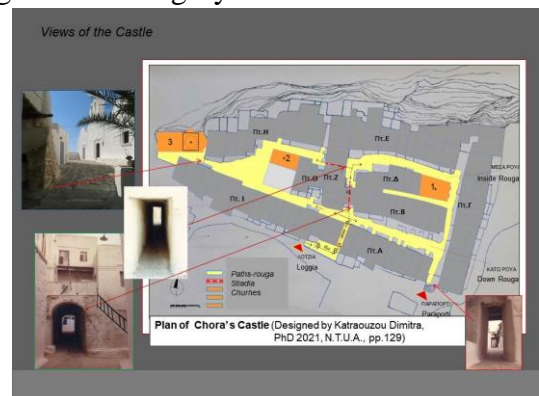


Figure 1. General Plan. Chora's Castle.

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Overall, it presents a roughly triangular shape with side dimensions of approximately 118, 120-126 and 60 meters. It is a fort with the possibility of 'passive' defense only with the potential of 'flank cutting', in the cases of small pirate raids. At the same time, it was an important refuge for the inhabitants at a time when intense riots prevailed in the Archipelago spreading endless insecurity. Inside, the two roads (Down and Inside-Back Rouga) represent the most spacious streets of the castle with their greatest width mainly towards the eastern side of the castle and near the Paraporti, whilst the two roofed passages (*diavatika or stadia*) are also points of interest. Based on historical documentation, it has been argued that it was built by the Latin family of Gozzadini, with colonization by Siphnians and then Cretans in the 1577 AD, at a time when the island was already deserted and the oldest Venetian castle that Sanoudos, Duke of Naxos, had built on the site of '*Paliokastro*', had already been destroyed. The colonization of Folegandros is attributed to them, as according to Slot [4] Kimolos and five more islands with settlers from Siphnos, had developed a type of agricultural economy based on wheat production, at a time when the trade of the product was in great demand in the Mediterranean. The main distributor of wheat exports from the Cyclades to Southern France were Franco-Levantines relying on a network of consulates in the small islands of the Archipelago. Subsequent history attests to the success of these colonisations, both economically and mainly culturally. At least in the case of Folegandros, the construction of the castle became one with the place, while its adaptation to local conditions and the character of the inhabitants had a two-way effect on the aspect of 'economy' and 'moderation'.

2.1 THE 'GEOMETRY' OF THE CASTLE- RESIDENCE TYPOLOGY

The systematic study of the typology of the dwellings that make up the Castle's built fabric, has proved that it is the result of scientific and methodological planning and was created as a single composition that was completed in one phase. In particular, there was almost complete standardization in a row with the repetition of a typical 'one-room' unit, in narrow-fronted plots of minimum area (approximately 20 square meters), with plot dimensions of approximately (3x8-8.50)m. external and (2.61x7.35)m. internal, repeated in row, that comprised 94 single-room units, as independent dwellings per floor, according to the status of 'floor ownership'. The small unit cell of a single house (*monospito*) of the castle was systematically repeated with the small exception of some larger-scale houses, mainly mansions. Whilst, removing the intermediate load-bearing walls and replacing them with full-body beams '*axonia*'. Such full-body beams had most certainly been imported from other places, as there was no similar timber on the island for their construction. Notwithstanding this, it has also been speculated that some may have come from ship masts.



Depending on circumstances, this small 'cell' house turned out to be larger than what we have been anticipated, and such development has nothing to do with the size but with the provision of improved living standards (Figure 2).

Among them, key elements were the climate as well as the structure of the soil topography. The mild and relatively warm winter of the island and its defensive expediency contributed to the architectural solution of the simple small one-room house with a roof, the 'single house' unique archetype in the Aegean, whose modest, closed and compact volume did not require additional heating. A fireplace, the well-known '*parostria*', was more sufficient for cooking or boiling water than for heating the small place.

Figure 2. Chora's Castle. Down Rouga.

Since the logic of 'minimalism' and 'economy of land' was followed inside and outside the castle, except of a few mansions located on the outskirts of the settlement or some individual cases of buildings of other use, no space was wasted for additional unnecessary enclosures. A wooden divider, the 'tavlado', appears to roughly separate the rear sleeping area from the kitchen, while the bed was essentially a wooden structure with storage space underneath. Regarding the openings in the facade of the typical multiple unit, it has been argued that there was only one entrance-exit door on the ground floor and one at each floor, with independent access, as in the case of the castle of Kimolos. All the exterior staircases of the castle that are still in place today are made of stone and they are particularly steep, with steps of 25-28 cm wide and up to 32 cm high. The most common case that is considered to be authentic is the (Γ)-shaped staircase with the lower arm starting perpendicular to the road and the elevation, while the upper arm, smaller than the first one, rests entirely on the landing that joins the two support legs. The staircase leads to a wood-framed cantilevered balcony (secondarily supported by the bulk volume of the staircase) from where the first floor residence is accessed, thus offering independence in movements towards the ground floor and upper floor. Because of its big bulk volume, the space underneath, which is called 'koiti', is quite spacious and provided space for auxiliary uses (w.c.). In the past, their use was concerned with the periodic rearing of domestic animals (e.g. pigs) and was a place for gathering all the unwanted bio-waste of the household, which according to testimonies, it was transported with animals to the fields, creating domes 'troulous' that were covered with soil and turned into fertilizer for crops. The ergonomics of this type of staircase had been thoroughly studied. It was protecting the lower courtyard from the winds, providing shade in the summer and, at the same time strengthening from a defensive point of view the wall inside where the fireplace was located. On the flat stairs they placed a clay container that through a canal 'canalos', rainwater from the roof, was collected for domestic use. Due to the hard limestone bedrock of the rock on which the castle was built, it was not easy to carve a cistern

for each house. It was constructed only where the morphology of the ground allowed it in hollows, or due to a slope as in the residences of the northern rear side towards the cliff and the sea, while there was probably a cistern for public use inside the castle, which no longer exists. But the importance of the castle does not stop here. As evidenced by the painstaking application of a grid 'Kannavos' articulated with the Venetian "passo" (foot)- about 1.75 meters in length- the architecture of the Castle is a product of design, including its strict overall implementation and adherence, during the construction phase.

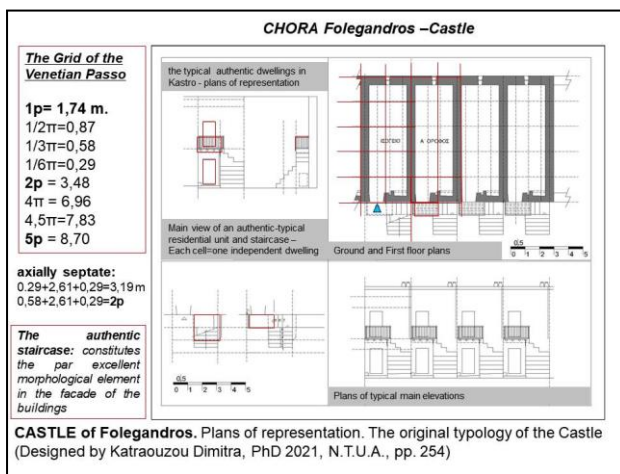


Figure 3. The original plan by the Grid of V. P.

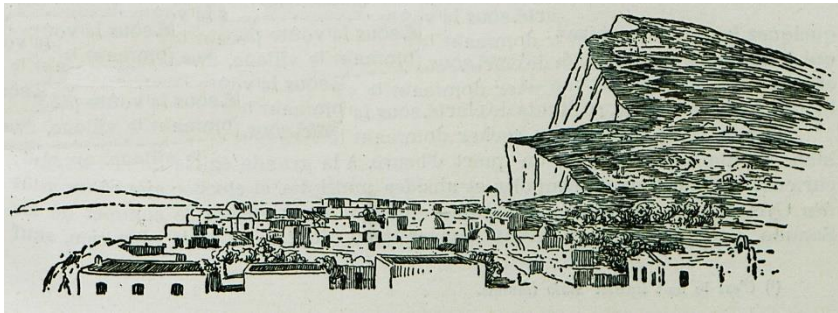
So, this unique monument that was built in one phase, manifested an architectural solution with a strictly applied geometry as a whole, that did not allow interventions in its main features. According to an important observation, almost all parts of the Castle structure are multiples and sub-multiples of the Venetian passo (1 v. passo=1.74m.), as shown in the print impression of an excerpt of the graphic representation of the original design (Figure 3). Its general dimensions (118x52,80x120) m. equal to (68x31x69) Venetian p., whereas the total length of the narrow-fronted housing unit (cell) is equal to 5 Venetian feet (or 4,5 vp.), while the internal width is 2,61m. equal to 1,5 vp. A similar standardization also appears in the individual elements of the facades etc. Another important observation is that, the typical dimension of 1.75 m. that Le Corbusier considered the average height

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of man, coincides with one Venetian passo (1vp.) As a modulo, the dimensions of the human body, such as the height, its members' length, its step opening, along with any possible movements constitute the 'external measurement unit', according to which the architectural form is derived, since as a work of necessity it must also be fit for this purpose. As most of the architectural elements of the Castle of Folegandros are associated with this measurement unit, or multiples and submultiples of it, it is reasonable to reduce that the aesthetic and ergonomic correlation with the 'human scale' led to the successful creation of such a 'large-scale project'.

2.2 FOLEGANDROS. THE ARCHITECTURAL LANDSCAPE

Since 1988, the Castle has been characterized by the Ministry of Culture as a 'historic monument'



since "it is one of the few settlements that preserves unchanged its basic characteristics and many of its original elements". In 1973 the entire settlement of Folegandros was declared "a place of historical and special natural beauty that needs state protection" (Figure 4).

Figure 4. Folegandros. Chora's Castle, windmill and Monastery.

However, even in the case of the castle for which there was a prior design, the participation of the inhabitants obviously contributed to an adaptation of 'Western standards' to the facts of Greek nature. This specific location gave the castle excellent natural fortification and made it invulnerable and almost invisible to any sneaky pirate on its north side, as the stone wall was exposed without plastering, so as not to stand out. Due to their natural gray shade built from local stones, they acquired a single feeling with the rocky environment and integrated completely into the landscape, they seemed to grow up from the rocks. This evocative scene from the perspective of the Castle is complemented by the hill of Panagia that rises towards the NE, the monastery of the same name that stands out as a landmark, and a wide cobbled serpentine path that starts from almost the level of the castle and is marked with white lime color, following its ritual ascent (in a zig-zag), and ends up at the great temple of Panagia, with a quarter of an hour's walk. From there, it only takes a few minutes to reach the location '*Paliokastro*'. Furthermore, the location where the settlement was developed, is a hub where starts a second network of routes of vital importance that fed it and accommodated the provision of the necessary supplies for its daily survival. Ensuring the acquisition of raw materials, precious drinking water, communication with the little ports (*araxovolia*), and its direct connection with the production area in two nearby locations. The first, which used to be fertile and cultivated, stretches out on the slope, right below the church of Panagia. The second, which is located by the smooth hillside of Plaka, and stretches to the west, is the largest and most fertile. Over centuries of toil and endeavour, the farmers wisely shaped the land in stepped terraces, '*belts*' or '*stairs*', as per local linguistic expression. The relatively steep ground slope of about 50 degrees, descending to the sea, was smoothly shaped in small-surface embankments, which are flat small land sections held in place by dry stones that carefully follow the elevational curves of the ground. Thus, retaining the scarce soil and water, valuable arable land was created and provided for centuries on the rocky island, where the limited agricultural wealth of the Folegandrites, such as cereals, and particularly wheat, were produced. The two aforementioned slopes are the only well-cultivated areas in direct contact with the Chora in the eastern part of the island, as this part is rocky and completely devoid of vegetation with steep coastlines. The wide path, known as '*Kalderimi*', bordered by dry stone paddocks in 1930 (today

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covered with asphalt) connects the castle of Chora with the other side of the island high up, where today is the agricultural settlement of 'Ano Mera'. This used to be a significant productive area which was also formed in terraces on either side of the ridge of the linear massif (Figure 5).

Ano Mera, in contrast to the densely built Chora, gives the impression of a strongly scattered settlement, as it essentially consists of clusters of rural individual buildings in the form of complexes where the traditional building of *'themonia'* predominates. These are small, self-contained agricultural units, which primarily include a basic dry-stone single room building, with other auxiliary spaces around it mainly for agricultural activities, such as: water tank, oven, cellar, winepress, a miniature vineyard and always a 'lemon house' (*lemonospito*).



Figure 5. Ano Mera. Chora is in second level.

The special geomorphology, the mild climate and the intensive daily tasks of the inhabitants in outdoor activities enabled these simple rural buildings to develop into important architectural entities. The island's lacy 'dry stone walling' landscape was built from end to end with skills and knowledge passed down through generations from masters to apprentices. It presents a remarkable example of traditional work of art, known as *'xerolithia'*, which is part of the identity of the Cyclades and has been included in the list of UNESCO's intangible cultural heritage since 2018.

2.3 THE EVOLUTION OF HABITATION IN THE SENCE OF 'ECONOMY'

Its capital Chora (or Folegandros) lies on the northern side of the island and today is constituted by two dissimilar entities: the Castle (Kastro) which is the most important cultural sight in the whole island, and the surrounding traditional settlement (Chorio), that gradually merges with the outlying houses and the surrounding landscape. Then the urban structure of the extension of Chora followed the general rules of the Castle and the architecture of the 'outside the walls' area, forming the subsequent traditional settlement, as it exists today. On the principle of the land being the primary resource for the 'family economy' to develop, people had to build their settlement again. "*Pholygandros boasts of only one town, which is walled, and called 'Inside', (μέσα) and of a colony outside this wall, of better-class houses, which is called 'Outside' (έξω) and a Pholygandriote knows of no other names but these*" Bent says in 1883-4. After all, the Castle, now a place of the aristocracy, continues to remain to this day its most interesting and qualitatively richest residential part. The islanders, previously fearful and entrenched within the walls of the castle, had acquired a certain way of life 'within limits'. A considerable amount of time had to go by until they shed their previous insecurity and their daily habits. Besides, considering that as a rule the residence was designed in a secluded form for defense purposes, it was made of solid walls without or very few but tiny windows, and a single entrance-exit, so that it could immediately be controlled in the case of malicious intruders, at the time that threatening dangers were in abundance. The fortified settlement of Kastro that once upon a time protected its inhabitants from foreign intruders (pirates) and was tantamount to a shell of life for their daily needs and activities, has transcended time to become a holiday resort attracting tourists (the new foreigners). Thus, being a valuable resource for its residents and visitors alike. Therefore, the fact that tourist traffic has increased exponentially on the island, while at the same time the said Castle is still an inhabited settlement, is somewhat concerning. The first general governing principle is the 'economy of space': transcribed to significantly reduced public space, demonstrated with narrow streets and platform instead of squares, in order to save space and provide as many houses as possible. The second governing principle was that the overall arrangement should be in such a way so that the residents could defend themselves effeciently but also had the opportunity to escape in

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case the settlement was raided. Reliable bibliographic information states that until 1779 the inhabitants still lived inside the walled city (castle). The opinion holds that traditional architecture is identified with the anonymous and that its character has been produced by an evolutionary process that is lost in the passing centuries. However, it is argued that the Castle of Folegandros, which is the primary core of the settlement, is a product of concept design and planning of a relatively large-scale project that was built with bare hands. As is the case of other islands of the Cyclades (which have been studied, e.g. Antiparos) [5], here too it is a matter of official architecture which, however, anticipated wider social needs such as those of ordinary citizens alongside the ruling class. Starting from the volumetric soft integration of the whole with the elevational lines of the plateau morphology on the outcrop of the rock to the construction and morphology of the buildings themselves. Their main materials are stone and wood, with secondary lime, sand, clay soil for waterproofing and algae. All these materials as analyzed were present on the island (only pozzolan for waterproofing the cisterns seems to have been supplied from neighbouring Santorini). As for the wood, they used '*phides*', a type of wild cedar (from Cardiotissa), while there are testimonies that they used to be abundant on the island. The uniform perception in the organization of the space and by extension in the formation of the facades of the houses, was demonstrated with the use of similar materials and methods of construction, where the frequent repetition of similar elements further indicated a strong homogeneity. The first noticeable difference, however, is in the fact that the village (Chorio) consisted almost exclusively of single-storey buildings, as opposed to the predominantly two-storey Castle houses that (despite the later dilapidated ones -because of their destroyed first floors- mainly on the western side) dominated the castle. A consequence of this leading to the second key difference between the area of the settlement outside and inside the castle perimeter, was the lack of stairs to ascend to the upper floor. Nowadays, the quality of the public space 'inside' and 'outside' of the castle is high. The whitewashed facades of the buildings as a whole, further unify morphologically the settlement inside and outside the castle. On the single front of the street facades, the gaze stops at the stairs. Their repetitive intense volume emphasized the presence and austerity of the unitary building on the one hand, while on the other, they added a certain diversity and plasticity to the flat facades. Thus, a vigorous sculptural effect is resulting from the alternating sun-flooded and shaded surfaces forming in the dwellings' yards. Although in our times, the simple one-room dwelling, where the islanders used to rest from a day's work, does not support the modern needs, the streets of the settlement, however, that constituted the basic area of social life, as evidenced by their uniform width that extended up the stairs, convey to us today a magic and a poetic eternity. Regarding the relationship between public and private space, it appears that the original network of pedestrian streets, which are preserved to this day with the same layout and proportions inside the settlement, were then extended in the countryside outside the boundaries of the built-up settlement. The appropriation of public space was achieved by the residents through caring, cleaning and aesthetically upgrading it in common that further reinforced coexistence and social contact. It should be noted that even the passer-by (resident or visitor) is compelled to stop, to look, to 'co-negotiate' and to participate that further affirms him as a member of a 'collective organization'. He cannot pass as a mere observer. There is a process whereby we all see and are being seen, observe and being observed. By reversing the interpretation of the terms 'inside' and 'outside' in practice, the way people 'inter-communicate' with other people also changes, thus turning the architected space into a 'living theatrical stage' of continuous action, where the human scale and extroversion prevail. Needless to say that the way in which "the public space is used by the residents", as well as the way it is "maintained, cared for and supervised daily by the members of the local community, create the feeling for the passing visitor that is somehow inside an intimate outdoor large room" [6], rather than in an unfamiliar and impersonal space.

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3. THE EVOLUTION OF CHORAS' SETTLEMENT – URBANITY CHANGES

To this day, the castle 'part of the landscape', that once dominated, carries the image of a densely populated settlement. Its three external elevations do not at all give the impression of a blind solid Castle defensive wall with a handful of tiny openings, such as small toxic hatches. Four centuries of Castle life have resulted in a multitude of reconstructions, additions and alterations. The adaptation of the original residence to contemporary living standards and the gradual elimination of the fear of pirate raids brought about changes such as the annexation of several units for increased living space, the addition of balconies, storerooms, sanitary areas, stairways, the increase of the number and size of openings, especially at the outer wall of the Castle. Significant changes were also brought about by the introduction of new uses, especially hotels and rooms for rent. The settlement as it was already formed until the end of the 20th century is characterized by the following urban planning units (Figure 6).

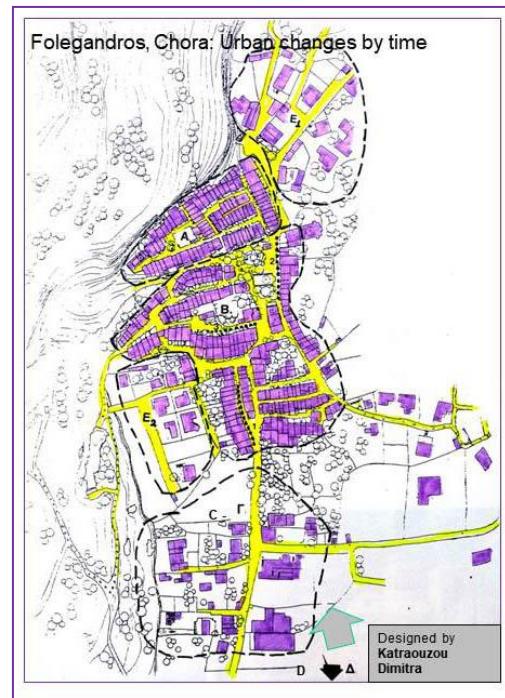


Figure 6. Chora's urban evolution-Units.



Figure 7. Chora. Themonies' area/D

The walled residential core of the Castle, where the two-storey volumes predominate is defined as area (A), while in the traditional settlement, that forms the main extension outside of Castro, defined as area (B), the single-storey buildings prevail by far. The third section, defined as area (C) mainly consists of mainly of the 19th century mansion type buildings, scattered within large properties along the road known as "Calderimi" in the direction of the Ano Mera settlement. The fourth section in the western hillside, defined as area (D), comprises scattered agricultural buildings, known as 'Themonies' (Figure 7).

The Castle area (A) remains the first in line of preserved authentic ensembles, followed by area (B) as the next best preserved section in terms of retaining its traditional identity. On the contrary half of the building stock in the third section that is area (C) comprises buildings that alter its traditional character. The last section which is defined area E (1&2) comprises buildings designed as hotel establishments,. As they exhibit a proportionally dominant effect, any association with the traditional character of the other sections of the settlement is unequivocally compromised. It is noteworthy that, until thirty years ago, the (E1) area had not been built, while at the base of the hill only the school building stood out. Towards the cliff the towering figure of a ruined lonely windmill has been standing for centuries as a landmark in the wider stony landscape. The settlement's preservation in the original low tones, was required to be preserved at all costs, as means to safeguard the superiority of the Castle's dominance. Including the wider projection of the characteristic architectural buildings and their defining features (e.g. skyline) such as the domes of the churches above the roofs of the houses and the modern buildings until they recede gently into the relief of the built environment. However, the transformation of many rural buildings from 'themonies' (an integral part of the remarkable dry-stone 'xerolithic' landscape of the island), into 'tourist hotel complexes' may be the biggest upheaval

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of its mild image (unit D). Furthermore, the overall disproportionate expansion of the settlement with the addition of exclusive use hotels buildings or luxury homes (villas), completely changed the calm and balanced physiognomy of the settlement. The construction of private use swimming pools in houses and hotels, combined with landscaping water-loving plants, not only has severely comprised the ambience of the landscape physiognomy of the landscape exacerbated the problem of water scarcity on the already arid island.

3.1 PROTECTION – PROGRESS – SUSTAINABILITY

Nowadays, these issues often remain intractable, not only for Folegandros, but also for other islands' cultural sites. The balance between the morphological variety and the absolute austerity of the architecture of Folegandros Castle is the key to the harmony between form and function. Therefore, if only one house per height had been saved or restored to its original layout, it would function as a museum element of the Castle, further saving its historical character and providing a respect incentive for its users. Fortunately, the mild tourism development of the previous decades has allowed the island to maintain most of its character and physiognomy to this day, so that even in the case of occurrence of the abovementioned concerns, they would still be manageable [7&8]. The 'carrying capacity' of a place is an important and finite evaluation methodology, especially concerning tourism, as it is defined as the "potential ability to cope with needs, demands or pressures without affecting its cultural values, its natural resources and in general, the possibility of its sustainability" [9]

The unprecedented construction of new buildings in the last decade in the periphery of the settlement's limits, in order to meet accommodation demands fueled by hypertourism, could be disastrous if construction continues at the same rate in the future (Figure 8 & 9). Especially in the sensitive area of Plaka -because of its panoramic location- such development would be particularly catastrophic for the entire settlement. It should be noted that the main danger for Chora is due to a potential increase on the number of tourists that would affect its appearance, not only morphologically but also by undermining its succeeded sense of 'urbanism' which generates this 'pure and simple type of habitation'!

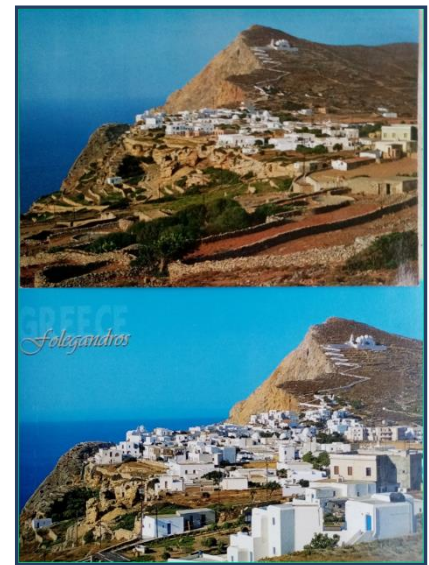


Figure 8. Chora in two times.

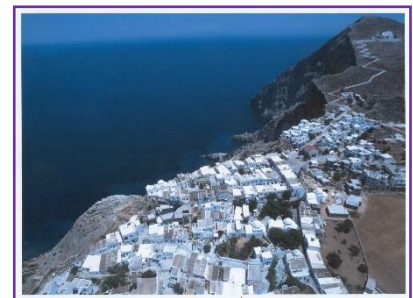


Figure 9. Chora's explosion.

Arguably, the question of how we would associate ourselves with the relevant debate between the residents and the tourists could reasonable arise. In other words, if we were requested to take a stand to support or not, new construction that would be dictated by market demands. As a consequence, our pure and simple answer would be manifested by our commitment to preserve the natural and cultural quality of the landscape, through our political vigilance and participation based on the objective of the sustainable development of the island [10]-not only for the present but also for the future generations of residents and tourists alike. The protection and preservation policies should be focused on two objectives: i) the non-disturbance of the unique and relatively well-preserved local environment including its sustainable development by the current development model of the island, ii) the protection of the residential cell, against the alteration of its character and its aesthetics, from the rapid, out-of-scale and anarchic construction due to 'overtourism'. The basic idea is that, through

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the revival of the network of old paths the space itself can tell its story, which will be gradually revealed through the relationship between the stone-built structures of the architectural heritage and the landscape that gives birth to them, as in an '*open air ecomuseum of architectural heritage*', with 'outdoor exhibits' and through an 'open debate' between the public: tourists and residents. To promote cultural tourism with the concept of architectural tourism, it is necessary to contact and inform visitors the motto of the place might be "*island without car*" as a walking destination. The promotion of alternative forms of tourism such as 'agrotourism' perhaps is the only way to protect the island's identity! [11]

4. CONCLUSION

The guiding principle of collectivism that the traditional society of the inhabitants had developed, functioned protectively for the island, as it was based on the common benefit and the respect for the place itself including its built environment and the common good. Measures such as protection and guarding that could be introduced by the competent public authorities are necessary now, as was previously done by the residents themselves. In the interest of the current and future residents, the love and care of the inhabitants for Folegandros, as well as a high sense of responsibility for its future, is required above all. Its 'unique' architectural character is an element of special cultural, environmental and economic value, and a point of reference for its tourist promotion. Heritage preservation and urban development under no circumstances should be considered contradictory or incompatible.

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Nicosia Airport, Dwindled Memories Awakened; Past, Present, Future.

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Extended abstract

Memories are gradually disappearing, and time took its toll on Nicosia Airport, a unique example of Modernist Aviation Architecture.

As it is left abandoned for nearly half a century due to political circumstances, the building is quietly fading away in the landscape, in the buffer zone, in the outskirts of the Cypriot capital.

Built in 1968, the Airport was the main arterial connection to the island for less than a decade, when it was interrupted by the Turkish invasion in 1974. Despite its abandonment, the building has survived untouched, and its architectural and structural integrity remains intact.

However, the memories of the place are fading away; the people who remember it are decreasing and the political negotiations for resolution seem to be moving further apart. Its fate is uncertain.

This paper argues that this 20th century building has unique architectural, cultural, and historical value. Its design concept and architectural details captured the essence of Mediterranean vernacular architecture. Its tangible and intangible cultural heritage is in danger of disappearing and an urgent endeavour is required from both communities, Greek Cypriot, and Turkish Cypriot to enhance and revitalises its significance. This shared heritage has the potential to be sustainably developed and become a hub of shared memories for both communities. A carefully studied proposal for its adaptive reuse and restoration could be a unique pilot project that could reignite viable negotiations of a 50-year political uncertainty. The study focuses to capturing the memories, 'mneme', and making an attend to provide some suggestions for its adaptive reuse, considering UNESCO'S SDG16.

The study's methodology (interviews, etc) aims to unearth memories of Cypriots from Greek Cypriots, and Turkish Cypriots. Dwindle memories, could be awakened, and recorded for the current and next generation. The study will aim to initiate the creation of an archive that could be treasured by both communities.

The paper argues that in the current climate, where relationships between the two communities are softened, it is timely to open a pathway for an initial study for a future sustainable project that would focus on People, and Place, and enhance a sense of Belonging.

Keywords: *memories, tangible, intangible heritage, Nicosia.*

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Interpretation and enhancement of a missing Roman city: the case of *Mugillae*

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Abstract

Nestled in the Appia Antica Archaeological Park, the settlement of Santa Maria delle Mole is characterized as a 'dormitory city' on the southern outskirts of Rome. Its urban growth has developed in an uncontrolled speculation, neglecting its innate connection to the surrounding landscape, which represents one of Rome's main cultural asset. Since the 1970s, efforts to curb rampant building have been driven primarily by its environmental and archaeological significance. Only in 2020, with the annexation of the area to the Park territories, did the incessant building come to a halt, ushering in a new era for archaeological conservation and enhancement.

This article would explore the methodological approach that harmonizes archaeological analysis with landscape and urban quality assessment. It would also explore the complexities of the historical identity of Mugillae's imagery and outlines how this process has informed design strategies and narratives for the enhancement of the site. In this line, it aims to outline a programme to revitalize and promote community engagement through a holistic and sustainable approach.

Keywords: *heritage design; mapping; archaeological landscape; memory; heritage communities*

1. INTRODUCTION

The Appia Antica Archaeological Park is a national heritage site that traverses the southern half of the Italian peninsula along the route built by Appius Claudius Caecus to advance troops towards the south and the Greek world. Stretching alongside Rome's expansion, it, together with the Via Egnatia, which crosses the northern Greek peninsula, formed the direct connection between the two capitals of the Roman Empire, Rome and Constantinople. The "Regina Viarum," as it was called in ancient times, was only recognized a year ago with the prestigious designation of UNESCO World Heritage, making it the only preserved Roman road to enter the list of sites.

Rediscovered and retraced by young Europeans traveling in the 1700s and 1800s during the *Grand Tour* era, this road has been a source of inspiration as material and intangible infrastructure for the artistic and intellectual movement in which today's European Culture has its roots anchored. The imagery of the Roman countryside is known to all, inhabited equally by the ancient ruins, maritime pines, and agricultural-pastoral activities of a world both submerged and dormant. The aesthetic value and cultural potential of this landscape, releases to be rediscovered and relived.

For Rome, the Appian Way represents the umbilical cord that leads to the origin of the city, which finds its conceptual origins in the communities settled on Monte Albano since protohistory and still today constitutes "the backbone" of Italy's capital city. As such in ancient times - yet today - this reality takes the form of an urbanistic *decalage* of the urban settlement fabric that leaves room for a territorial reality and its productive, agricultural and industrial functions, crossed by communication routes and waterways, limits and connectors of human settlement.

During Rome's expansion phase, this reality was challenged by land consumption for urban expansion amid intense speculation, also responding to the housing emergency characterizing the mid-20th century. However, during the same years, a movement of intellectuals, journalists, politicians, archaeologists and urban planners forced into the debate the issue of defending the historic and

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archaeological landscape from overbuilding. By infiltrating their perspective and interest into the dynamics of urban planning, would lead to the creation of the *Appia Antica Archaeological Park* and the *Castelli Romani Regional Nature Park*.

In this context, those satellite urban centers that arise in the area were motivated from the beginning by a twofold force. On the one hand, building speculation, which even upon the return of the housing emergency, did not stop the consumption of land, and on the other hand, the newborn city communities began to suffer from the absence of public spaces and of a urban planification attentive to the values rooted in the surrounding territory and landscape. Starting from the 1970s, a period of assemblies, disputes, and struggles began, with the communities of the small inhabited centers created within the new Archaeological and Natural Park leading the defense of the territory, both in its cultural and environmental aspects.

One of these disputes concerns the site of Mugillae, an urban void threatened by land speculation, situated between the settlement of Santa Maria delle Mole in the municipality of Marino and the agricultural estates forming a green belt between the Appia Antica Archaeological Park and the Castelli Romani Regional Natural Park. This piece of land -and others-, which constitute a strategic strip of territory to prevent overbuilding portions which are in fact affected by the same cultural and environmental values as the landscape context, and thus in fact more desirable in the real estate annuity arena, were annexed in 2020. This major achievement, acquired on paper, nevertheless needed timely planning that could *de facto* integrate urbanized and natural realities in the area.



Figure 1. Map of the Appia Antica Archaeological Park and the most recent annexation - drawing from the authors

In the same year the municipality of Marino launched in collaboration with the Facoltà di Architettura della Sapienza Università di Roma -already involved in the problematic of the area - a series of workshops carried out by the students of the International Master ALA (Architecture, Landscape, Archaeology) for the enhancement of four key spots for the integration of those areas attached to the

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reality of the Archaeological and Natural Park and in direct contact with the urbanized settlement reality [1]. One of these key points was the Mugillae site, which was the subject of intense interdisciplinary activity to the development of an enhancement project aimed to safeguard the heritage still threatened by the expansionist desires of real estate agents and, above all, to return it to the legacy communities of residents.

2. MUGILLAE TODAY AND THE MISSING ROMAN CITY

Santa Maria delle Mole is a neighborhood in the Municipality of Marino, in the Region of Lazio. Has a population of 25.000 inhabitants (2011), a total area of 16.000m² public green area, and a total projected build area of 180 Project area 180.000m². It means that the actual situation leads to a 0,64m² per person, way less than the recommendation by the World Health organization (a minimum of 9m² per person), or by the Italian Planning Law (a minimum of 18m² per person). The lack of public space has been one of the first and most important demands of the newly formed community, organized into a dense network of associations dedicated to various territorial defense themes.

The lack of public space was in fact one of the first and most important claims of the newly formed city community organized into a dense network of associations dedicated to a variety of land defense issues. This condition led to the emergence of numerous active citizenship projects, which very quickly identified the claiming of undeveloped urban parcels as the first option for solving the problem. To preserve these spaces for public use and avoid further construction, it was necessary to impose a legal constraint on real estate speculation. Given the significant presence of archaeological assets of various epochs and types in the surrounding area, which had already served as a limit to building expansion, the citizens' committees soon recognized the surrounding archaeological landscape as a common resource. During this overdevelopment, the local community supported the preservation of the archaeological heritage, seeing it as an opportunity to reclaim public spaces and to protect and enhance not already built areas.

Thus, many initiatives were born, dedicated to discovering the histories of the territory and the areas surrounding Santa Maria delle Mole, to verify and search for assets that could testify to the public nature of the area and redefine new urban and landscape functions. The activists' initiatives were met with broader involvement from a citizenry that, initially a result of the capital's overpopulation, was now seeking its own community identity [2].



Figure 2. Manifestation against the building speculation - november 2019 - pictures of the authors

At the same time, a shared sense of community, rootedness, and collective identity blossomed, intertwined with the notion of an ancient city, Mugillae, said to have existed nearby. According to the topographer Nibby in the 19th century, the archaic city of Mugillae was located in that part of the territory, from which the area's toponym derives. This town was founded between the 4th and 3rd centuries BC, situated between Santa Maria delle Mole and Falcognana. The city was a fortified

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military outpost defended by square tufa walls, strategically located near the border with the territory of the Latins, between today's Via Ardeatina and Via Appia. It was the first city destroyed by the early expansion of Rome, and since then, few ancient sources about its existence have animated historical research to identify it on the ground.

Considering the geographical configuration of the small hill facing the Appian Way, Nibby hypothetically located the ancient city in this strategic position on his famous map in the 19th century. Even though archaeological surveys in the area have not proven the presence of the ancient city, the community has a strongly rooted perception of its bond with a common past as a source of identity. This period of contention stimulated the formation of an imagined historical identity linked with the legacy of this ancient city.

Nowadays, the area holds high landscape value, acting as a hinge between the Appia Antica Park and the Roman Campagna and containing only archaeological structures related to the presence of a villa, considering the Roman cistern still preserved in the area. In the community's imagination, starting from the hypothesis of the city's location of Mugillae, promoted by historians and antique dealers, the existence of an archaic city became rooted in common perception. This belief has established itself in historical and geographical cartography, becoming part of the toponymy and collective imagination.

None of the investigations conducted has been able to support this hypothesis, yet in recent developments, this place has become a symbolic area due to building speculation and is considered a public space belonging to the entire community. This function represents an unprecedented patrimony of values that deserves not to be overlooked. Among the enhancement strategies, it offers an excellent opportunity to educate about the distinction between material and immaterial values linked to the past and, in terms of planning, a design of the public space that provides an opportunity to socialize experiences and political content of communal life.

The site, assumed to have been the location of Mugillae more than two centuries ago, presents itself today as an urban void, preserving a Roman cistern within it, amidst a mixture of urban space, archaeological remains, and agricultural landscapes. Although there is no direct archaeological evidence of the ancient city, a comprehensive mapping of the non-monumental traces found before and during urban expansion has been instrumental in bringing the area's neglected archaeological heritage to light. This mapping, which details the typology, chronology, and functional attributes of these traces, serves as a fundamental reference for subsequent design proposals.

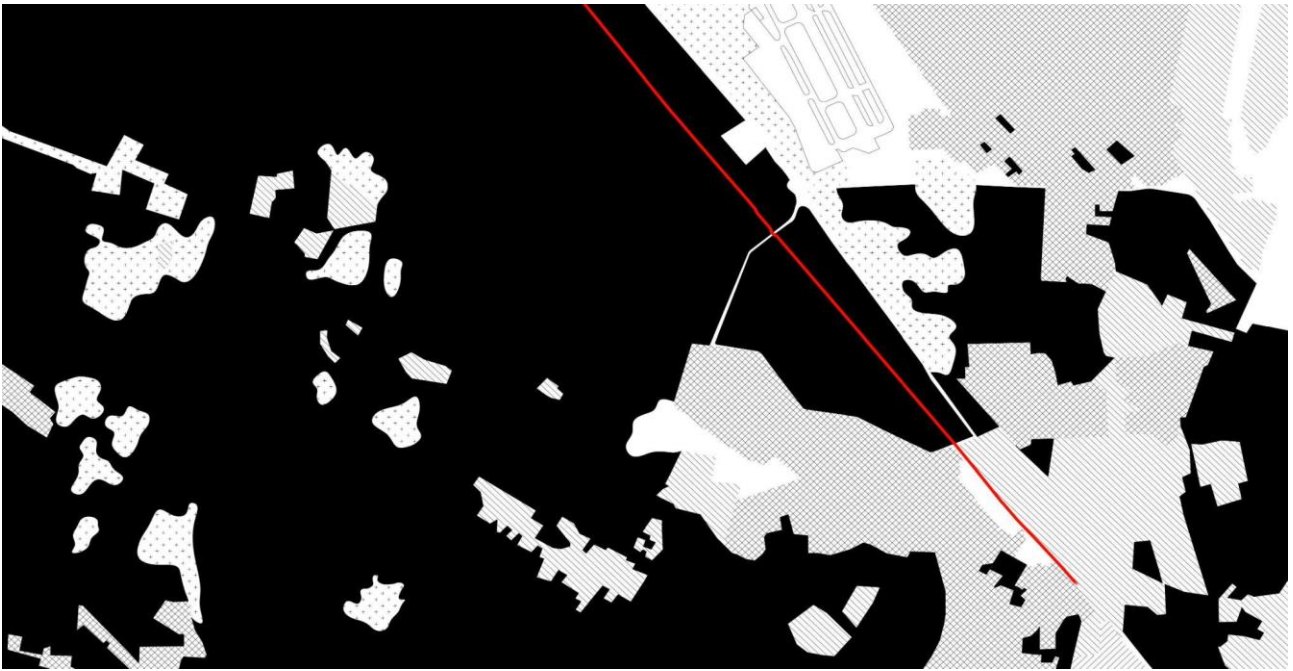


Figure 3. map of the area evidencing the urban void, the connection to the Appian way and the mixed urban pattern - drawing by the authors

3. METODOLOGICAL FRAMEWORK: MAPPING BORDERS, MOBILITY AND IDENTITY

3.1 ASSIGNEMENT:

The so-called site of Mugillae in Santa Maria delle Mole, located in close proximity to the primary historical route, the Appian Way, finds itself as a void between two conflicting worlds. On one side lies the agro-pastures of traditional rural life, and on the other, the rapid spread of concrete developments that have largely neglected the provision of open public and green spaces for the community. This oversight has been vehemently voiced by the locals through protests, a reality we considered extremely important to take into account in our project proposal. The power of these protests lay in their defense of the area under the principle of protecting the narrative and values of its history as a basis of an identity in process of conception.

Our task as a team was to understand this site's unique position, both in the contemporary and historic world, and the community's needs, integrating it into the broader archaeological park and enhancing its value as a public space. The site, embedded within the urban fabric, has the potential to serve as a cornerstone for not only integrating the area into the archaeological park but also fostering a sense of unity within the community. This potential is recognized by the community, who have fought for the site's status as a public space, highlighting the presence of a monumental Roman-era cistern and its multi-scalar relation with the surrounding landscape.



Figure 3. Roman-era cistern - picture of the authors

We carried out site surveys and mappings activities to document the area's historical and actual state, both material, immaterial, imagined and real characteristics and its historical value and significance. These activities were not only based on abstract processes unanchored from the terrain, such as laboratory activities, in the classroom away from the site, but also involved a recognition of the site through the tour. Walking, discovering, recognizing, getting lost, changing perspective, seeing the unseen and learning from that as a necessary stage for a deep apprehension of the site. This complex process also included assembling historical records and conducting interviews with local residents and community leaders to understand their perspectives and needs.

Social interactions were crucial in shaping our understanding of the site's importance and the community's desires for its future. These sessions provided a platform for residents to voice their concerns, ensuring their input to be a direct influence on the design process. Through these engagements, we aimed to bridge the gap between the community's historical consciousness and modern urban needs.

Our primary design goal was to transform the site into a vibrant public space that honors its historical significance while addressing the current lack of green spaces in the town. The design aimed to enhance the area's historical value, making it a focal point for cultural and social activities, thus promoting a deeper connection between residents and their heritage.

The project was not only supported by local associations but also by institutions that commissioned the project. These institutions hoped to use the project to promote a broader cultural action capable of countering the social degradation associated with the phenomenon of commuting to Rome. This commuting pattern has turned the town into a "dormitory city," where residents sleep but do not engage in significant social or cultural activities locally.

In summary, the need to integrate Mugillae into the archaeological park and the community's daily life through a combination of historical research, community engagement, and design workshops, lead to create a space which reflect the community's identity and needs, providing a meaningful public space that celebrates the past while addressing contemporary urban challenges.

3.2 THEORETICAL APPROACH:

Cities are the outcome of human activity, sometimes regulated and sometimes improvised. Mankind has produced in them objects, artifacts, supports, related to the specificities of human life. With the use and construction of cisterns or other kinds of systems for water harvesting and canals for its distribution, roads, bridges, new crop systems for food production, etc., we have been constantly leaving traces in the territory and landscape. All these interactions between people and their territory are mapped. ‘Mapping’ provides a methodological contribution to archaeological interpretation as well as to design, both from a conceptual and practical point of view. The agency of mapping is positioned as a basic tool for working from a critical perspective of the archaeological/urban/natural/landscape/architectural relationships. Abstracting from the conditions that may appear at first sight for their interpretation, ‘mapping’ stands as a trigger of new interpretations for potential application in project situations where there is a dialogue between past and present.

Water moves, and while moving it alters the territory. Sometimes in a drastic and other in subtle ways, when done through man's hand, the changes tend to acquire visibility of an almost immediate tenor in relation to the (usual) times of nature. Water probably is the element that has the greatest impact on the transformations of the landscape, history and territory. A river, like a border, can be either what keeps us apart or what brings us together. On a time plane, the register of water could help to create bonds with the past. By understanding water as an element that enables transformations, we can determine tools for designing and interpreting that allow us to rethink our relationship with water as a foundational element for the development of civilizations.

Our landscapes are undoubtedly fundamental elements of our collective memories. We can define it as the platform where our history and culture are kept. We even preserve those landscapes that no longer exist through oral and written narratives where landscape (remembered, imagined) is the support of the story itself. Reconsidering history as a part of our daily lives, linking it to our heritage and memories through material culture, creates a platform for understanding the complexity of our landscapes. The origin of cities has been linked to a great extent to singular geographic conditions. Over each city’ particular landscape, an overlapping of infrastructural elements that have produced over time variations in the original territory.

Humanity is constantly transforming its territory. We produce new geographies, living landscapes in constant change that are the result of superimpositions, hybridizations and intertwining of histories. Therefore, it is necessary to have new approaches to their interpretation, to consider the city, its visible and invisible history, the territory in which it is inserted and the potential imagined futures in an integrated whole, and not as a sequence of disjointed elements [3].

Mapping a site can trigger countless glances from/ towards it. It is in its operative character that it establishes clear and varied possibilities: “Based on the concrete constructions of reality made by the map, not only new conceptions of the cartographed reality open up, but also new possibilities to transform it.”. The cartographic practice undoubtedly requires walking, roaming, creating a route so as to absorb the concrete data of each site and transform them into information. Information that converges into tools that enable new approaches to the design processes of projects aimed to transform the human milieu. As a creative practice, *mapping* goes beyond the condition of reproduction or representation of what exists, extending to places where the discovery of unknown or unimagined realities allows the elaboration of new ideas about the territory. “Thus, mapping unfolds potential; it re-makes territory over and over again, each time with new and diverse

consequences.”[4]. *Mapping* requires an intentional, analytical and critical view of territory and landscape.

“The map does not reproduce an unconscious closed in upon itself; it constructs the unconscious. It fosters connections between fields, the removal of blockages on bodies without organs, the maximum opening of bodies without organs onto a plane of consistency.

(...) The map is open and connectable in all of its dimensions; it is detachable, reversible, susceptible to constant modification.”[5]

A map can be significantly more than a simple two-dimensional object. While maps stimulate our perception of the environment in which we find ourselves, they contribute to preserve, interpret and enhance the memory of the sites. In this way, we believe it is nourishing for the archaeological practice linked to the architecture/landscape project to approach the joint work from the perspective of landscape cartography. Inquiring into what exists, to discover the past and therefore imagine what is yet to come.

3.3 FROM THEORIES TO PRACTICE:

By considering our theoretical approach, and by prioritizing in our project the conceptual significance of the cistern as the sole archaeological presence in the area, underlined the importance of water in the function of the site and its historical connection to villa culture. This connection provided a basis for how such activities could relate people to the territory, justifying our design proposal.

The information collected through mapping, pinpointed both real and hypothetical archaeological data and elements within the area, also possible paths and activities to be held in the site. Related to those historical elements considered hypothetical, two aspects were taken into account: the collective memory of the community, which has been significantly influenced by the urban and territorial policies affecting Santa Maria delle Mole, and the potential to conduct preventive archaeological investigations during the project's implementation to verify these hypotheses. Through mapping, a possible paths system was defined, formulating routes based on scientific foundations to trace the ancient roads in the area.

Our goal was to, by using and supporting historical research and analysis, inform the design process in diverse scales. We aimed to highlight the productive vocation of the territory and the monuments that trace its continuity and contextualize their transformations over time. Using the traces of the antique landscape and the use of land identified on the maps, both in a conceptual and material foundation -a "device"- lead to develop the architectural design narrative. This also involves preserving materials and on-site historic traces to ensure their transmission to future generations, hoping they will become part of increasingly valid systems of understanding and value.

Informed by this process, we identified the need for a city identity, which we translated into design through the concept of the Roman *limitatio*, creating borders and thus defining the city. Also, the need to anchor this identity to tangible heritage, consisting of the cistern, symbolizing the villa and its interaction with the territory through collective activities. Leading us to create the Eco Museum, which allowed us to achieve different goals: provide new and enhanced public spaces, and link city life with the surrounding territory to promote inclusion, sustainability, memory, and a tool to bond ancient and contemporary narratives.

The mixed use of drawings, models, photography, social interaction, written register, collages, as a whole synthesized on *mapping* as a tool and device, played a crucial role in this process. It detailed the typology, chronology, and functional attributes of the traces found, serving as a fundamental reference for subsequent design proposals. This comprehensive understanding of the site enabled us

to integrate historical research with contemporary planning needs, ensuring that our intervention would be deeply rooted in the cultural and historical fabric of the area.

By emphasizing the interaction between the community and its historical landscape, our project aimed to foster a stronger sense of place and identity. The Eco Museum, as a central feature of our design, was conceived not only as a repository of historical artifacts but also as a living space where the community could engage with its heritage through collective activities. This approach aligned with broader objectives of promoting cultural heritage, sustainability, and community inclusion, positioning our project as a model for integrating historical preservation with modern urban development.

4. MAPPING AS A DEVICE: DOCUMENTING, INTERPRETING, DESIGNING

Having chosen as the scale of preliminary observation analysis the territorial scale (imposed by the context of the oldest part of the Appia Park, in the municipality of Marino, where the area is located, such analysis has taken into account the previous field surveys available from bibliographic sources, the study of remote images, in depth diagnoses[6]; analysis of historical, cartographic and archival and toponomastic documentation[7]; analysis of ancient sources[8]; geomorphological studies[9]; ethnoarchaeological and anthropological investigations[10]; excavations on sites of particular importance in the perspective of the reconstruction of the landscapes in their context.

The Roman-era cistern in the area served as both a sign and document underlying the proposed integration into the archaeological park, enabling the allocation of part of the town to public space in line with recent urban policies. During the design phase, direct analysis and surveys focused on this element, evaluating aspects related to its conservation and its symbolic role in the project.

The information was collected in an archaeological map that was able to pin point on the area (and therefore able to be interpolated with the other analyzes that had been done) both real archaeological data and those of a hypothetical nature. The latter took in consideration two things: taking into account the memory of the community, which in the specific case of our area have received a powerful updating in contrast to the urban and territorial policies that have affected the town of Santa Maria delle Mole; and the possibility during the realization of the project to carry out a series of preventive archaeological investigations aimed to verify these hypotheses or in the case of the road system in the territory they tried to formulate using a scientific basis and trace the road in the area [11].

The realization of an interpretative map of the archaeological vocation of the territory, interpolated to the others created to investigate the characteristics of the current landscape, revealed a scenario that shows agricultural and productive use of the territory as a distinctive element that has continued through time.

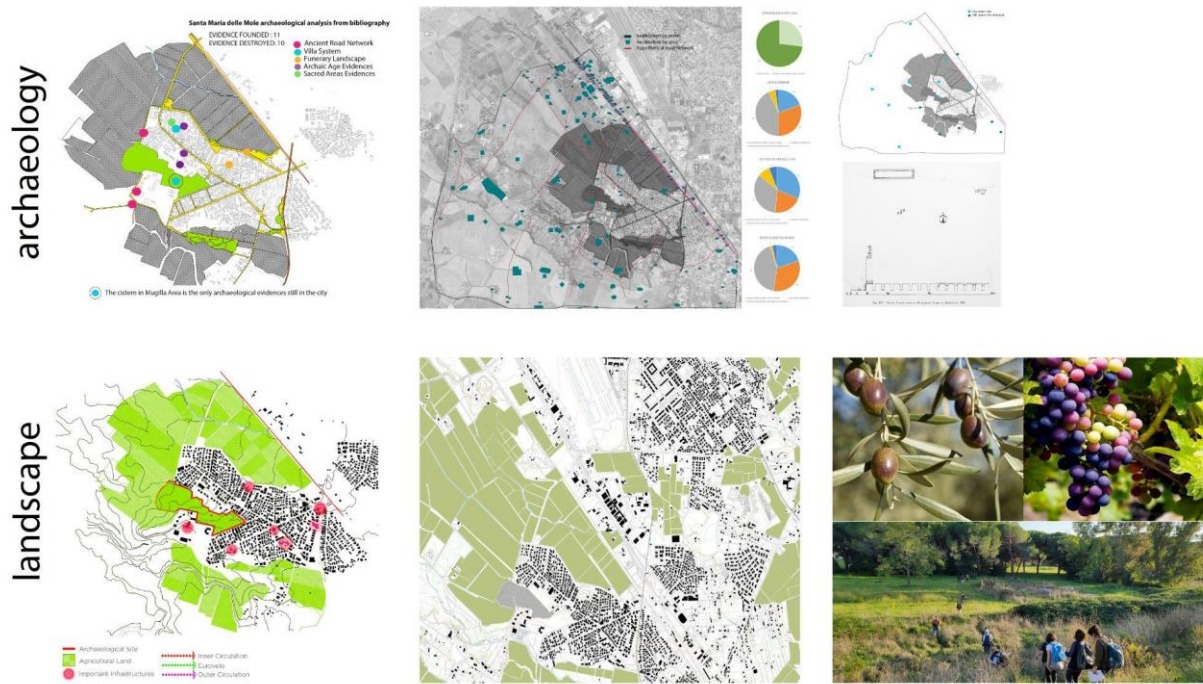


Figure 4. Archaeological and landscape maps - drawing by the authors

The cognitive process therefore led us to define the project strategy and suggested us to interpret the assigned area, showing evidence of the agricultural use of the territory, as a fundamental junction capable of relating the urban landscape and that of the surrounding area characterized by agricultural use. This made sense since the area is in a marginal position compared to the built-up area; the extension of the area to the entire perimeter of the urban center which has the same characteristics of "marginality" allows an organic action with a view to connecting the entire city fabric to the surrounding landscape, by infiltrating the layout of public spaces.

5. THE ENHANCEMENT PROJECT

Developing a project on this peculiar site, meant to address the complexity of an area characterized by an undefined perimeter and heterogeneous features. The material heritage of the community, often not monumental, were interpreted as part of complex historical frames in the evolution of the Appia park landscape and are enhanced through the creation of a network of paths and activities thus narratives, according to the archeological interpretation, leading to the historical reading of the landscape.

Marino's urban shape made no contribution to us, since it was not the result of urban planning, but the outcome of building speculation. The proposal did not seem to be a single space with an delimited programme, but rather an intervention on a territorial scale that would help the inhabitants to build their own cultural identity. The need to create, strengthen, and unite the community lacked a unifying element that could function as a social amalgam. From this project we seek to highlight those characteristics of the territory, the landscape and the history in such a way that they are positioned as a platform on which to build identity, i.e., community. With these goals in mind, the urban void had to be able to generate broader dynamics, oriented not only towards the urban front of the constructed area, but also towards the surrounding landscape of the archaeological park. Numerous analyses, both on the maps and on the field, confirmed our first impression: it was fundamental to identify a new compositional logic that would reverberate a cultural dimension throughout the city.

The composition of our group, as varied disciplinarily as culturally, allowed us to develop a work based not on material memory, which in fact had proved to be fragmented and not referable to an ancient urban dimension, but on the intangible heritage that the population shared. How to find in this an infrastructure to justify useful forms or strategies in the assigned area?

We started various mapping activities about the boundaries of the town and in relation to the park: all the streets were dead ends and the threshold with the park fenced off. So we realized that it was a city without a border and therefore we imagined a ring, which could be structured analogically to a Roman border. We then added to this structure the need for devices that could materially and immaterially define the border and tell the memory of the sites destroyed by speculation.

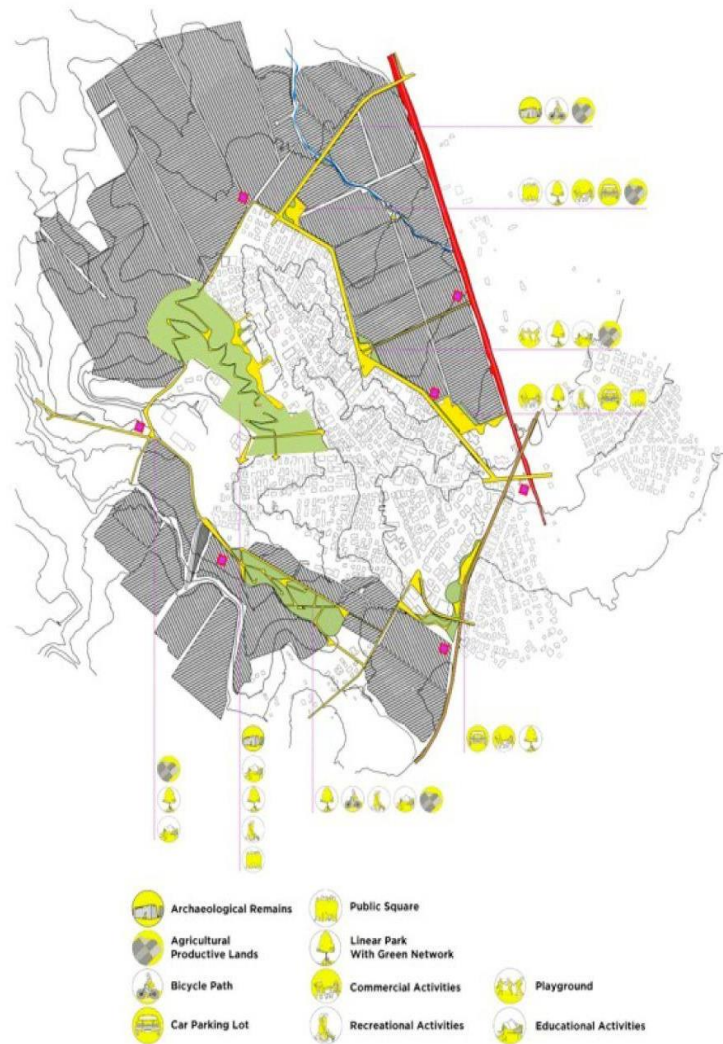


Figure 5. Masterplan of intervention, the idea of the Ring - drawing by the authors

François Hartog [12] explains perfectly how the vision of *historia magistra vitae* has been since Homeric times a way of declaring the present through the past by the use of an *exemplum*. It is with this philosophy that we looked at the structure of the territory in the Roman world: how was the urban boundary managed in relation to the context surrounding the city?

Thinking back to the Roman strategy, we have organized space according to the gradual transition that at least in part must have affected the area of Santa Maria della Mole. The parallelism proposed to define the border landscape of urban centers in ritual practices (and therefore of Roman social and

spatial management) of the *limitatio*: an ancient strategy to design the “borderscape”, flagged by terminus (physical landmark of the borders line). In this regard, the surviving monument at the basis of the agricultural use of the territory in ancient times could qualify itself (through appropriate design techniques) as a terminus/landmark of the past, able to disclose its meaning, making them temporal kaleidoscopes of signs in the landscape. From the *urbis* to the *orbis*, without new volumetries but with only the structuralisation and hierarchization of spaces so that the void is not occupied by a "new" autonomous element, tending towards the spectacularization of itself [13]. This structure has allowed us to give a directional adjective to a space that lacked it, also defining a modulation which leads to a greater awareness of the path by the user [14]. The idea is to involve the whole community within a public space that is conceived as a border: intended as a permeable membrane, a point and a moment of passage that requires to be managed through gradual experience that is able to offer the cognitive tools necessary to access one condition to another. With this motivation, it was decided to divide the area into functional areas, each of which constitutes a place and an educational moment that allows a multidimensional experience aimed at understanding the values contained in the landscape.

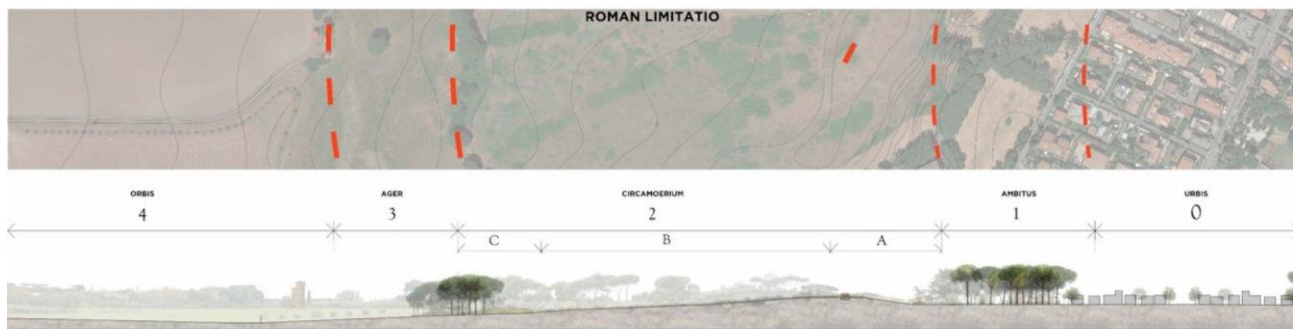


Figure 6. representation of the roman limitation on the area - drawing by the authors

Thus, the *ambitus* (public use, not built area) in a contemporary key became the park with an urban character, equipped primarily for a neighborhood use, with supplies for sports or spaces for everyday use: a large square and several sports fields, a watercourse and green areas with tall pine trees. We removed the border of the fence and allowed open access into the park leading into the archaeological site as the *Ambitus*, creating playgrounds, pavilions and seating spaces under the naturally abundant *Pinus* trees, where social activities such as festivals, farmer markets and Christmas markets can function.

Assuming the natural boundary identified by a small rise in elevation, we defined the next area, or the *circamoerium*: location for holy sanctuaries related with educational activities. In this area, at the top of the small rise, stands the only archaeological evidence that has been reconstructed as a cistern. In our vision for Marino, the *circamoerium* is composed of three sub-categories: we used the natural slope leading up to the cistern as an embedded theater where public gatherings for social or political demonstrations can take place. In conjunction to the introduction to the first historical pavilion that informs the visitor about the myth of *Mugillae* and the villa, this entire section with the cistern as the core articulates as the *circaemoerium*. From here onwards into the *Ager*, a trail raised over the revived agricultural field leads through a series of cultivation-specific pavilions oriented in organic positions towards the cultivations they have been designated for. These range from the “Olive Pavilion”, the “Grape Pavilion”, to the “Urban Crops Pavilion”, where not only ancient agricultural tools and historical information are displayed, but active educational activities with the cultivations can occur under a public paradigm. The end of this trail leads to a local winery/restaurant that processes the production of the field and can generate a socio-cultural space between producers and consumers. The tail of this trail has been integrated into the Green Ring and can connect back to the Appia Way, tying the intervention into a cohesive, holistic system of connections. These cultivations are in fact

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the intangible component of the local heritage, an indissoluble link with the past. The position of the cistern is decisive and by no means accidental, it is there so that it could irrigate the hillside, so we decided to restore its original landscape function, but in its contemporary configuration it becomes an urban vegetable garden and not a unit with an agricultural-productive character. This ring provides a more direct connection to the prominent Appia Antica, that is also integrated with the renowned Eurovelo biking trail across Europe reaching the *orbis* (the external world) [15].

The proposed eco-museum entity is therefore not an exact volume or perimeter, but a series of spaces and activities that narrate not only a production cycle but the tradition of a place with roots that do not refer to an artefact or a specific event, but to the identity that the inhabitants have chosen. Even the path traced, although it has its own direction, can be overturned or fragmented: all the areas described retain their own specificity and autonomy, while participating in the narrative of a collective space. Quoting Ferlenga [16] again, we can say that the meaning of the place has not been exhausted over the centuries, so much so that it continues to shape spaces and stories.

The stories are also echoed in some of the landmarks we have designed: just as in ancient times there were *termina*, we have re-elaborated the model into landmarks that can constellate the landscape, both urban and rural. We have a reinterpretation of the ancient *Terminus*, a concept in which a God, in the form of stones, defined the limit of the space, was carried out as landmarks in the shape of Totems. Taking this as a conceptual basis, we set a series of landmarks located along the pathways in which the archeological evidence spread in the area were curated as part of its musealization in the open field. Small obelisks with a didactic function that offer a resting place with seats but also surfaces to display plans and data useful for understanding the eco-museum, with information on history of the site, they become the voice of 125 destroyed archaeological sites in the vicinity (from roads to villas, funerary monuments to sacred).

Thus, we offer new collective spaces, suitable for the most diverse users, local as well as external. Cultural heritage is linked to territory and memory, which act as vectors of identity. Commemoration no longer becomes an act addressed to the past, to absence, but a moment of reflection on the present in which one's identity is reworked and reaffirmed. Memory no longer has the form of the ancient but conquers a place: a place of memory.

The lack of a perfectly delineated form or image of the past has allowed us to make this place more real and less idealised, definitively entering the dimension of local identity. Paolo Zermani's words are useful here to describe this approach: 'the journey into the immaterial does not mean escaping from the front of reality but taking on an inner material endowed with sensitivity' [17].

Our idea constitute an interesting experiment within the experiences of public archeology, incorporating in the installation's appropriate strategies for the realization of happenings and temporary configurations of the spaces. The "dynamic process for intervention phases" strategy could therefore qualify as an elastic tool for the progressive systematization of knowledge and places within the park.

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Places of Multiple Identities

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Extended abstract

Throughout history cities have been regarded as places bestowing identity that ideally transcends ethnic and cultural differences and social divisions. But in recent years, with the rapid transformation of the urban environment and the extensive population movements, cities are conceptualized as fragmented places of multiple identities. Contemporary cities are shaped by the different ideologies, beliefs, and diverse cultural dynamics they incorporate. In today's reality defining the cultural identity of a certain place is not always an easy task. Symbols of the past, monuments, artifacts and written historic works, stand as reminders of what a place used to be, as significant mnemonic cultural references. But they do not delineate the current condition of a constantly changing reality.

Mneme, the ability to preserve a set of ideas or behaviours through time, goes way back, as far as the cultural constructions of human history. It does not always operate in chronological sequences but acts as more of a selective process.

Philosopher Danniell Dennet uses the word memes in order to define belief systems, that form cultural entities on their own, and spread almost like a virus, from generation to generation, as replicators of ideas, reproducing similar but not exactly the same set of other ideas. The term meme is coined by the British evolutionary biologist Richard Dawkins. It also relates with the term mneme and describes a mechanism of cultural evolution based on memes, a notion that is analogous to the theory of biological evolution based on genes. In this sense the notion of cultural identity could be seen as something much more complex. As sets of different ideas and shared behaviours, combined together in different ways, forming different kinds of narratives. It can also be seen as a constant process of transformation that incorporates not only the past, but also the present and connect us with the future. Following Modern Athens' historical and cultural evolution, it seems that the particular and rather complex urban fabric of the city reflects an unorthodox urban development that has been occurring since the very beginning of the 19th century. Throughout the years as the city seeks to establish its very own identity, as a contemporary modernized European Capital, its urban environment is mainly characterized by radical economic, political and social change, having direct impact on the city's landscape. Although the city is linked from the very beginning to its mythical and glorious past of antiquity, its urban form, illustrates contemporary Athens as a place of a more complex identity, that relates to the rest of the Western Capitals not only by stating its similarities, but also by accentuating its "differences".

Keywords: *cultural, identity, complex, mneme, narrative*

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Vradeto, memory as a tool for the promotion and protection of a settlement of the absentees

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Extended abstract

This paper concerns Vradeto, a settlement in central Zagori area, the investigation of place identity as well as the policies required for its protection and sustainable development. The settlement, which has currently few permanent inhabitants, was recently included in the World Heritage List of UNESCO as a «protected cultural landscape».

The present research is part of the students' project entitled: "Protection and conservation at the scale of an urban center or historic settlement", in the MSc "Protection of Monuments", NTUA. The research aimed at highlighting the attributes of the settlement that make it unique in historical, cultural, environmental, societal and architectural terms. The research was based on the analysis of the settlement at different spatial scales and levels, a bibliography review, map analysis and fieldwork.

The outcome of field research has pointed critical features contributing in the making of the village's individual character. Of major importance is geomorphology and the landscape that encouraged the development of nearby settlements with different characters, all belonging within the network of the Zagori villages. More specifically, fieldwork was based on surveying and mapping architectural elements and spatial qualities, as well as on interviews with the inhabitants to identify the role of the village in the network of settlements. This part of the research was particularly challenging as the settlement is nowadays least inhabited, with only two permanent residents and few seasonal.

In such a settlement of 'absentees', the memory of few permanent and seasonal residents is a key-parameter in approaching the cultural characteristics of Vradeto and the way in which they were inscribed in the site. The network of churches and their association with rural and social life, the paths and their daily use to meet their basic needs, the festivals and celebrations taking place in public space, the natural environment with Vikos River and other streams, are significant elements of both intangible cultural heritage and place identity.

In this methodological framework, there has been an attempt to understand all the phases of evolution and eventual abandonment of Vradeto, investigate contemporary needs of inhabitants and their concerns for the future, and define the policies required for the preservation of the settlement's identity and its sustainable development. There is a prominent risk of over-tourism and rapid development without respecting place identity and resilience, with negative consequences for both the natural and the built environment. In the case of Vradeto, the research points as best policies both soft tourism development, and 'de-development', the main pillars of which are social care, autonomy and self-sufficiency.

Keywords: *memory, settlement of the absentees, village settlements, Zagori*

1. INTRODUCTION

The present work was carried out in the framework of the MSc "Protection of Monuments" - Direction A' for the course "Protection, design and management of historic buildings, ensembles and landscapes"

The exercise aimed to identify the characteristics that constitute the image and spirit of a settlement called Vradeto in Zagori, in order to create a strategic framework for the development of its protection and enhancement. A key tool of our methodology were the tabs for each building, created and completed during our visit to the settlement in order to collect all the necessary data. The main source of information were the interviews of the few inhabitants, but also the very few bibliographical references listed in the full issue of the study.

2. GENERAL CHARACTERISTICS

In the first phase, various data on the wider area of the settlement were analyzed in order to study the way it developed as well as other factors that may have influenced its development over the years. Its relationship with the surrounding settlements, as well as with other larger urban centers and its role within this context were key factors to define its position on the map.

The natural environment, the terrain and its components have created an environment of ravines, deep gorges, rich vegetation with a strong presence of water and snow. There are references to the settlement dated as far back as 1616, which may indicate that it has existed in its place for over 400 years. This gives the settlement a variety of values, the most important of which is the historical one.

3. GENERAL INFORMATION ABOUT THE SETTLEMENT

The settlement is located between two gorges on the southwestern slopes of Mount Tymphi and is the highest village of Zagori in the prefecture of Ioannina, just above the gorge of Mezaria, resulting in a stunning view of the landscape. The general picture that the settlement presents today is that of abandonment. Dense vegetation covers the few buildings while the majority of the buildings are nothing but ruins. The settlements that were once directly connected to Vradeto are Kapesovo to the south through the 'Stairs of Vradeto', Tsepelovo to the east and Monodendri with Aristi to the north. The urban development is interesting considering the historical data available. The inhabitants of the settlement mainly occupied areas around farming, while to a lesser extent agriculture existed exclusively to serve the needs of the settlement. If needs were not met, there was access to other settlements from which the inhabitants could further supply. Conditions changed abruptly in 1930 when the inhabitants started to migrate to larger urban centers.

Analyzing the data (old photographs, old maps, field study, etc.) it was found that the settlement was most likely built on a junction of an older network and over time developed organically around this core. The location of the nucleus cannot be ruled out that it was chosen exactly at the point where there seems to have been a junction in this road to the summer and winter paths to Kapesovo, which later on shows corresponding junctions to Tsepelovo. The core later evolved southwards, forming the second phase of the network's development. The next phase of the network comes after the expansion of the settlement to the north as inferred from its position in relation to the buildings. The final phase is identified as the extension of the asphalt road in 1973.

The settlement in its initial phase seems to have had no squares at all. Some places that are nowadays identified as such, are either additional configurations (e.g. central square realized in 1973), or the demolition of an older buildings without constructing another one in its place.

The majority of roads are currently in poor condition. The analysis showed that there are many interventions and they are generally considered to be inappropriate. The roads that are maintained still in the best condition until this day are located near the paved road from which one reaches the village. Cars enter the village up to the point of the central square.

The most important points of interest near the settlement are the "Stairs of Vradeto" and the "Beloi" site. The infrastructure is generally in good condition and can serve the few inhabitants of the settlement. This is of great importance for the development proposal, as for further increase of the population and consequently of the needs, the current infrastructure (electricity, water etc.) is not sufficient.

The majority of the buildings are built by the middle class, but are not poorly built. The typologies recorded are specific and not particularly varied. Generally, the buildings are not in good condition and as individual buildings are of no particular value.

The buildings are mainly residential. When the settlement was inhabited, small industries were housed within the dwellings and therefore there is no evidence of the uses of the buildings besides recent times. Today there is very little variation in uses which is limited to the modern core of the settlement, the square with the church.

The networks that form between the settlements are an element of the cultural heritage of a wider network that expresses a way of life of the people who once lived there. Vradeto was the center of intersection of these networks. **Its importance is highlighted when one considers its role as a hub in a wider network of routes.**

Today, due to the dense vegetation, the view of the landscape that the settlement once had has been lost. From the old photographs it can be concluded that there were no trees in the settlement, possibly there was intensive logging. The settlement retains to a satisfactory degree the old production structures, although in poor condition. The threshing floors, animal sheds, underground storage of the houses and many others, could perhaps form some "trails of tradition".

All of the above express the current state of the settlement through a cartographic, photographic, anthropological and experiential point of view. All together, they form a strong identity for the settlement that can as an element evolve into a development resource with the right conditions of protection and promotion in a wider cultural network. The lack of enhancement of the settlement is the main reason preventing its protection.

4. LEGISLATIVE FRAMEWORK

In the first phase, the settlement is protected by Greek legislation with Π.Δ.594/Δ/1978 (ΦΕΚ 404/Β/1965) and Law 423/Δ/1995 (ΦΕΚ 615/Δ/79). Each of them protects the settlement from a different aspect. This chapter has attempted to approach the broader legislative framework governing the settlement. Methodologically, all relevant references to the legislation were examined, then a critique of the legislation was made as it was assessed as general and that some observations do not apply to Vradeto, and in a subsequent phase an assessment of the implementation of the legislation was made. Finally, very interesting conclusions were drawn about the proposals for the enhancement of the settlement relating to the legislative aspect.

SWOT analysis

After all the relevant data, concerning the settlement were collected, a SWOT analysis table was completed, where all the above-mentioned data were listed in order to record the strengths, weaknesses, opportunities and threats of the settlement. This methodological step was crucial in order to have a comprehensive view of the data so as to evaluate them.

5. STRATEGIC DEVELOPMENT FRAMEWORK FOR THE PROTECTION AND PROMOTION OF THE SETTLEMENT

The next stage was to define the strategic objectives for the design of a strategic plan for the development, protection and enhancement of the settlement, which were identified through the work and through experience with the settlement. As the paper concludes, the most important objective becomes the protection of the settlement itself. In order for this to happen it was deemed necessary

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to increase the population through various methods presented in the thesis. It also becomes imperative to make the settlement a pole for naturalistic activities since there are several natural resources (ravines, viewpoints, lakes, etc.) very close by. In the same context, it is proposed to create an environmental-research center so that the area can further develop the contact with nature of potential tourists. A strategic objective is the development of the economy in general, based on the local resources that the settlement once had (pastures, traditional trades, etc.).

The settlement today is not defined. It is proposed to draw the boundary on the basis of the registered properties as derived from the land register. Once the boundary exists one can partially define uses as well as building restrictions. In addition, there is a need to further refine the morphological rules that apply today. An important legislative measure would also be the legal characterization of buildings or elements within the settlement of the man-made and natural environment as worthy to protect.

Economic measures and incentives are an important part of the strategic plan. Priority is given to measures that will develop the domestic economy with a view to achieving domestic self-sufficiency. Various amounts can be provided through financial projects to create “cooperatives” or to promote local products towards larger markets. In addition, financial funding can focus on supporting specific uses within the settlement that will also ensure self-sufficiency. Incentives should also be given to rehabilitate buildings, following their evaluation.

With regard to administrative arrangements, it is considered necessary to maintain and frequently monitor the existing road network, as the weather conditions are severe it is quickly damaged. At the same time, there is a need for a further expansion of traffic parking spaces, as well as the expansion of public transport to and from the settlement. At the scale of the settlement there is a need to support or create infrastructure (environmental, energy digital and cultural) to serve the strategic objectives set out earlier. Within the settlement there is a clear lack of maintenance of its network and a complete absence of the necessary urban equipment. The lack of emergency and disaster prevention infrastructure is a significant disparity.

As far as architectural proposals are concerned, they are divided into two categories, public space and buildings. More specifically, for the public space, it is proposed to restore and maintain the existing cobblestoned paths, all the frontages with curtain walls in order to restore the image of the public space, the maintenance of the covered entrances and other elements that constitute its image. With regard to the buildings, it is proposed that they be assessed, also on the basis of their degree of risk of collapse, as well as their value as individual buildings in relation to the wider context of the settlement. Finally, it is proposed to establish a network of cultural routes taking into account all the man-made and natural features of the settlement and its surroundings.

In conclusion, several other measures and projects which do not fall into any of the above categories are mentioned. Some of these include subsidized programs for the recording of oral history, strengthening of local tour groups, organizing seminars about traditional building techniques, and promoting to the public information about the values of the settlement, for example through a guidebook to be made available to visitors.

The Ship in the Museum, in the Palace, in the Kyrenia Castle, Cyprus

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“ὥστ’ ἔγωγε, καθάπερ οἱ ποιηταί, δέομαι ἀρχόμενος τῆς διηγήσεως Μούσας τε καὶ Μνημοσύνην ἐπικαλεῖσθαι.”

“Consequently, like the poets, I must begin my narrative with an invocation of the Muses and Memory” Plato, *Euthydemus*.

Extended abstract

Digital survey

Documenting large architectures with an accurate survey has recently become possible even with a limited budget. Digital survey tools based on both active and passive solutions, offers today versatile opportunities for the architectural documentation, regardless of the building's dimension. This lecture presents an extract of Terrestrial and Aerial Photogrammetry and Terrestrial Lasergrammetry. We accomplished a digital survey of the Kyrenia Castle in Cyprus during a specific workshop (activated for one week in May 2018) producing the first (partial) digital model of this building. The castle is a medieval fortification organized in an almost square plan with a side of about 150 meters and walls up to 30 meters high. Following the appropriate protocols and best practices for digital documentation of heritage buildings, the workshop coordinating committee, in synergy with the museum management unit, has accomplished on an articulated experience. The research includes studies on the morphology of the castle, its stratigraphy, the museographical aspects, the restoration issues, and the production of multimedia contents for technical and/or general public access. The castle currently hosts an archaeological museum displaying the Kyrenia Shipwreck, which indeed holds a preeminent role in the history of modern underwater archaeology.

Different levels of interiority

During the workshop, we experimented different alternative solutions for the redesign of this museum, following an established design methodology. The designer who is establishing a new function within an existing building is always dealing with a high number of formal constraints. In the case of a heritage building the number of formal constraints increases dramatically. We intend here by formal constraints the given condition that delimits the designer's freedom in determining forms within the project. The contextual setting of such a condition is therefore delimiting the different possibilities of the project. Constraints are not only those given by regulations and codes but are also the consequence of the search of meaning in the designers' intention. As a meaningful *μεταφορα*, it is like writing a comment to an existing text, a genre widely in use in the mediaeval tradition of religious literature. Therein it was not possible to write freely, it was possible to write only in relation to the sacred text and its different levels of meaning. Jacques Derrida was the first to establish this approach in modern philosophy giving birth within the architectural field to the so-called de-construction. It became an architectural style, which, by misinterpreting the sense of de-construction, was characterised mostly by broken forms. Within the contemporary production of museum architecture, especially within archaeological areas, it is possible to parameterise the different levels of meaning and relationship that the formal constraints given by the context (the castle), could establish within the content (the collection). Within the specific case of the castle, the projects established a formal and meaningful relationship between the container, the castle, and the content, the archaeological collection. The design activity determined how and where the visitor is

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able to read the meaning levels. As an example, we designed the museum entrance as a gate across a sacred limit, the *τεμενος*, which in the case of a museum acts as time gate. It became the place where the visitor goes across two different times, the contemporary time, and the trip in the past that the museum effectively impersonates.

Keywords: *Digital survey; architectural design, museum design, archaeology*

“Foundling Legacies” and Selective Monumentalization: The Case of the Parthenon

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Extended abstract

The universality of the Acropolis, and especially of the Parthenon, as a symbol of Hellenism represents a development not of antiquity, but of the post-antique world. During the Roman era, the high regard that Plutarch expressed for the buildings of the Acropolis was purely personal, since no *national* consciousness of Greek identity yet existed. The Acropolis monuments were simply admired as classic works of "ageless beauty" produced under Pericles (Pericles, 13.3). If we tried today to distinguish a national spirit embodied in ancient architecture, we would have to ask ourselves how much “Ionicity” would the Ionic temple of Artemis at Ephesus have evoked? Or how much “Aeolianism” would the Aeolian-style temple of Athena at Assos have imparted? Do such buildings convey an ethnic identity? Does architecture itself reflect nationality, or merely location?

Although being a Greek (versus a “barbarian”) is an ancient distinction that can be traced from Homeric times, a more cohesive, nationalistic sense of Hellenic identity or “Greekness” is a development of the late eighteenth century preceding the Greek Revolution. Disregarding the role of Christianity and Byzantium in the survival of Greek language and culture, a newfound national value was given to “Hellenism”, which was perceived as having its cultural roots in pagan, polytheistic ancient Greece. The European discovery of Greek antiquity during the European and Greek Enlightenment would provide an ideological background to the Greeks’ subsequent struggle for independence. Europe’s educated elite who embraced ancient Greek culture and philosophy were the ones who would give particular aid and support to the Ottoman-ruled Greeks to free themselves and form their own nation.

The narrative surrounding the Greeks’ national aspirations soon found its material existence in a monument – the Periclean Parthenon – which, despite its 1687 destruction and other tribulations, had retained most of the elements of its form. The ancient monuments of the Acropolis gave meaning to the current quest for independence as a *Greek* struggle and represented the material proof of its historical authenticity and legitimacy. For Greece’s Bavarian court of Ludwig I and his son Otto, the preserved Acropolis monuments were thought to lend weight and meaning to their own role as concerned hellenophiles aiming just as the ancients did to impose order within a wild, uncivilized region. The recognition of the Parthenon in particular as a symbol of Greekness created emotional links with the romantic movement of European neoclassicism.

Consequently, the "arrangement" of the Acropolis’ space – its "return" to a form resembling as much as possible that of the fifth-century BC sanctuary from the Golden Age of Pericles – was necessary for the modern nation’s absolute union with antiquity. No other architectural “interference” could be allowed to distract from this crucial connection. The intervening centuries between then and now did not exist. The newly founded Greek nation’s interventions on the Acropolis were a self-evident restoration consistent with the romance and naivety of the time. The contrived “unchanged” appearance of the Acropolis summit would forever confirm the “unchanged” spiritual bond between new and ancient Hellenism. Ultimately, the Greek Revolution itself predicted the fate of the age-old Athenian Acropolis – but as a victim or a victory trophy?

Keywords: *Parthenon; Acropolis; restoration; Greek Revolution; Neoclassicism; Greek Enlightenment.*

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Revitalizing Public Urban Places through Cultural and Political Memory: A Technological Approach

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Abstract

This paper delves into the intricate intersection of memory, place, and identity, exploring how new technologies, particularly Apple Vision Pro, illuminate this nexus. Leveraging the capabilities of digital twins and virtual reality, we embark on a multifaceted exploration to deepen our comprehension of how memory is intricately woven into landscapes and urban environments of cultural and historical significance. Through this approach, we discern key visual elements that evoke memory and heritage within physical environments.

Innovative applications through tools such as Apple Vision Pro can facilitate image extension to define place identity, where the technology informs the viewer on cultural and political entities of a varying timeline. Concurrently, visual storytelling techniques curated with Apple Vision Pro showcase the dynamic evolution of landscapes and the preservation of cultural heritage, offering new insights into the interplay between memory and physical environments. Furthermore, the integration of Virtual Reality (VR) technologies enables the recreation of historical landscapes and urban-scapes. This immersive approach invites users to transcend temporal boundaries, immersing themselves in reconstructed environments and experiencing the past in a dynamic and engaging manner. Semantic Image Search capabilities implemented using Apple Vision Pro streamline research efforts, facilitating the exploration of mnemonic landscapes. By uncovering images related to specific themes or keywords such as monuments, tradition, or cultural identity, we deepen our understanding of the intricate connections between memory, place, and identity.

This research investigates a methodology to connect digital twins and virtual environments with urban and non-urban environments and landscapes to illustrate the concepts of cultural, historical, and environmental sustainability. Central to this approach is defining the resilience of the current state, its evolution into the future, and emphasizing the significance of the past. These technologies not only facilitate a historical and cultural embrace but also evoke a nostalgic feeling of returning to a specific place years later. A methodology is introduced to analyze and quantify this approach of identity and its evaluation over time. This methodology outlines the integration of technologies necessary to achieve the goal of revitalizing public urban places through cultural and political memory.

Through these innovative applications, this paper contributes to the advancement of research in digital twins of spaces, urban transformation, and cultural heritage preservation. By offering novel insights into the complex relationship between memory, place, and identity in the digital age, we pave the way for a deeper understanding of our collective past and its impact on the present.

Keywords: *AR; identities; NTUA; TWT, Apple Vision Pro; Visual Reality; Immersive Experiences; Augmented Reality*

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1. Introduction

Virtual and augmented reality environments present an interest in researchers, engineers, and architects nowadays because of the established visual production and communication of ideas in modern culture. The same attention is given to the newly publicly introduced technology of Large Language Models (LLMs) with the commonly accepted tool ChatGPT. This paper briefly shows one of the latest developments in the field of artificial intelligence and its potential applications to the field of architectural and space representation. This study briefly discusses how LLMs can be effectively used to understand the space in which we are located, whether this is a square, a monument, a landscape, or a building with significant importance. LLMs are artificial intelligence systems that generate text/translate visual images using generative pre-trained transformers (GPT) architecture [1]. The paper presents some possible use cases of LLMs in urban understanding. Given the benefits of the LLMs, they are also prone to limitations such as biased results, prompt injection attacks, and colossal requirements of computational resources [1]. It is to be noted that the LLMs are helpful but are still in the early stages of development and need further in-depth research and evaluation for efficient use in transportation systems [1]. This work aims to address the integration of such technologies into the infrastructure and, more precisely, to the identity of a place. Recent advancements in multimodal large language models (MLLMs) have achieved significant multimodal generation capabilities akin to GPT-4. These models predominantly map visual information into language representation space, leveraging the vast knowledge and powerful text generation abilities of LLMs to produce multimodal instruction-following responses [2]. Specifically, we introduce augmented reality, which is connected to the multimodal generation capabilities of LLMs, to understand, illustrate, and predict the identity of a place.

Augmented Reality (AR) merges computer-generated data with the real world, enhancing people's perception of reality by integrating synthetic information into the live view of the physical environment. In AR, the physical world retains its predominant role, with computer-generated elements complementing and enriching the user experience. This technology falls within the realm of mixed reality [16], where virtual and real-world objects coexist seamlessly in the same space. AR systems such as the Apple Vision Pro enable real-time interaction by combining real and virtual elements within a real environment while also accurately registering virtual objects in three-dimensional space.

Genuine environments, whether urban or periurban landscapes are undeniably fundamental to our existence. However, they are not isolated entities merely existing in tangible form. Reality and its material expression are always accompanied, sustained, and perpetuated by intangible mental phenomena such as memories, fantasies, desires, and even fears, which manifest in symbolic or semantic expressions [15]. Over the past decade, AR has presented intriguing opportunities and practical applications for revealing cultural heritage, promoting historical materials, and facilitating interactive visualizations of heritage items [17].

Archeoguide was one of the first AR systems, which was built at the archaeological site of Olympia in Greece from 2000 to 2002 [18]. It provided personal AR tours and reconstructed the ruined cultural heritage sites to understand and experience the past. The equipment that has been used to make the 3D of the monuments possible is a head-mounted display (HMD) with an external camera and a compass, a backpack with a computer, a battery, and a wireless communication equipment [18].

An additional study aims to improve the identification and examination of spatial structures in architectural heritage settings by creating a "digital multi-parametric methodology." The study seeks to provide an all-inclusive online platform for evaluating and modeling environmental data by combining digital instruments like drones and thermal cameras with traditional surveying methods. The methodology is validated by conducting a case study on partially abandoned settlements in the Doris Municipality, Greece. The objective is to comprehend the relationships between spatial entities,

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the constructed environment, and the natural landscape, ultimately aiding in the evaluation of sustainability and resilience. [27]

Highlighting the significance of public urban and peri-urban spaces as catalysts for social identity and cohesion, the municipality of Kaisariani, situated on the outskirts of Athens, presents another compelling project. The redesign of the square aimed not only to provide visitors with recreational opportunities but also to offer them the chance to explore a virtual narrative of the historical and cultural heritage of the surrounding area. This initiative intertwines physical and virtual networks, offering visitors within the physical space and beyond the opportunity to engage with the cultural landscape through virtual navigation primarily. The creation of this virtual visiting network enables continuous data collection, enriching both the virtual tour structure and future utilization of the physical space. The square's surface was transformed into a map depicting the eastern part of the Aegean Sea and the western coastal zone of Minor Asia. Metallic signs embedded in the square floor feature QR codes, inviting visitors to embark on a virtual journey through the history of the Hellenic communities in Minor Asia [15]. Through such initiatives, which emphasize social interactions and the public display of collective affiliations, the crucial role of public spaces in shaping identities becomes evident.

2. Identity of Place Definition

Place identity, as a fundamental concept in human-environment relations, encompasses a variety of psychological theories and dimensions. Initially, place identity is defined as the aspects of self that shape an individual's personal identity in relation to the physical environment through a complex interplay of conscious and unconscious thoughts, emotions, values, and behavioral inclinations [5]. Various studies have further explored this concept, establishing connections between it, subjective regional identity, and attachment to places. Place identity has been described as a combination of physical processes, man-made elements, and the meanings attributed to places, emphasizing the diverse components that contribute to a place's identification within the spatial system [6]. They perceive the identities of places in varied ways, distinguishing them by considering diverse elements like physical features, cultural attributes, historical associations, experiential ties, and more [7]. There are mediating variables that impact the place's identity during the transition from the past to the present and the future.

Identity consists of two primary components. The first is the intensity, which signifies the strength of belief, and the second is the degree of positive connection with the object of identity [13]. Overall, place identity serves to distinguish regions from one another, drawing on elements such as nature, culture, inhabitants, language, and historical connections [7].

2.1 Evolution of Place Identity

The evolving nature of society, characterized by technological advancements, urbanization, and globalization, continually reshapes the physical and cultural landscapes of places, altering the ways individuals perceive and engage with their environments. Amidst these transitions, individuals navigate the complexities of past experiences, present realities, and future aspirations, shaping their evolving sense of place identity. Place identity, conceived as a subjective social construct, emerges as individuals distinguish one place from another, drawing on subjective cognition and objective physical settings. Memory plays a pivotal role in this process, serving as a mechanism that intertwines sensation with intellect and links present conditions with past experiences [10]. As memory intertwines with place, it becomes evident that places acquire identity not solely through material substance but also through intangible processes, collective memories, and ideological formations [10]. This dynamic interplay between memory and place underscores the significance of the "emplacement" of memory, highlighting the intricate relationship between collective memory and the formation of place identity [10].

2.2 Transforming space identity in society and architecture.

The dynamic nature of societal changes and architectural evolution has significant impacts on both society and the architectural community. The swift progression of urbanization and globalization in society necessitates a reevaluation of cultural identity and social interconnectedness. As communities embrace new influences and experience architectural changes, old values may undergo a transition, which can affect social unity and collective memory. Furthermore, political interventions and global events such as globalization have the potential to disturb the historical flow and redefine the narrative of a location's identity. These changes force communities to balance the conservation of their cultural traditions with the need for progress, impacting the citizens' sense of identity and ongoing connection. These shifts require the architectural community to reassess design ideas and approaches to creating places. Architects are faced with the challenge of balancing the preservation of historical identities with the accommodation of modern demands and aspirations. This necessitates a meticulous equilibrium between conservation efforts and inventive design interventions that protect cultural heritage while promoting adjustment to contemporary circumstances. Moreover, the impact of worldwide trends and international cooperation significantly influences architectural discussions, resulting in the development of novel paradigms and design methodologies.

Environmental psychology is crucial for comprehending human behavior in constructed environments [12], assisting architects in designing spaces that evoke people's emotions, values, and memories. The analysis and improvements of current theories in environmental psychology provide guidance for design techniques that prioritize the well-being and user experience. This reflects the shifting dynamics of place identification in a rapidly evolving world [11]. The alteration of a community's surrounding natural environment over time reshapes its social structure, consequently impacting the identity of the place [11].

3. Technological Tools: AR Technology & LLM integration

3.1 AR and VR technologies

In this section, the evolution, applications, and emerging challenges of Augmented Reality (AR) and Virtual Reality (VR) are outlined, identifying their transformative impact on place and identity.

AR technology enriches the real world by overlaying digital content like images and sounds onto the user's environment in real-time, seamlessly integrating digital elements into their surroundings. Conversely, VR immerses users in simulated environments, disconnecting them from the physical world through devices like VR headsets that control visual and auditory perceptions. This immersive experience enables users to explore various environments and scenarios, ranging from lifelike to fantastical realms [23].

While definitions of AR and VR were more clearly defined and popularized in the 1990s, studies about these technologies can already be found in the late 1950s [23]. Early AR and VR systems struggled with accessibility and practical use. For example, the ARCHEOGUIDE project, an early 2000s initiative funded by the EU to enhance archaeological site tours with AR, involved the use of Head-mounted displays, a laptop with several hardware attachments as well as heavy backpacks, which highlights the significant logistical complications of early AR implementations [26].

In recent years, AR and VR have found widespread application, for example, in architectural design and education [19]. Today, these technologies are increasingly integrated into infrastructure projects to enhance visualization [22] of complex infrastructure systems [23] or for guided tours in museums [24] [20].

Despite advancements in AR and VR, challenges remain in the widespread adoption of AR and VR in said fields. Issues include complications in outdoor environments due to temperature and

luminance changes, device user-friendliness [21], localization method accuracy [21] and practicality, and high latency [23].

Latest technology like the Apple Vision Pro, a mixed reality headset, offers high-resolution displays and spatial audio capabilities, enhancing user experience. The Apple Vision Pro incorporates eye and hand-tracking technologies by using a total of twelve cameras, six microphones, and five sensors to enable intuitive interaction with virtual environments without the need for conventional controllers. Two onboard processors, one specifically designed to calculate inputs, are included to reduce latency, making it possible to transmit sounds and images within 12 milliseconds, which is an important aspect of reducing motion sickness [25].

Future research in AR technology may focus on addressing challenges like occlusion, localization method accuracy [22], enhancing device affordability and performance, and developing standardized AR tools for better application integration and comparison across academic and engineering communities [24].

3.2 Augmented reality in the infrastructure world

Apple Vision Pro overlays digital content in real-world environments. While standing at Monastiraki Square in Athens, one can view the surrounding area and simultaneously access historical images and information from outputs like ChatGPT or other large language models (LLMs).

The device's spatial mapping ensures that digital elements are accurately placed onto real-world objects and stay fixed in the user's physical surroundings, as it has the ability to adapt to the physical environment by using, for instance, a LiDAR (Light Detection and Ranging) sensor. Furthermore, Vision Pro makes it easy to interact with multiple windows, as the user can open various applications and information sources and is able to place them around himself. Precise eye tracking enables intuitive navigation, as one can select virtual content by simply looking at it. Hand gesture recognition is another key feature, allowing users to resize, move, or close application windows with simple gestures. Besides, voice control and Siri integration provide hands-free operation by allowing users to issue commands and search for information [25].

All these features make it easier and more accessible for users to connect real-time information from LLMs like Chatgpt with locations, creating a deepened understanding of place and identity.

3.3 LLMs and Generative AI in the infrastructure world

Large language models (LLMs) are AI systems trained on massive datasets that enable them to perform complex language tasks. With billions of parameters, LLMs can infer context, generate responses, translate languages, summarize text, answer questions, and even assist with creative writing and code. These capabilities are revolutionizing fields like chatbots, virtual assistants, content creation, research, and translation, making LLMs a cornerstone of modern AI. Large language models (LLMs) are a category of foundation models trained on immense amounts of data, making them capable of understanding and generating natural language and other types of content to perform a wide range of tasks [3]. LLMs have become a household name thanks to the role they have played in bringing generative AI to the forefront of the public interest [3]. This technological advancement has occurred alongside the evolution of machine learning, machine learning models, algorithms, neural networks, and the transformer models that provide the architecture for these AI systems. LLMs are a class of foundation models that are trained on enormous amounts of data to provide the foundational capabilities needed to drive multiple use cases and applications [3].

LLMs represent a significant breakthrough in Natural Language Processing (NLP) and artificial intelligence and are easily accessible to the public through interfaces like Open AI's Chat GPT-3 and GPT-4, Meta's Llama models, and Google's Gemini tool, IBM's Granite model with the products Watson Assistant and Watson Orchestrate.

3.4 LLM Tools to Describe Place Identity: An approach with ChatGPT.

ChatGPT, when combined with DALL·E, showcases numerous notable abilities in generating outcomes. DALL·E, the AI system that creates realistic images and art from a description in natural language, is directly integrated into ChatGPT [4]. ChatGPT's advanced natural language understanding is demonstrated by its capacity to comprehend and interpret intricate prompts regarding historical eras and hypothetical futures. The generation of intricate prompts for DALL·E exemplifies ChatGPT's aptitude for imaginative cognition of the future development of space. It creates narratives by combining historical facts with imaginative elements that are appropriate for specific time periods. The integration of ChatGPT with DALL·E showcases the cross-modal capacity of AI systems to convert textual descriptions into visual representations. ChatGPT demonstrates its profound understanding of historical facts by integrating well-known historical aspects of a specific space into the image generation prompts, showcasing its comprehensive knowledge of the past up to the present time. The tool has the ability to demonstrate urban developments based on the AI's proficiency in generating realistic future scenarios. The diverse functionality of AI is demonstrated through its ability to be utilized for educational, creative, and speculative purposes. Additionally, we emphasize AI's ability to connect the divide between written and visual communication, thereby creating fresh opportunities for generating content and ideas.

4. Methodology and Discussion

4.1 Methodology

This section outlines our approach to evaluating the identification of spaces. Initially, we determine the specific location or space that we wish to analyze, either by capturing our own photograph of the space or by locating it through Google Street View. In this section, we provide a detailed explanation of the methodology employed to establish the identity of the LLM tool. Finally, we present the incorporation of this data into the Apple Vision Pro to enhance the current environment with the identification produced by ChatGPT. Figure 1 depicts the concept of place identity and how it is visually represented through the use of technology.

Based on the work performed by ChatGPT and DALL·E in creating and processing complicated prompts and visualizing information, we created a methodology pipeline. To carry out our preliminary assessment, we needed to collect input data from which we could derive context. During the first stage of our method, we decided to use rapid formulation. During the first stage of our method, we opted to utilize prompt formulation.

Concretely, we obtained the image of Google StreetView and instructed ChatGPT to ascertain whether it recognizes the space. We provide the name of the space as additional context and information in situations where recognition fails. Subsequently, we depended on a crucial element that involved creating clear and accurate questions to obtain information. This involved skillfully employing natural language processing (NLP) techniques to analyze and organize user inputs into clear prompts, addressing their informational requirements related to space identification and providing historical and cultural insights.

As mentioned before, ChatGPT is trained by utilizing an extensive amount of data, which encompasses photographs and historical records. LLMs are employed to measure identity by soliciting space-related information, such as inquiries about the construction date of a square, the identity of its builder, the evolution of its structure and its usage from ancient to Byzantine to modern times, and the architectural trends that influenced the emergence of new standards and design approaches during that period.

The utilization of DALL·E is a result of combining Apple Vision Pro with the visual depiction of the space. An interaction involving the utilization of Apple Vision Pro in Google StreetView, along with

a real-time conversation with ChatGPT, whether through written or spoken language, simulates a discussion with someone who possesses knowledge about the subject matter, like a tour guide equipped with comprehensive information or gained expertise. Taking this a step further, we aim to convert the textual information into a visual representation, specifically an image. We request DALLE to develop an image depicting the spatial changes over various time periods throughout the years. We specifically requested an image depicting Monastiraki Square during three distinct periods: ancient times, the Byzantine era, and a speculative future scenario set 50 years after the completion of this project in 2074.

We proceed with an iterative process of improvement, recognizing that the provided images are not derived from accurate historical images and sources but rather serve as a means of generating imaginative representations. Therefore, we proceed with the feedback loop, which enables the user to observe the produced image and offer input regarding its precision and aesthetic attributes. The main issue of these technologies lies in their limited accuracy in generating photographs and their inability to produce photos from historical sources, instead relying on generating them from scratch. However, it should be noted that ChatGPT offers references to websites where users can access and review information about the space. The final stage of the process focuses on delivering the output and facilitating user interaction. We accomplish this by presenting a polished image to the user through a user-friendly interface, specifically the Apple Vision Pro. Afterward, users are able to engage in an interactive exploration using the Apple Vision Pro, enabling them to interact with the generated content. This includes actions such as zooming, editing, or overlaying supplementary information, which enhances the educational and creative experience. Figure 2 illustrates the methodology of place identity, which is based on a technological approach involving LLMs and augmented reality.

This pipeline emphasizes the integration of NLP and computer vision, enabled by machine learning methods, to not only produce spatial identification of content but also create an interactive and dynamic platform for creative and instructional objectives. The pipeline is designed to be iterative, with user feedback immediately influencing continuing enhancements and adjustments, ensuring that the system adapts to user needs and technical changes.

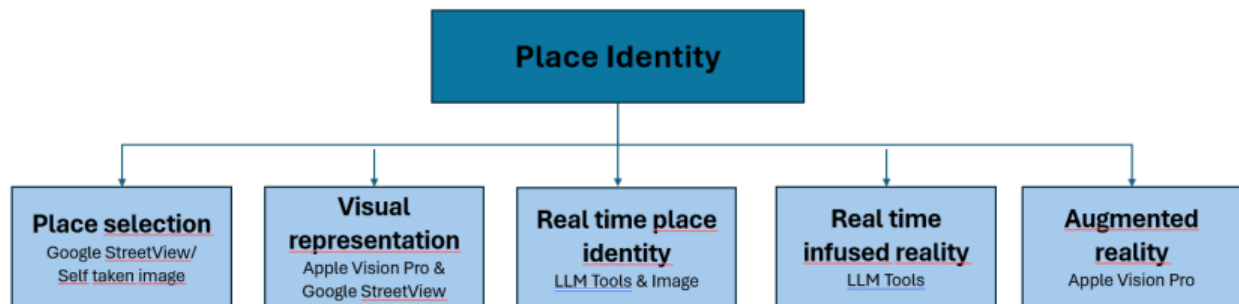


Figure 1. Place identity and its representation by technology

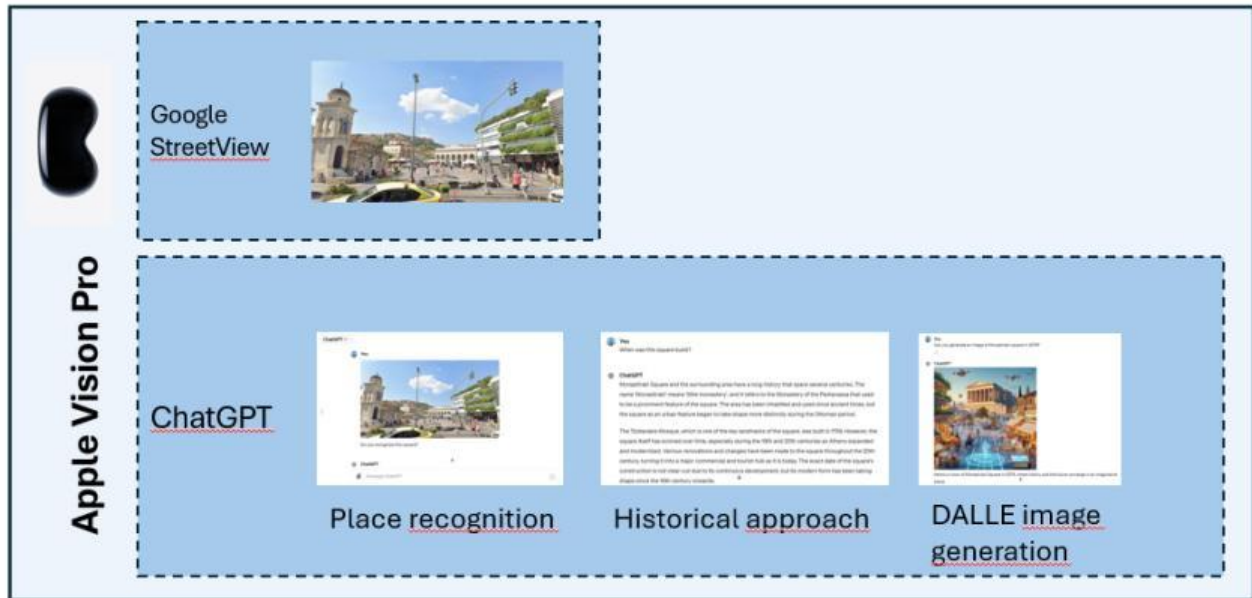


Figure 2. The methodology of place identity is based on the technological approach with LLMs and augmented reality

4.2 Use Cases and Discussion

For this methodology, we explored Monastiraki Square, which is one of the most vibrant squares in Athens, Greece, and has a long architectural, historical, and cultural importance. ChatGPT immediately recognized the square and was able to answer all the questions we asked. The approach that was wanted would have been to discuss with ChatGPT whether it was a real tour guide or a historian and architect altogether. It gives us information on *"the mixture of architectural styles, including the Tzistarakis Mosque with its distinctive dome, which now houses part of the Museum of Greek Folk Art, and the Byzantine Church of the Pantanassa."* We also received cultural information: *"Monastiraki is known for its flea market and vibrant atmosphere, a mix of ancient and modern that's characteristic of Athens."* When asked: *"Can you show me pictures from the ancient times of the square?"* ChatGPT answered: *"Finding authentic pictures of Monastiraki Square from ancient times would be quite challenging, as the concept of photography did not exist until the 19th century. However, there are historical records and drawings that provide us with an understanding of what the area may have looked like."* We were not able to show any illustrations of the square. *"I'm sorry for the confusion, but as an AI developed by OpenAI, I currently don't have the ability to browse the internet or access external databases in real-time, so I can't retrieve or show existing images or drawings from external sources."*

To build a visual understanding of these times, we requested the representation of these eras, as shown in Figure 2. The goal is to correlate the different time periods with the space identity and its evolution. More accurate results could be obtained by combining tools such as ChatGPT and Gemini. While Gemini does not recognize the square with its current technology, it is able to show a search in the network and accurately find an ancient representation of Athens as given by <https://ancientathens3d.com/>, a similar approach someone would follow on a Google search. The result of this approach is shown in Figure 3.



(a) Ancient representation (b) Byzantine representation (c) Future representation

Figure 3. DALLE generated images on three different representations of the Monastiraki square.

✦ I cannot unfortunately show you a picture of what Monastiraki Square looked like in ancient times as there are no depictions of this specific area. However, I can show you a recreation of what Athens looked like in ancient times:



Figure 4. Gemini provided a representation of Monastiraki Square.

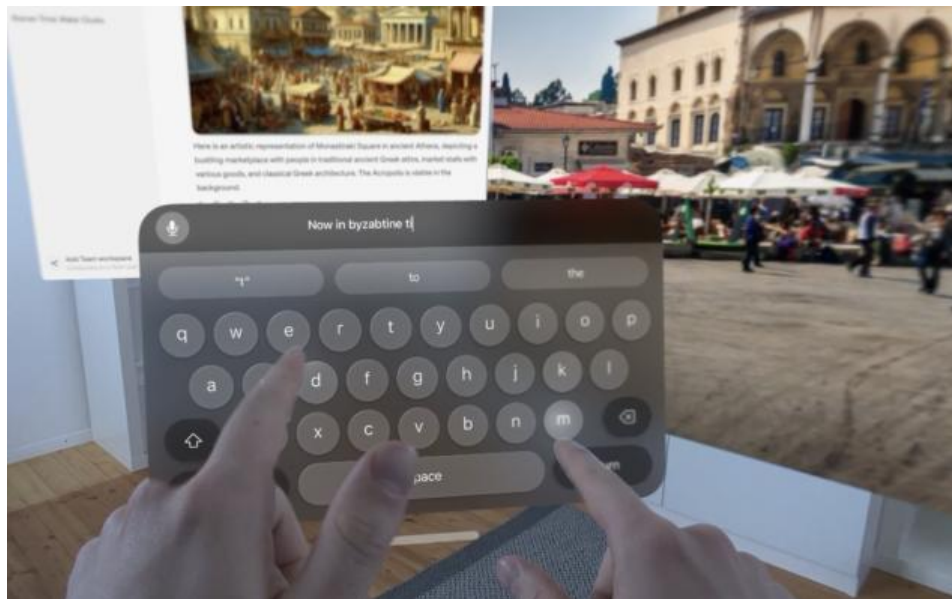


Figure 5. The space visual represented with Apple Vision Pro

In these examples, we show the powerful ChatGPT tool, but as shown and described in the methodology, there are a few advancements that need to be considered. For instance, there is a need for customized training models for these tasks. During the work of this pipeline, we show the

importance of the improvement of the LLM tools to adjust their capabilities on space identity, and Llama is the most capable openly available LLM [4]. The significance of the Llama tool by Meta is the fact that it allows further training on new, more specific tasks. The vision is to enable developers to customize Llama 3 to support identification analysis and historical correlation of places. More specifically, the LLM model can be re-trained, specializing in the space's identity and its historical, cultural, and political transformation throughout time.

4. Conclusion

This study has critically explored the transformative potential of augmented reality (AR) and large language models (LLMs) in redefining public urban spaces through the lens of cultural and political memory. By integrating AR with the sophisticated capabilities of LLMs, particularly through platforms like Apple Vision Pro and ChatGPT, we have outlined a robust methodology to enhance the identification and appreciation of place identity in urban environments. Our findings demonstrate that AR can significantly enrich the physical experience of a location by merging digital information with real-world contexts, thus allowing for a deeper engagement with the historical and cultural layers of urban spaces. Virtual Reality (VR) further extends these capabilities by creating immersive environments where past, present, and future narratives of urban landscapes can be experienced, offering users a unique perspective that is not possible through traditional means. The use of LLMs, exemplified by ChatGPT, has shown promising results in generating detailed narratives and visual representations that anchor the memory of a place within its physical attributes. These models not only facilitate a richer interaction with the environment but also act as repositories of cultural memory, capable of conveying complex historical and social narratives through their generative abilities. The integration of these technologies into the study of place identity suggests a dynamic and innovative approach to urban design and heritage conservation. The ability to overlay digital twins with real environments in AR, combined with the narrative and analytical power of LLMs, provides a powerful tool for architects, planners, and heritage professionals to explore and interpret urban spaces in ways that were previously unattainable. Future research should focus on refining these technological tools improving their accuracy, user-friendliness, and accessibility. Additionally, further exploration into the ethical implications and potential biases inherent in AI-driven interpretations of cultural and political memories is crucial. In conclusion, this research paves the way for a new era of urban and architectural design, where digital and physical realms merge to enhance our understanding of place identity. By harnessing the power of AR and LLM technologies, we can not only preserve but revitalize the memory embedded within urban landscapes, ensuring that they remain dynamic, relevant, and meaningful for future generations.

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Urban planning methods as tangible and intangible expression in Constantinos Doxiadis and Adriano Olivetti's approaches: Revisiting their work via the lenses of urban-scale digital twins

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Abstract

At the heart of the paper is the development of methodological tools that offer the possibility of developing new forms of participatory planning by linking the use of artificial intelligence and big data in urban planning with the holistic approaches of urban planning of Constantinos A. Doxiadis and Adriano Olivetti. The paper pays special attention to the role of tangible and intangible expression in Doxiadis and Olivetti's thought, and to how their approaches understood the relationship with place identity and sustainable planning and development. Particular emphasis is placed on the concepts of 'entopia', 'ekistics', and 'Ecumenopolis' in Doxiadis's thought, on the concept of 'concrete utopia' in Olivetti's approach, and on the role of visualization via the use of computers in the case of Doxiadis Associates Computer Centrer (DACC). Urban scale digital twins, which have as a core characteristic the possibility to be updated in real-time thanks to the use of technologies such as big data and artificial intelligence, aim to compare different strategies during the processes of decision-making concerning urban and spatial planning. At the core of the paper is the comparison of the ongoing and growing use of urban scale digital twins applications in decision making in urban planning with the methods of visualization used in the case of Athens Center of Ekistics.

Keywords: Constantinos A. Doxiadis; Adriano Olivetti; big data; urban scale digital twins; concrete utopias; artificial intelligence; digital universalism; Ecumenopolis; tangible and intangible expression

1. INTRODUCTION

Urban scale digital twins, which have as a core characteristic the possibility to be updated in real-time thanks to the use of technologies such as big data and artificial intelligence, aim to compare different strategies during the processes of decision-making concerning urban and spatial planning. At the core of the paper is the comparison of the ongoing and growing use of urban scale digital twins applications in decision making in urban planning with the methods of visualization used in the case of Athens Center of Ekistics [1]. The paper also intends to shed light on the tension between the real and the ideal at stake during the process of abstracting sets of variables and processes in the case of urban scale digital twins [2]. The use of digital technologies in the field of inclusive cultural heritage aims to shed light on the connections between the tangible and intangible aspects of urban planning. Within the framework of their endeavor to incorporate digital technologies in their research, Alison McCandlish and Gayle McPherson, for instance, "explore the use of two complementary digital methods: digital cultural asset mapping and digital storytelling to reveal hidden heritage and engage the local citizen's voice" [3].

The paper places particular emphasis on the concept of Ecumenopolis in the work of Constantinos A. Doxiadis [4], and the relation of urban governance in the thought of Constantinos A. Doxiadis and Adriano Olivetti to contemporary urban planning practices based on the use of artificial intelligence and big data. According to Doxiadis, Ecumenopolis would "form a continuous, differentiated, but also unified texture consisting of many cells, the human communities" [5]. Moreover, special attention is paid to Adriano Olivetti's understanding of urban planning methods as concrete utopias [6,7,8]. Both Doxiadis and Olivetti, instead of framing their practice and theory within the frontiers

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of specific disciplines, tried to reflect on strategies of reconstruction beyond conventional models. Their way of thinking at the intersection of different domains of practice explains why the examination of their activities is essential for understanding the role of urban planning in enhancing political emancipation. Both holism and interdisciplinarity lie at the heart of Doxiadis's approach to the understanding of human progress. Doxiadis drew a distinction between interdisciplinary and a condisciplinary science. In "Ekistics, the Science of Human Settlements", published in *Science* in 1970, Doxiadis highlights: "To achieve the needed knowledge and develop the science of human settlements we must move from an interdisciplinary to a condisciplinary science" [9].

2. THE ROLE OF URBAN SCALE DIGITAL TWIN IN DECISION-MAKING IN URBAN PLANNING

Recently, within the field of smart cities, the notion of urban scale digital twin has acquired a central place. The term 'digital twin' refers to the digital representation enabling comprehensive data exchange and can contain models, simulations and algorithms describing their counterpart and its features and behaviour in the real world. A 'digital twin' is a digital representation of a physical process, person, place, system or device. The term 'digital twin' firstly emerged in the field of manufacturing sector to refer to digital simulation models that run alongside real-time processes. 'Digital twins' are digital replicas of physical entities [1]. Their creation is based on the use of advanced technological applications, such as sensing, processing, and data transmission. Digital twins are used in the field of urban analytics, as well as in the field of computational social sciences. Digital twins enhance evidence-based operational decisions and experimentation on urban policies. The current state of research concerning the role of digital twins in shaping urban policies is characterized by a dichotomy between scholars that focus on the technological and sustainable benefits of the use of urban scale digital twins and researchers that criticize 'digital universalism'. Digital twins enhance evidence-based operational decisions and experimentation on urban policies.

The European Union has set the following goals regarding sustainable urban planning strategies: firstly, the empowerment of "urban actors towards common goals; secondly, the development of people-oriented urban planning strategies that aim to contribute to the social equity of communities; thirdly, the development of digital platforms and other digital tools that intend to enhance interactive and proactive approaches in urban planning decision-making, and "the creation of integrated, open, and functional technological infrastructures for the development of programmes and the provision of services (data-driven planning)". Among existing urban scale digital twins that are either in operation or under development are the twins of the following cities or districts: that of Athens in Greece, that of Dublin Docklands in Ireland, that of Herrenberg in Germany, that of Vienna in Austria, that of Zurich in Switzerland, that of New York in the United States of America, that of London in the United Kingdom, and that of Helsinki in Finland. Other note-worthy urban scale digital twins are those of Cambridge, Gothenburg, Munich, Newcastle, Paris, Rennes and Rotterdam. Two programs that play a major role in shaping sustainable urban planning methods are the European New Green Deal, the Agenda for Sustainable Development and its Sustainable Development Goals, which is also known as SDGs. The former – the European Green Deal – is based on the intention to achieve zero net emissions by 2050. This program places particular emphasis on achieving a circular economy by 2050, and on protecting biodiversity. Digital twins are also used in the domain of cultural heritage, as mentioned by Marijana Ćosović, and Mirjana Maksimović, in their paper entitled "Application of the digital twin concept in cultural heritage" [10, 11], as well as by Li Xin, Gu Hongyu, Seo Eun Kyeong, Wu Qitao, Yin Guojun, and Deng Bangkun, in their paper entitled "Towards Cultural Heritage Digital Twin: Concept, Characteristics, Framework and Applications" [12].

3. THE ROLE OF ‘ENTOPIA’ IN CONSTANTINOS A. DOXIADIS’S THOUGHT AND THE ROLE OF ‘CONCRETE UTOPIA’ IN ADRIANO OLIVETTI’S APPROACH

Doxiadis believed in the potentials of ‘entopia’ instead of utopia or dystopia. Doxiadis defined ‘entopia’ as the place that is practicable-that can exist. Informing regarding this term is its etymology: “εν” in Greek means “in”, and “τόπος” in Greek means “place”. Doxiadis referred to the term ‘entopia’ during his Trinity College lectures in 1966. An analysis of this notion is included in his book *Between Dystopia and Utopia*, which was published that same year [13]. According to Doxiadis, architectural or urban design strategies could be characterized as ‘entopian’ if they take into consideration environmental and physical limitations, and the networks that concern the social aspects of architectural or urban projects. Moreover, Doxiadis pays special attention to the capacity of architectural or urban design strategies to respond to the dynamic parameters concerning the settlements. Within such a framework, Doxiadis conceptualized the so-called ‘ekistic grid’ as a tool aiming to provide architecture and urban planning solutions able to promote ‘entopia’. Doxiadis was convinced that ‘entopian’ architecture and urban planning projects should place particular emphasis on the following five elements and their interconnections: Nature, Man, Society, Shells and Networks (Fig. 1).

At the center of Olivetti’s vision was the search for the elaboration of new models of civil cohabitation. Of great significance for understanding Olivetti’s political agenda is the way he conceived the relationship between democracy and community. Olivetti gave much importance to the relationship of citizens to institutions. Four seminal works for understanding Olivetti’s vision are his books entitled *The political order of the communities: of the state according to the laws of the spirito* [*L’ordine politico delle comunità: dello stato secondo le leggi dello spirito*] [6], *For communitarian economy and politics* [*Per un’economia e politica comunitaria*] [14], *City of Man* [*Città dell’uomo*] [15], and *Society, State, Community* [*Società, Stato, Comunità*] [7]. As Italian sociologist Franco Ferrarotti has underscored, Olivetti’s utopian vision could be characterized as ‘concrete utopia’ in the sense that his understanding of communities as concrete goes hand in hand with his conviction that communities are determined by geography and history [16].

connections of elements
intezual cohesion of conceptions

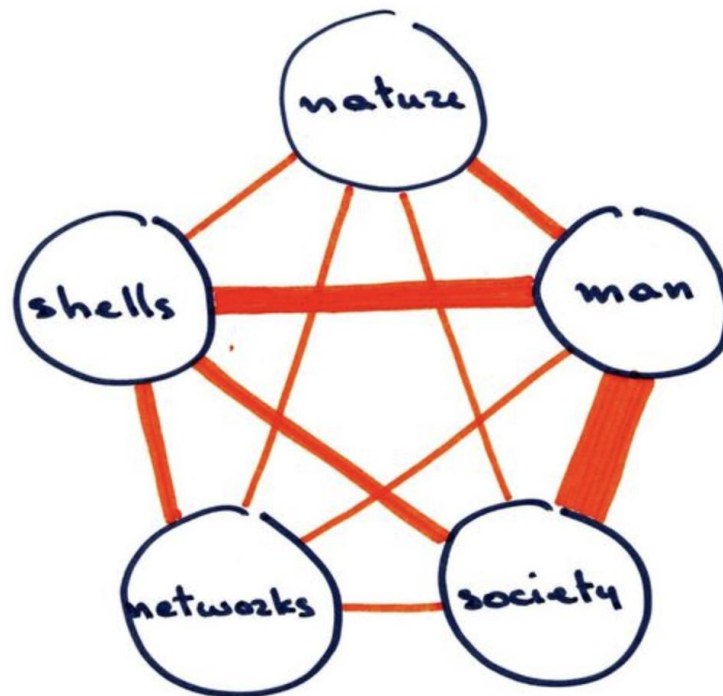


Figure 1. Diagram by Constantinos A. Doxiadis concerning “connections of elements” © Constantinos and Emma Doxiadis Foundation

4. THE CONCEPT OF ‘EKISTICS’ IN DOXIADIS’S WORK AND THE ORGANIZATION OF DELOS SYMPOSIA

According to Constantinos A. Doxiadis, ‘ekistics’ refers to the science of human settlements. According to Doxiadis’s theory of Ekistics, the Elements of ekistics are divided into five parts, namely nature (human), human (antrophos), society (society), reflection (shells) and networks (networks). He highlighted that he originally used this term during an ensemble of lectures he delivered at the National Technical University of Athens in 1942. Important for understanding the approach of Doxiadis is his concept of ‘ekistics’, which he analyses, among other texts, in the study entitled *Ekistic Studies — Ekistic Analysis [Οικιστικές Μελέτες Οικιστική Ανάλυση: Οδηγίες για τη Μελέτη των Χωροταξικών, των Οικιστικών και Πολεοδομικών Προβλημάτων και για την Ανοικοδόμηση της Χώρας]* published in 1946 [17]. According to Doxiadis, ‘ekistics’ operate at three levels: firstly, general ekistics; secondly, urban planning, and thirdly, building design and construction.

Analyzing the history and legacy of the Delos Symposia, which were organized by Doxiadis and British planner Jaqueline Tyrwhitt between 1963 and 1975, one can understand how important interdisciplinary was for Doxiadis’s approach. Doxiadis died on 28 June 1975.

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Twelve Delos Symposia were organized in total. Mark Wigley, in “Network Fever”, examines the debates around networks and urban dynamics that took place in the framework of Delos Symposia. The core theme of the first Delos Symposium was “The present crisis in human settlements”. Among the topics that were addressed during the first Delos symposium, which was held in July 1963, were “The present crisis”, “Objective causes of the crisis”, and “Subjective causes of the crisis”. Among the contributors to the first Delos Symposium were American Anthropologist Margaret Mead, Swiss Architecture Historian Sigfried Giedion, and Canadian Philosopher Herbert Marshall McLuhan [18]. The “Declaration of Delos” refers to the document yea was signed during the final meeting of the first Delos Symposium at the ancient theatre of Delos. This Declaration was signed on 12 July 1963. In the “Declaration of Delos”, the participants expressed their interest in exploring ways that would:

- establish a new discipline of human settlements
- initiate basic research of the most far-reaching kind
- bring together specialists from other relevant disciplines to work together on projects in this field
- work out new methods of training the men who could assume leadership and responsibility in the sphere of action
- attract some of the best young minds into this new area of research, development and practice.

Characteristically, Giedion highlighted the following concerning the importance of the development of interdisciplinary reflections during the discussion that accompanied the signing of the “Declaration of Delos”: “At present a lawyer cannot understand a physicist, but we need to create a new type of specialist, and this is something this gathering could help to bring about- of course with the help of the younger generation. It is only now that both generations can work together without one feeling frustrated or suppressed” [19].

The central topic of the second Delos Symposium was the exploration of “A Framework for a New Discipline of Human Settlements”. The third Delos Symposium was devoted to the theme “Problems of Living at High Density”. The fourth Delos Symposium, which was held in 1966, was centered on the topic “Nature and Human Settlements” was focused on issues related to urban mobility and transportation planning. The fifth Delos Symposium, which was held in 1967, was dedicated to the topic “Strategy for Human Settlements”. The sixth Delos Symposium, which took place in 1968, was devoted to the theme “Man and His Settlements: Need for A Policy”. The seventh Delos Symposium, which was held in 1969, was centered on the theme “Society and Human Settlements”. The eighth Delos Symposium, which was held in 1970, was devoted to the topic “Networks and Human Settlements”. The ninth Delos Symposium, which was held in 1971, was dedicated to the topic “Our Buildings (Shells) and Human Settlements”. At the core of the tenth Delos Symposium, which was centered on the theme “Synthesis of all issues discussed in previous symposia and specific proposals addressed to national and local governments and authorities”, were environmental concerns and the expansion of urban networks. The last two Delos Symposia of 1974 and 1975, that took place at the Athens Center of Ekistics and the Apollonion settlement at Porto Rafti, had the same theme: "Action for Human Settlements". Some of the reflections on the role of ‘ekistics’ in offering citizens “equal chances in all aspects and expressions of the social system in space” that were presented by Doxiadis during the eleventh Delos Symposium are included in his article entitled “The twelve radical changes needed for action for human settlements” published in *Ekistics* in 1974 [20]. The last Delos Symposium, which was held in 1975 two weeks after Doxiadis’s death, placed particular emphasis on the ideas that Doxiadis developed in the four books he published in conjunction with the first UN Habitat between 1974 and 1976: *Anthropopolis: City for Human Development* [21], *Ecumenopolis: The Inevitable City of the Future* [22], *Building Entopia* [23], and *Action for Human Settlements* [24].

5. THE RESEARCH PROGRAM “THE HUMAN COMMUNITY” AND DOXIADIS ASSOCIATES COMPUTER CENTER (DACC)

In the 1960s, Doxiadis Associates coordinated the research program entitled “The Human Community” [25]. Pivotal for this research program was the Doxiadis Associates Computer Center (DACC) that was established by Doxiadis Associates in 1964. The research program entitled “The

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Human Community” was centered on the exploration of the habits of the residents of Athens and aimed to explore their adaptation to the growth and pace of the postwar city. The Human Community project used the rapidly expanding city of Athens as “laboratory” and its research team produced a systematic analysis of the communities within this urban framework. The “The Human Community” project included a time-allocation study as well as for a study of residents’ satisfaction with their community. The findings could also be used for a subsequent launching of comprehensive effort in order to determine the relationship between urban design policy-making and satisfactoriness of community functioning.

A turning point for the Doxiadis Associates was the purchase of the computer Univac 1107, which was among the best computers of that era. This computer was placed in the courtyard of the building complex on the ring road of Lycabettus, under a sculpted owl-symbol of wisdom, created by Frosso Efthymiadi-Menegaki. It was protected by a bulletproof glass “wall” and illuminated at night. In 1969, C.A. Doxiadis (the owner of Doxiadis Associates) decided to install a Univac 1107 in Doxiadis Associates’ premises at the cost of \$500,000 (\$3.3M in today’s prices). A computer center with air-conditioning and bulletproof windows was set up for the installation. The fact that at that time only four similar computer systems existed in Europe and around ten more were operating in the US underlies the project’s importance. The computer was presented through a series of events to opinion leaders including businessmen, journalists, and scientists and was made available for third party use. The way in which Doxiadis Associates Computer Center used Univac 1107 in the framework of the research project entitled “The Human Community” is pivotal for understanding the articulation of computational urbanism. For this reason, it would be interesting to compare these early moments of the use of computer technology for urban analytics to the current trends in visual mapping of parameters in the cities to take decisions concerning urban planning, with particular emphasis on social and environmental equity.



Figure 2. Map Arrival of the UNIVAC 1004 at the Doxiadis Association Computer Center (DACC) on 31 July 1964. Constantine A. Doxiadis Archive © Constantine and Emma Doxiadis Foundation

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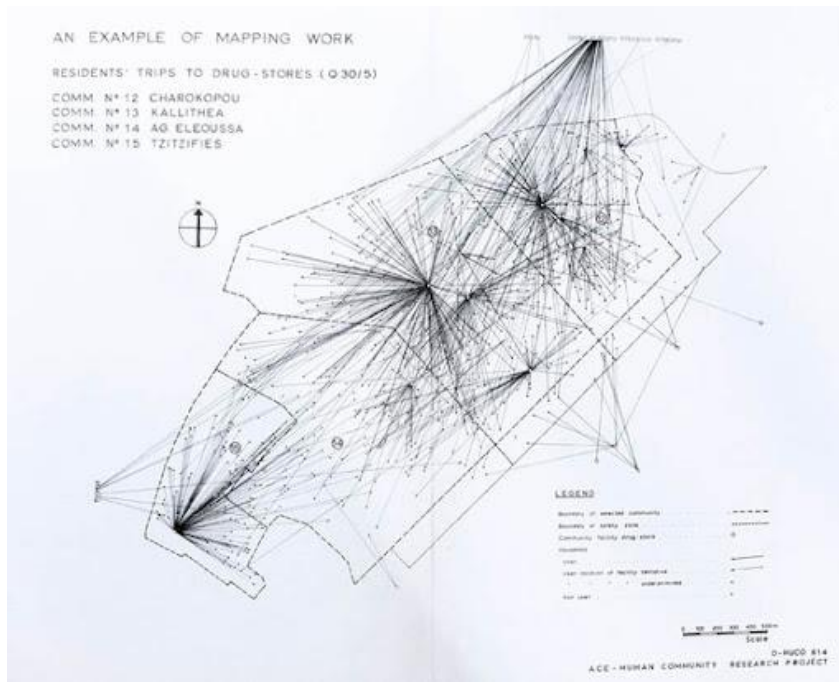


Figure 3. Athens Center of Ekistics, The Human Community, map of residents's trips to drug stores, ca.1964. Courtesy Constantin A. Doxiadis Archives © Constantin and Emma Doxiadis Foundation

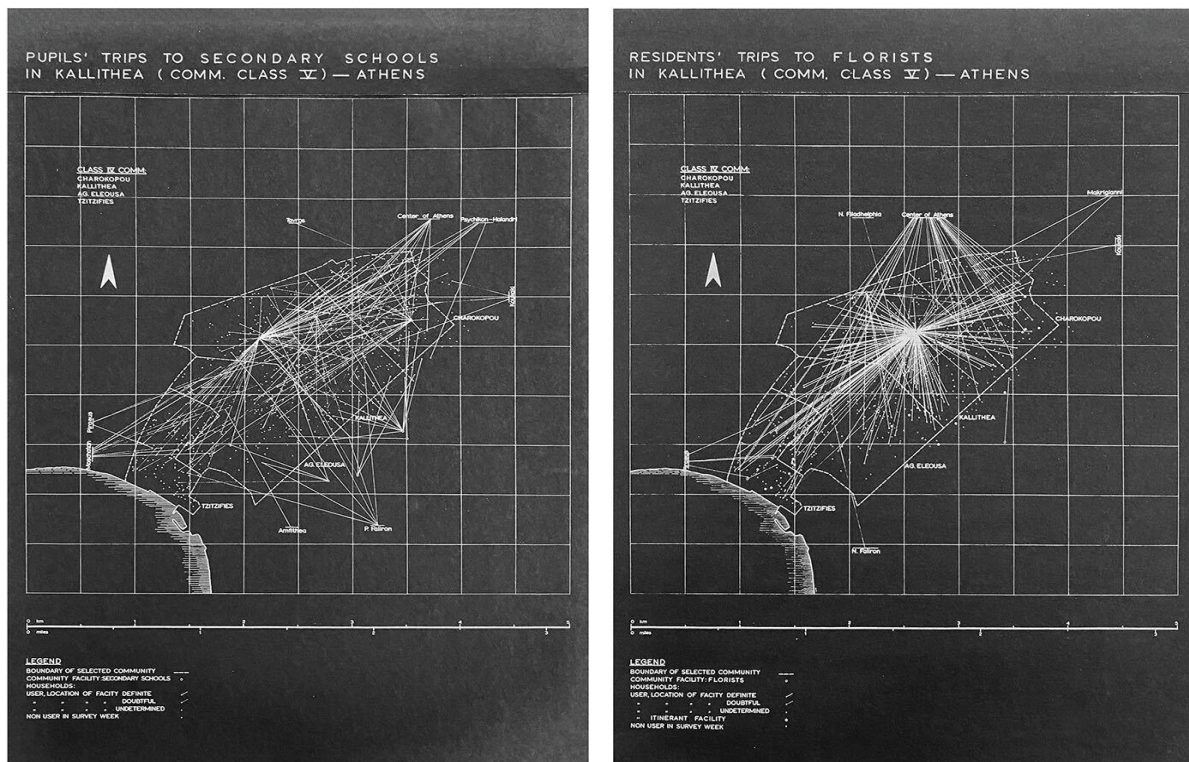


Figure 4. Athens Center of Ekistics, The Human Community, map of pupils' trips to secondary schools and maps to residents' trips to Florists in Kallithea © Constantin and Emma Doxiadis Foundation

6. CONCLUSION OR THE ECOLOGICAL ASPECT OF CONTSANTINOS A. DOXIADIS'S APPROACH

An important book for understanding the role of sustainability in Doxiadis's thought is his book entitled *Ecology and Ekistics* [26]. Doxiadis completed the first draft of *Ecology and Ekistics* in the summer of 1975, shortly before his death. Gerald Dix became its editor and the final version was published in 1977. At the core of the book entitled *Ecology and Ekistics* is the argument that a condition of global ecologic balance is of pivotal importance for providing environments that can offer to man or anthropos satisfactory conditions. Of great significance for achieving such balance is the balance between the global ecosystem and human settlements. Doxiadis believed that this would become possible through the establishment of a so-called 'global ecological balance'. Doxiadis was particularly interested in the environmental issues concerning architecture and urban planning. More specifically, as Panayota Pyla highlights, "one can argue that Doxiadis was a pioneer in environmental thought from the 1940s, because the concept of ekistics, shaped during his early career as a coordinator of postwar reconstruction in Greece, sought to integrate people and environments in a comprehensive system" [27]. Doxiadis conceived 'ekistics' as a new way of understanding the science and art of human settlements. More specifically, he argued that 'ekistics' aims to co-ordinate "economics, social sciences, political and administrative sciences, technology and aesthetics into a coherent whole", creating "a new type of human habitat" [28].

Another term that is at the core of Doxiadis's work is that of 'Ecumenopolis'. This concept started off with the hypothesis that urbanization, population growth, and the development of means of transport and human networks would lead to a fusion of urban areas, leading to megalopolises forming a single continuous planetwide city. Doxiadis employed different concepts to refer to different understandings of urban dynamics corresponding to different historical eras. For the city of the 20th century, he used the concept of 'megapolis', arguing that its main characteristic was the perpetual intensification of mobility flows, which would break the limits of the cities, altering not only their structure, and their very meaning. Doxiadis was convinced that the age of automobility demanded the founding of new urban types, which would be organized like beehives around multiple centres.

Doxiadis's "Towards Ecumenopolis", a confidential report that was prepared in January 1961 in the framework of the Research Project "The City of the Future", and was focused on how to devise a different approach concerning the city of the future. In this report, he understood infrastructure as a skeleton of a body covering the entire globe and resulting from the balance between settlements, production and nature. We could relate the concept of Ecumenopolis in Doxiadis's work to the exploration of "strategies for the symbiosis of the global city with the natural world" [27]. Through the concept of Ecumenopolis, Doxiadis aimed to turn ekistics into a strategy for global environmental protection. According to Doxiadis, "global ecological balance" would be achieved through the functional organization of the earth's land to accommodate the competing needs of production, settlement, recreation, and environmental protection. The ultimate goal was clear: "In the [future] we will have built the great, universal city and garden of man with water running in its arteries bringing life and guaranteeing its inner balance and peace." [29]

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Pame (Lets go) Kaimakli Festivals

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Extended abstract

Buyuk (big) Kaimakli, a Greek Cypriot neighborhood of the divided capital of Cyprus is separated from the Turkish Cypriot Kuchuk (small) Kaimakli by the Green Dividing Line. The remaining old population received flows of displaced people. Refugees in their own island- country found a new home after the events of 1974, middle-class groups in the end of the last millennium, and low-income immigrants from Europe, Asia, and Africa in the beginning of this millennium. The conditions of the no-Man land area, that divides the Kaimaklis, the capital and the island in two also attracted creative and activists' groups that added more layering on the people's amalgamation.

The existing 'Mneme' of Kaimakli suffered together with the indelible traumas of the Division in the island; its population was aging; its young members were leaving the area. The new layers of Human topographies brought their own 'Mneme' that started coexisting in the cultural landscape of Kaimakli. As new Kaimakli residents, we were involved in various of its activities together with its primary population. As members of the NGO Urban Gorillas, we enacted the Pame (lets go) Kaimakli festivals since 2013, a bottom-up approach with democratic participatory methods. We dealt with various thematic, such as the 'Open houses' "Open Windows", 'Open Kitchens', Adopt and Artist' 'Istories Allosfos' etc. They all aimed at social sustainability with creative mode to bring together disparate groups of people as elder people and children, immigrants, and artists etc. The festivals served as catalysts to trigger social mechanism among the residents, facilitating their voice to be heard, their presence to be seen, their rights to be pursued etc.

Besides the immaterial processes, the cultural, creative, and artistic activities, we introduced material infrastructures as ephemeral entities to facilitate the diverse needs for social creative expression such the modularized Agora with a vast variation of assembling, the inflatable structures etc.

Both the material and immaterial constituent elements of the Pame Kaimakli festival led to ephemeral and spontaneous urbanism as a response to the injustice of the planned, official urbanism.

Being 'there' and 'construct' synergic, catalytic collaborations between students, minorities, activists, 'normal' residents, students could serve as a model of unofficial community-based planning, tailored for Kaimakli, and not only?

Respecting, remembering, enjoying the 'Mneme' of the 'Topos' is often a challenging approach as it can be entrapped in romanticization and romanticization of our built environment. In this presentation we will point out the merits of the old Mneme and the highlight the importance of receiving the inserted Mneme by the ever-shifting populations due to Political, Climatic, and other Crises. Could his coexistence of Mnemes give birth to emerging Mnemes that could well be blended in cultural landscapes such as in Kaimakli? Could this be a way out of responding to the ever-growing conservatism, and xenophobia while enriching our Mnemes of the Past and the Presence, while facilitating Socially and Environmentally Sustainable Mnemes to emerge?

Keywords: *Human Topographies; ephemeral urbanism; Mneme of the Topos;*

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Us, Them. Here, There. Investigations in Design of Monumental-Scale Shape-Changing Inflatable Media for Socio-Locational Telepresence

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Extended abstract

We understand our social identity in relation to others but we mostly perceive others implicitly, through the traces of their interactions with physical space near us. What if our urban environments could remotely mediate these traces, allowing spatially unrelated people to experience each other's presence collectively? Territoriality is an intrinsic characteristic of human behavior. We act territorially not only out of necessity but also instinctively, out of a natural propensity to exert control on our surrounding environment. We also act territorially reflectively, as a response to territorial behavior we experience from others on objects or territories we relate to. Moreover, we act territorially imitatively, when we join a social group's behavioral dynamics out of companionship. Territoriality, as the propensity to exert control on a place or an object, involves the psychological association with it. Importantly, according to social identity theory, territorial interactions that emerge between individuals reinforce perception of social identity because they provoke individuals to reason what unifies them and what distinguishes them territorially from others. This paper discusses the theoretical grounding, design, development, and early experiments, of a city-scale physical telepresence public art installation project of wirelessly connected giant inflatables placed at multiple sites that can enable visitors in each site to physically experience the presence of visitors in other remote sites, questioning our perception of locality, belongingness, and social identity. Cubic-shaped inflatable beacons, each containing 8,000 cubic feet of air, landmark selected locations in a city. The beacons share collectively the same volume of air forming a city-scale closed system. Anyone can animate any beacon by sending bursts of air to it using their mobile phones. Sending, however, a burst of air to a beacon requires removing the same burst of air from another beacon. Beacons illuminate, revealing the identity of the neighbourhoods they exchange air with. Watching a beacon deflate signifies someone from another neighbourhood uses this air to inflate their local beacon. Watching a beacon inflate signifies someone from the same neighbourhood uses this air to publicly manifest their presence in your common neighbourhood. Depending on people's location, point of view, and level of engagement, patterns of cooperation or competition may slowly build up across neighbourhoods, reflecting the two categorical ways with which we perceive our socio-locational identity: "us versus them" and "here versus there". The paper contributes to the discourse on environmental legibility, human territoriality, and social identity, arguing that the construction and perception of socio-locational identity can be influenced by design of locative physical telepresence media. It contributes to the field of shape changing interfaces by presenting novel methods to design and actuate shape changing interfaces for monumental scales.

Keywords: *Crowdsourcing; Participatory Systems; Inflatables; Physical Telepresence; Shape Changing Interfaces; Territoriality; Socio-locational Identity.*

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**COMPONENTS OF URBAN DESIGN TOWARDS A SUSTAINABLE
MEDITERRANEAN CITY**



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Assoc. Prof. Maro Sinou, Department of Interior Architecture, University of West Attica

The water element in metropolises: the case of «Antonis Tritsis» Metropolitan Park

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Abstract

The element of water maintains a deep, timeless and bidirectional relationship with built space and the evolution of human society within it. This paper, explores how water is affected by cities and how sustainable water planning and management, may affect cities both on a microclimate level, as well as on a psychosocial, economic and cultural levels. In modern times, public health science, but also urban planning, investigate the benefits of water in psychosocial well-being. Focusing on the local scale of metropolises, characterized by densely built urban fabric and construction materials with high heat capacity, the present paper analyses Urban Heat Island effect, as well as the factors that improve urban microclimate. In this framework, guidelines for designing water elements are defined, aiming at regulating the microclimate, and also the comfort conditions of users in urban public spaces. «Antonis Tritsis» Metropolitan Park is the largest park in the Attica basin; it has a significant proportion of water elements in relation to its size while it is located in an extremely dense urban fabric. Hence, it is considered as an important case study of blue infrastructure. The aim is to highlight the benefits of the water element in the urban fabric, the good health and well-being of citizens due to both encouraged social interaction and interaction between citizens and natural environment. Thus, the park may act as a pilot case study, a point of reference for sustainable water management practices throughout Attica.

Keywords: *urban water, sustainable water management, comfortable urban environment, blue infrastructure, microclimate management, well being, A. Tritsis Metropolitan Park*

1. INTRODUCTION

This paper examines the multifaceted property of water as a main factor in shaping a holistic and sustainable living space for living organisms at the scale of the modern metropolis. The research aims on methods of adaptation to the environment and on the needs of such large-scale residential areas. The overall objective is to strengthen the connection between mankind and water, which is not only biological and physical, but also affects other areas of his life, namely mental health, economy, culture and society, as has been seen since antiquity. It has been observed that in areas where was access to water, there was development, for example along the sea coast and along rivers. In today's world, sustainable urban environments with water element that promote the psychosocial well-being and all living creatures that cohabit in them, is called Blue Spaces (BS). The research concentrates into two main objectives. Firstly, the planning of sustainable water management aiming to protect water resources and regulate the microclimate to improve the comfort levels of users in densely populated cities and secondly, the impact of the water element on social interaction and well-being of users and their connection to it. The major urban centers of the Mediterranean, due to their large populations, are characterised by coastal development, which transforms the coastline through the creation of buildings and infrastructure for housing, tourism, trade and transport; a phenomenon that interferes with the natural movement of water, but also its quality, with the landscape itself and its biodiversity. In the article entitled "Urban Blue Spaces as Therapeutic Landscapes: "A Slice of Nature in the City", in addition to the psychosocial well-being offered by BS, the medical term "therapeutic landscape" is

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outlined. In BS, according to the authors, the concept of recreational activity is strong and directly linked to their beneficial effects on physical and mental health[1].

2. THE RELATION OF WATER TO THE BUILT ENVIRONMENT,

2.1 The importance of water in the urban microclimate

Massive bodies of water, such as oceans and large lakes can be described as heat reservoirs, as water has the maximum specific heat capacity of the materials around it and thus in large quantities it acquires the highest heat/thermal capacity of most materials on land, maintaining its temperature for longer, with so-called thermal inertia. For this reason, areas around large water masses are characterised by mild winters and cool summers. The form and design of cities have a bidirectional influence on the local climate, but also on the microclimate, with micro-meteorological variables such as air temperature, humidity, sunlight, as well as wind in open spaces and around buildings [2].

Within a city there is a constant alternation of sunny and shaded areas and this depends on the density and morphology of the built environment, the area and type of vegetation and the local weather conditions. The materials most commonly used on the surfaces of constructed space are asphalt, cement, brick, stone and other building materials, which are characterised by high heat capacity, of course less than that of water, and low albedo. This increases the temperature of the city and creates the **urban heat island effect**, which is even more observed at night. The small urban water elements cool the surrounding air during the day in the summer. However, during the night they remain warmer [3]. This is occurring due to cooling by evaporation, a phenomenon that occurs on all water surfaces. Water has the ability to reduce the ambient temperature by up to 3°C, within a radius of about 30-35m [4].

The research '*Really cooling water bodies in cities*' (REALCOOL) investigates the thermal effects of typical urban water bodies in the Netherlands and concludes that shaded water bodies, such as small canals, fountains and jets, have an improved effect on local temperature reduction [5]. Furthermore, moving water elements are considered to be more effective in regulating the microclimate than stagnant water element, as overheating of the water is avoided. More efficient practice is strategically dispersed water features on the area. Water and wind elements work in a complementary way at the local scale to regulate the microclimate. Dependent on the geomorphology of the landscape, but also the geometry of the buildings and the wind paths, a phenomenon called natural ventilation is created. Therefore, it is easy to comprehend that water surfaces have the ability to affect the microclimate of their area, but also to enhance the biodiversity and aesthetics of the landscape. By using moving water as waterfalls, fountains, jets, etc., or horizontal water surfaces in the suitable locations and quantities, such as canals, lakes and rivers, in combination with wind flow, it is possible to regulate the overall microclimate of an area within a city. The following table summarises the factors related to water elements and microclimate.

Parameters affecting the design of water elements, with the aim of regulating the microclimate			
parameters	characteristics/ properties	benefits	risks
vegetation	shade, water needs, evapotranspiration	shading, reduction of topical temperature	obstruction of wind flow and natural ventilation
general microclimate of the area	typical weather conditions	cloud cover, alternation of sunny and shaded areas	extreme/unexpected temperatures
type and size of water bodies	temperature absorption, phenomenon intensity	large water mass, greater evaporation	dazzling effect due to the reflectivity of the materials

surfaces	lower heat capacity than water	wind phenomena - sea breeze/land- offshore breeze	at very high temperatures, the phenomenon does not work
pavings	transmittance	water-permeable pavings enhance cooling by evaporation	impervious, stagnant water without drainage
inclination of surfaces (including water bodies)	different incidence angle of radiation	vertical or sloping surfaces absorb more radiation and cool more	horizontal water surfaces cool less
possibility of movement	jets in continuous or periodical motion	oxygenation of water, reduction of local temperature	easier spread of diseases
urban morphology, urban planning, architectural geometry of buildings	solar radiation/sunlight reaching surfaces	cooling by evaporation in summer/ solar heat gains in winter	overheating of stagnant water in summer, less solar heat gains in winter
general geomorphology of the area	wind, complementary operation with water	natural ventilation in summertime	strong winds in winter
human activities	function and needs of the space	aesthetic improvement	misuse, contamination and waste disposal

Figure 1: Parameters affecting the design of water elements, aiming of regulating the microclimate. (source: creation of the author)

2.2 Comfort and water element

Primarily for the protection of mankind and secondarily to ensure its comfort, it is necessary to design areas or zones in the city with a conducive microclimate and then to create comfortable outdoor public spaces in harmony with the natural landscape. By exploiting the local microclimatic characteristics, the appropriate comfort conditions can be created, with natural mechanisms for passive solar heating, cooling and lighting [6]. These conditions are divided into categories according to the sense they serve. These are the thermal, visual, acoustic and olfactory comforts that provide the visitor with physical and mental satisfaction. Thermal comfort is directly affected by the temperature of the air at 1-2 m from the ground, the temperature of the materials with which people come into contact, such as the materials from the seats. Visual comfort which is described by certain characteristics of the ambient light, such as quantity, uniformity and colour rendering [7]. The aim is to achieve maximum natural lighting during the day, without creating the phenomenon of glare, and at night, the most necessary and highest quality artificial lighting to avoid the consumption of excess energy and avoid disturbing wildlife. Also, visual comfort is not only about lighting, but also about the pictures the visitor receives, such as unobstructed views and natural elements, i.e. vegetation and water elements. Acoustic comfort, on the other hand, is not directly related to climatic conditions, apart from strong weather phenomena, but to human activity, which can have adverse effects. Lastly, olfactory comfort, which is often overlooked, although it is quite important, has to do with air quality, pollutants, proper ventilation without constant humidity, and in general with the smells one may encounter in the area. All of the above, ensuring comfort conditions in combination with the support of psychosocial needs, constitute a holistic sustainable tool for the improvement of public urban open spaces, for the optimal quality of life of the users. The importance of the existence of the water element in the built environment has more than an essential role, which serves the strategies of sustainable planning on multiple levels. A methodological tool entitled: "Small urban space network design parameters for comfort" was the basis for the **Figure. 2**, which **contains the effectiveness of water in regulating comfort** [8]

	Comfort			
	thermal	visual	acoustic	olfactory
water element	regulation of the local microclimate	aesthetic upgrade	flowing water, fauna that uses water	air quality when there is a flow of running water/ odour generation in the case of stagnant water

Figure 2: Comfort conditions in urban public space and the water material that regulate them. (source: creation of the author, based on the article «Small urban space network: the perspective of a green network including small and very small urban spaces as an answer to the scarcity of available public space in city centers»)

2.3 Blue infrastructure and water management practices in the urban landscape

The prosperity of coastal metropolises relies on their coastline, not only economically because of trade and industry, but also for the well-being of its own inhabitants. Many studies have been carried out in recent years to redefine the relationship: city and water. This applies to all forms of water within the city and collectively they are studied as Urban Blue Infrastructure (UBI); often UBI is associated with Urban Green Infrastructure (GUI), as in most cases they coexist. Large urban parks, for example, are identified as Green - Blue Infrastructure (UBI) because these green spaces contain UGIs, which deliver benefits to residents, supporting human health and well-being by bringing people closer to nature [9]. UBIs include all surface waters, whether natural or artificial, such as flowing water, i.e. rivers, streams, canals and creeks, but also stagnant water bodies, such as lakes and large ponds. Also, the shorelines of seas and rivers, with piers, harbors, docks and other types of water extensions [10] are part of this type of infrastructure. Their overall benefits are quite geared towards meeting urban needs through sustainable solutions and optimal ecosystem management to reduce the impacts of climate change [11]. This is because UBI solve practical comfort issues, as mentioned above for the water element, and contribute to reducing the Urban Heat Island effect, especially when combined with Green Infrastructure. The sustainable water management practices which are used in UBI have as a common denominator functionality, avoidance of alteration of the natural environment and circular economy to reduce the consumption of conventional energy. Some of these are rainwater harvesting, permeable surfaces and rain garden.

The biggest issue that the application of **rainwater harvesting** solves is the stagnant water on the impervious surfaces of cities, where unfortunately in today's large cities and metropolises, there are few natural surfaces and / or mainly artificial surfaces and the soil does not have the possibility to absorb quantities of water. The main reasons for using this practice are first to enhance water availability and reduce the demand for fresh water from the city's main water supply network and second, the artificial enrichment of the underground aquifer and improvement of water quality.

The overlay practices of **permeable pavements** and **rain gardens (RG)**, can be combined to carry out rainwater harvesting [12], filtering and reuse, as shown in the sketch in **Figure 3**. Also, the **filtering** and **reuse of grey and black water** from the neighbouring buildings in the area can fulfil the same uses as recycled rainwater.

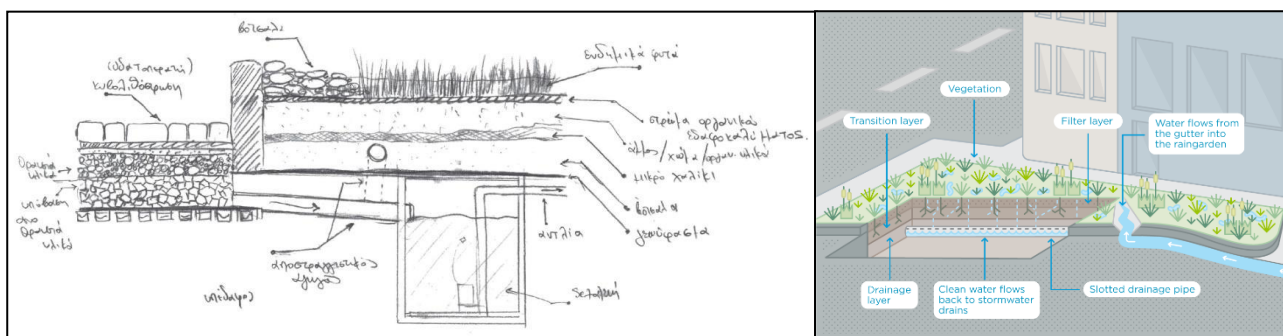


Figure 3: Rainwater harvesting with the combination of permeable pavings and rain gardens. (source: creation of the author, with information drawn from Greek Architects, 2014 and Commercial Stormwater Harvesting Systems, 2021. (right), Urbanwater.melbourne.vic.gov.au (left)).

All this, combined with renewable energy production, increases the resilience of cities to climate change and makes the local economy flexible. In conclusion, in an overall picture, UBIs in the urban fabric address the following issues listed in **Figure 4**.

Benefits of Urban Blue Infrastructure (UBI)	
Social	Coverage of the 5 basic human needs, by Carr etc.
	Interesting stopping points and movement zones for observation, meeting and relaxation
	Informing and raising awareness of water in society
	Access for all
	Encouraging physical exercise
Economic	Zero energy consumption
	Production of sustainable energy (clean energy)
	Use of materials with high durability for less maintenance
	Selection of local materials to reduce the waste of energy for transportation
Environmental	Strengthening urban resilience to climate change
	Reducing the risks of flooding, drought, but also ensuring water supply and drainage.
	Minimise fresh water consumption by collecting rainwater for reuse.
	Filtering and recycling of surrounding urban wastewater with artificial and natural treatment systems, grey water recycling
	Sustainable drainage system
	Protection and enhancement of biodiversity
	Ecosystem services of water bodies, through the concentration of larger populations of rare bird species and other wildlife.
	Improving the quality and quantity of water in the city

Figure 4. Benefits of blue infrastructure. (source: creation of the author)

To conclude, the connectivity of green and blue infrastructure in a city carries many advantages, such as the creation of wildlife corridors, allowing people, animals and wider biodiversity to co-exist and evolve, whether environmentally, socially or culturally.

3. CASE STUDY - THE METROPOLITAN PARK "ANTONIS TRITSIS"

3.1 General

The Metropolitan Park of Environmental and Educational Activities and Social Economy Development "Antonis Tritsis" is an important green area of Attica and the neighbouring municipalities, for many years with a wide variety of flora and fauna. The relationship of the study area with the main green spaces in the Attica basin is complementary and necessary, as it is the largest green space in terms of area and serves almost all of western Attica (**Figure 5**). Almost throughout its area there is a special water collection of six artificial water reservoirs (ponds) and an elongated channel connecting them. These ponds host and shelter rare aquatic flora, because they have been integrated into the environment, as they were originally waterholes from seasonal streams. Water conservation in the park's ponds was and is a key point of attention, because the main water supply is the aquifer, the wells and water reservoirs are still dependent on seasonal rainfall. The level of the aquifer has declined due to urbanisation, climate change and the overall poor management of the water element in the Attica basin.



Figure 5 (left). Location of the Antonis Tritsis Metropolitan Park in relation to the Attica basin, the main road network and green spaces. **Figure 6** (right). Aerial photograph of the study area in Antonis Tritsis Park. (source: google maps, edited by the author)

The landscape of the park, due to its diversity, allows the simultaneous existence of different uses that require space and facilities for intense activity, but also for relaxation. The uses of the park range from daily, to occasional or infrequent. It is undeniable that it is a very satisfying solution to escape from everyday life and to get in touch with nature. The proposal is being implemented in the northern part of the park to deepen sustainable water management strategies, but with the aim in future studies to extend these practices throughout the park, as well as to upgrade them (**Figure 6**).

3.2 Methodology and Results

The methodology applied is first the theoretical recording of the case study in relation to the history and evolution of the place, but also the collection of data, such as the urban characteristics, the needs of the wider area, and the climatic data of the area, for the subsequent selection of the appropriate practices to be proposed. Secondly, a field survey of the study case was carried out, with photographic recording and observation of the existing conditions in terms of flora, fauna, uses, the general situation and the needs of the study area. More specifically, in the first phase, the field survey is composed of data that were collected from users and residents of the city through digital questionnaire. In a second phase, the surface temperatures of the materials used on site are monitored.

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3.2.1. Questionnaire

The digital questionnaire was divided into thematic sections in order to carry out quantitative research on users, their characteristics and their relationship with the site, as well as qualitative research on their needs and suggestions regarding the study area. A total of 498 responses to the questionnaire were collected (participation period December 2022 - January 2023).

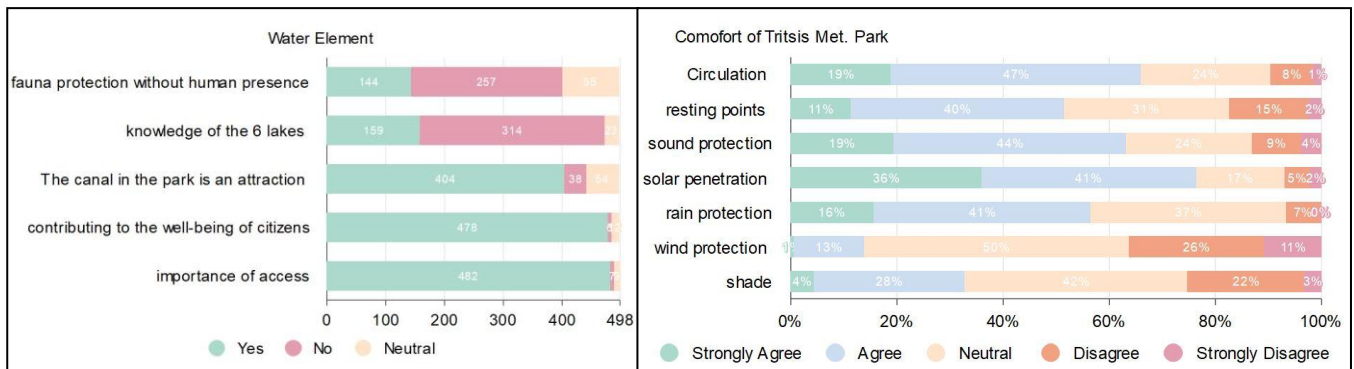


Figure 7. (left) Level of satisfaction - comfort, **Figure 8.** (right) Opinions in relation to water elements.(source: results from the questionnaires by the author)

As shown in **Figure 7** the prevailing comfort conditions in the open spaces of the park in relation to the participants' satisfaction regarding thermal, visual and acoustic comfort, as well as resting and walking areas. The shading and rest areas are what is lacking in the park. In the **Figure 8** the vast majority of participants believe that the water elements in the city are important and contribute to the mental wellbeing of citizens, nevertheless they are unaware of the existence of ponds in the park. Furthermore, a very high percentage of participants (63.3%) consider the design and implementation of public spaces that promote sustainable management of environmental issues and at the same time serve citizens as utopia. In summary, the following conclusions were drawn from the questionnaire.

1. The water element offers relaxation and well-being and this is the main reason for visiting the site, followed by education and entertainment, with sport being a low preferred choice, but not negligible.
2. The need for new park equipment to provide safety and comfort (lighting, seating).
3. The creation of spaces in the park for themed activities such as experiential education, connecting with nature and relaxation, and lastly, spaces for children and also dogs.
4. Access to the park by public transport is poor and is a key reason why the park does not have a hyper-local character; therefore it is most often visited only by those living in neighbouring areas.
5. Sustainable solutions for the protection of the environment and the sustainable management of the park are significantly accepted and legitimate.
6. Need for areas with continuous vegetation and water. To this day there are no such spaces in the country and thus the participants consider that the blue infrastructure is not a possible project to be implemented.

In conclusion, water is an element that addresses users' psychosocial needs for well-being, through encouraging them to walk and exercise around it, but also to socialise. While at the same time there is a major shortage of blue infrastructure in the study area, as in many dense urban environments.

3.2.2. Documentation of thermal characteristics

The collection of local data in relation to microclimatic conditions for more targeted analysis was aimed at surface temperature.

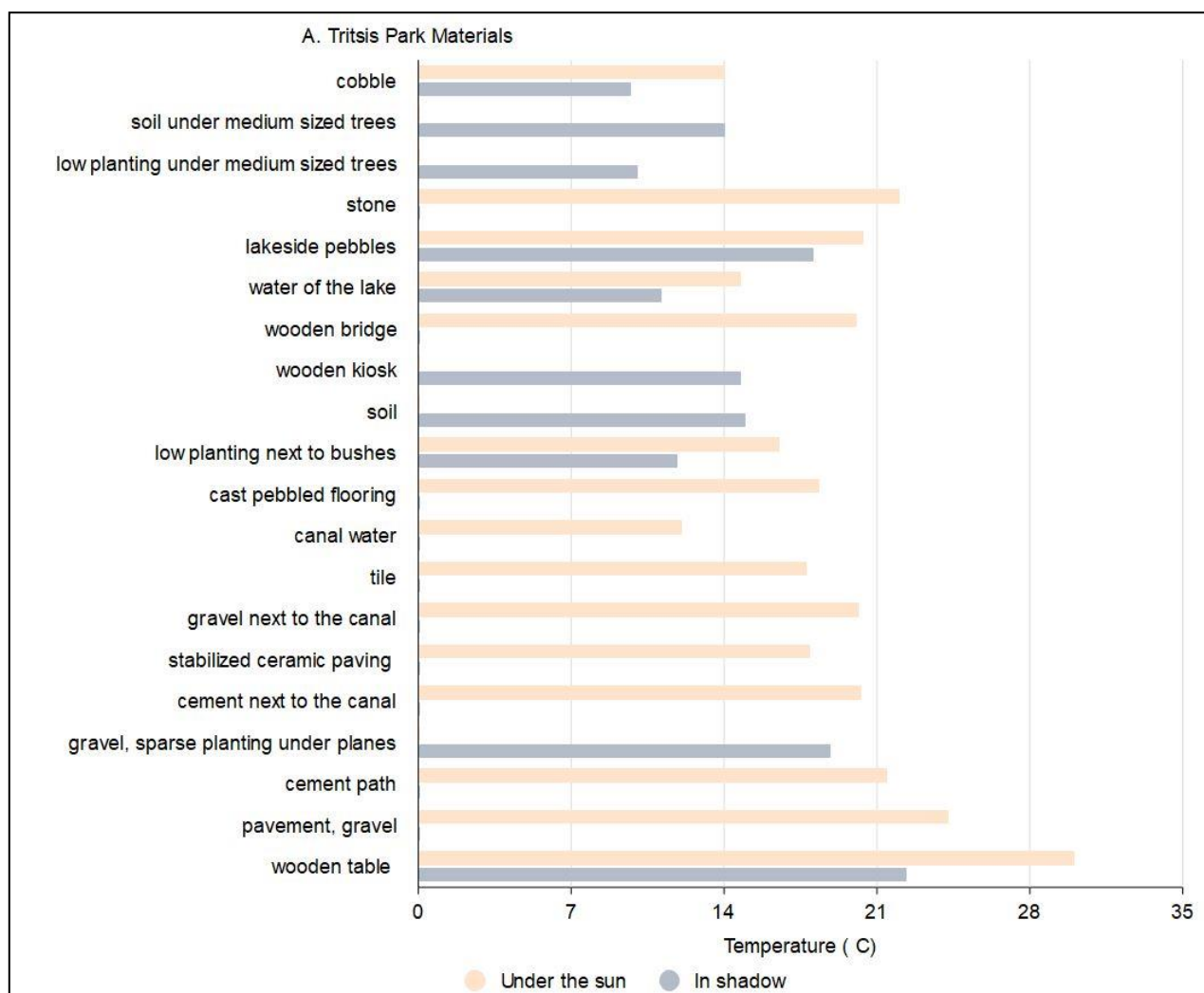


Figure 9. Temperatures of the current park materials. Day: 29/12/2022. Time: 14.30-15.30. (source: created by the author)

On the day when the data were collected it was sunny with thin clouds, the temperature was around 9-15°C and there was high relative humidity. As can be easily seen from **Figure 9**, the time when the monitoring was held, it was the hottest time of the day, as the materials had absorbed radiation since sunrise and from then on, as the sun "setting", the radiation would decrease. The extremities of temperature recorded were the highest in the wooden seat in the sun, at 30°C, and the lowest was in the under-tree plantation, at 10 °C, where moisture is retained in the soil. In general, the materials most utilized in the built environment, such as cement, soil, gravel, tile and stone, in the sun maintained temperatures between 18-22 °C, while in the shade, for example, cobblestones were 9,7 °C. And lastly, a difference was also seen between the new and old materials, where the cement at that time had reached 21,4 °C, while the pebbled pavings had reached 18,3 °C.

4. PROPOSAL

The proposal is based on a thorough study of sustainable practices that will combine to protect the environment and create a suitable space for wildlife and the residents of Attica, that will upgrade the park both aesthetically and environmentally. The proposal is divided into two axes: 1) Sustainable water management 2) Visitor well-being and their connection to water. The design adds to the study the aspect of visitors, their well-being, information and socialization, through the planning, chosen

uses, equipment as well as the materials. The Metropolitan Park A. Tritsis on the one hand is still a space within the urban fabric and unhindered access for everyone is necessary, but on the other hand the use of natural materials benefits the hydrological cycle and maintains the natural beauty that the park offers to the residents. Therefore, paving should be varied to meet firstly the direct transport of water to the ground and secondly, the needs of the circulation in the area. The elements of the proposal are the following:

- Rainwater harvesting through Rain Gardens (RG), with native plants to filter and store rainwater for reuse (circular economy). For optimum results, it is proposed to place RG throughout the park, especially on the south side, to avoid runoff in the form of streams during heavy downpours to neighbouring municipalities.
- Collection, recycling and reuse of grey water from the buildings (central café - othonian courtyard buildings with new uses on the west side of the park - theatre - stadium etc.) and removal of pollutants in sustainable ways.
- Sustainable management of waste water - black water separately for each building complex (underground bioreactor)
- Placement of underground tanks (at strategic locations) to collect and store filtered water, i.e. rain and grey water, for irrigation, cleaning and also to supplement recycled water in the ponds whenever required (especially in the warmer months).
- Continuous flowing water to oxygenate in the canal and create visual, acoustic and thermal comfort in an important part of the park.
- Creation of an Outdoor Water and Energy Museum to educate citizens of all ages about water and sustainable water management.
- Generation of renewable energy, using the canal and general water flow in the park (Outdoor Museum area).
- Information and education of visitors, through games and activities about the elements of water.
- More general use of sustainable materials, with the aim of saving energy and easier maintenance and the use of water permeable materials.

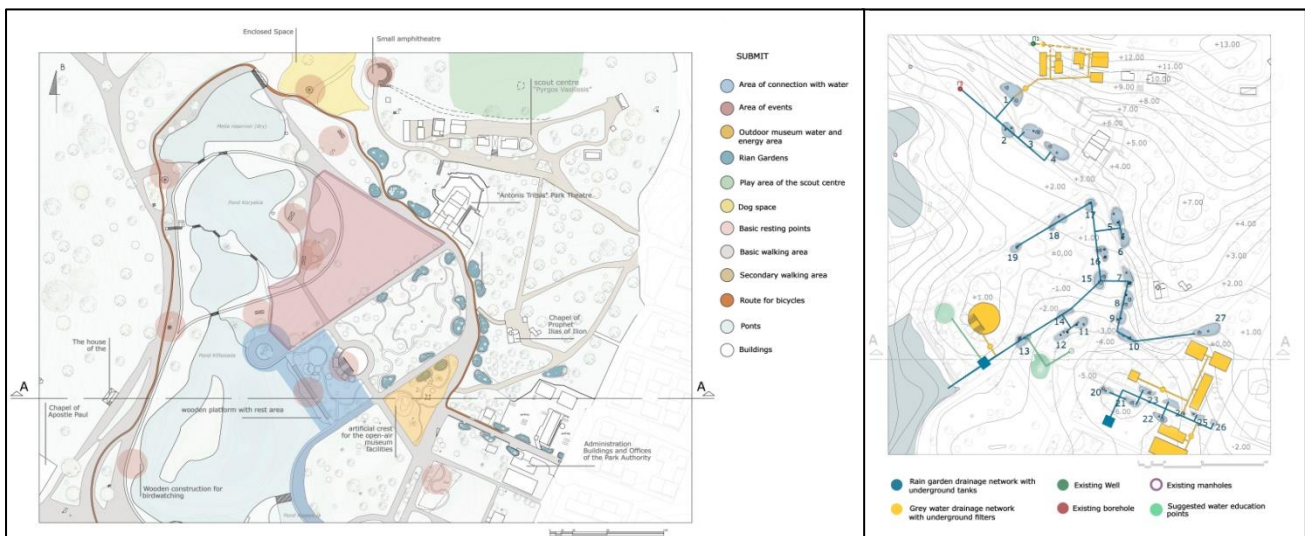


Figure 10. (left) Master plan of the proposal, Figure11.(right) Water management diagram. (source: created by the author)

In **Figure 10**, can be seen the master plan of the proposal, the separation of the areas according to their use. The zones are defined by the previous study. The aim is to meet as much as possible the park's water demand through water reuse. This aboveground system is supported by an underground

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system of pipes and tanks (**Figure 11**). Their location on the site depends on the altitude, distance from the RG and the estimated amount of water.

5. CONCLUSION

The connection with the water element is a major component of people's well-being. Blue infrastructures, that are urban spaces where residents can come into contact with the water, have always been places in the urban fabric that have been chosen not only for operational purposes, such as trade, transport, or recreation, such as sports, but also for mental peace and tranquility. In addition to mental relief, people in blue infrastructure can also enjoy physical relief, as the water, depending on its volume, can regulate the local microclimate of the area and, by extension, the comfort conditions of urban spaces on a thermal, visual, acoustic and olfactory level.

Regarding the case study, the redesign of the park is a challenge that needs to be addressed, so that the citizens of Attica not only do not consider sustainable solutions utopian, but become an integral part of their everyday life, as the questionnaire highlighted the need for this. Information and awareness-raising is necessary, in a first stage and in a second stage, or even in combination, to implement these sustainable solutions in large and small areas within the city.

On a practical level as emphasized by the thermal monitoring in the field, the water-permeable materials in combination with continued shade, and the water bodies in various shapes are capable of regulating the microclimate of the area in a natural and sustainable way.

It is clear from the above that multi-faceted research can have combined effects and benefits on many levels. The cooperation of different research disciplines, such as medicine, architecture, planning, urban planning, agriculture, physics, etc., can therefore highlight the positive results that a multifaceted sustainable approach to the issues facing the modern everyday life of urban metropolises in relation to the water element can achieve.

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A multi-criteria evaluation method for accessing the developmental potential of Thermal Springs in Macedonia and Thrace

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Abstract

The research project "*LOUTROTOPOS: Critical mapping and visual narration of thermal springs in the Hellenic Territory*" investigates a network of places with thermal resources, which were selected according to the official map of thermal springs issued by the Greek Ministries of Tourism and Health. Following typical regional planning developmental strategies for remote and inaccessible places in the Hellenic periphery, the project focuses on the potential of enhancing endogenous local resources, highlighting the fact that thermal springs are geographical places with a unique physiognomy, reinforcing thereby their fundamental linkage with the concept of healing, as a cross-cultural holistic practice of well-being with uninterrupted historical continuity.

Within this conceptual framework, we visited and researched thermal springs in Macedonia and Thrace and identified their particular developmental advantages as well as problems. They are distinguished for the exceptional beauty of the natural landscape (such as Pozar and Eleftheres), the architectural heritage (such as the Byzantine and Ottoman installations in Agistro and Lagadas) or the special status of public use (such as the Baths of Echinis and Paranestio in Xanthi). However, we also identified several problems, such as abandonment, desolation, abuse, and disconnection from the architectural and natural landscape.

At the current stage of the research project, we applied a multi-criteria evaluation method that led to a qualitative classification of thermal springs in several regions, including Macedonia and Thrace. In line with the methodology of the research project, we selected the criteria according to multiple parameters, such as historical, geographical, cultural, social, architectural, aesthetic, landscape, urban, functional, place-image, etc. The findings were visualized in an interactive map, which will subsequently be used for the creation of visual narrations in the form of multi-channel videos that will showcase and promote the places of these thermal resources in the context of their interdisciplinary, cross-cultural and historical value.

Keywords: *thermal springs; critical mapping; visual narration; Macedonia; Thrace.*

1. INTRODUCTION

According to data from the Hellenic Geological and Mineral Research Authority (EAGME, formerly IGME), Greece is particularly rich in natural springs, having 822 recorded springs of thermal mineral waters, of which 750 are considered exploitable for their therapeutic properties. Despite this rich heritage, the thermal springs of Greece have not managed to attract a large number of international visitors compared to similar destinations abroad, which rather indicates a lack of an ingrained culture of thermalism, while the common perception of the primacy of the biomedical / therapeutic dimension of waters often associates these natural resources with the concept of illness and limits - arguably incorrectly - the image that we have of the average visitor, as a person of health interest. On the

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contrary, the recent turn of the World Health Organization towards a more holistic view of health as a biopsychosocial condition of well-being, makes the study of thermalism particularly interesting from the point of view of a wider interaction between an individual and their physical and social environment, as well as the correlation of human behavior with a holistic view of health. The same turn also substantiates an approach to thermalism from a historical and folklore point of view, as these values are found equally in ancient naturalism as well as in the anonymous traditional practices of good nutrition, exercise, moderation and balance; values that are ultimately embedded in a recognizable behavioral, environmental and sociocultural context.

All of the above indicate that any inquiry on the potential of such natural resources as places for sustainable development, must perceive them as broader assemblies that encompass material and immaterial cultural heritage characteristics, which are inextricably intertwined with history, folk culture, alongside evidence-based documented medical and therapeutic practices connected to the springs. This perspective is aligned with the regional planning policies for the development of remote regions of the Greek territory based on the preservation of cultural identity and the promotion of endogenous local resources, highlighting thermalism as a holistic, body-centered and intercultural practice with uninterrupted continuity in Hellenic history and tradition.

Based on the above, the research project aims to examine in depth - and ultimately highlight - the cultural wealth of places endowed with thermal springs, in parallel to and inseparably from their basic function as thermalism destinations that support a therapeutic practice. For this purpose, it makes use of a research methodology based on mapping, a process that includes the identification, collection and organization of multifarious elements, material and immaterial, that the place image of a Loutrotopos consists of. The basic principles that this mapping process follows are a) the analytical and thorough investigation of each individual place, b) the investigation of their historical development, the identification and justification of temporal continuities and discontinuities and the recognition of its palimpsest structure and c) the comparison between different places and the identifying correlations and interactions between them. Finally, at the same time and through mapping, it attempts to discover the causes that led to the decline of the Loutrotopoi (plural) as spa destinations, in parallel with the weakening of the Greek spa culture, which once flourished. Overall, the approach aims to take into account *all* the various elements, combinations and correlations that shape and ultimately define the cultural identity of each Loutrotopos.

2. HORIZONTAL MAPPING

Work package 05 of the research project included introductory research to prepare for a more specific work plan and select the thermal springs that would be further explored. The ultimate goal of this preliminary work was to identify a profile of these springs and their networks. We carried out bibliographic research on official sources, websites and archives of public bodies or reliable private companies, in cross-reference with the official map and data on thermal springs of the Ministry of Tourism. We also looked up other, unofficial sources, websites, social networks, tourist websites and books to identify 'folk' places of thermalist interest that may not (in some cases, yet) be officially recognized by State authorities and are not included in the map of the Ministry or in official studies. In addition, we identified criteria for the evaluation and selection of places with thermal springs, as described in detail below, and designed a record sheet to formalize the research and the map on which they will be marked.

The thermal springs were grouped according to the administrative regions of Greece. Based on this classification, each researcher was assigned to prepare a brief explanatory report for their evaluation. The research team held a series of meetings to discuss the findings, present the introductory reports, and select thermal springs of interest for the next stage of the project. While the official data from the Ministry of Tourism provided information for their institutional recognition, we employed an additional 16 criteria according to the scope and methodology of the research project, on the basis of

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historical, geographical, cultural, urban and other parameters as well as parameters related to the operation, reputation and type of the thermal springs. The list of the thermal springs (grouped according to the 8 administrative regions of Greece) along with their classification criteria were input in an excel file. Each thermal spring would get an evaluation grade from 1-4, where 1=none, 2=small, 3=large, 4=absolute agreement on each criterion, while at the end there was room for "observations" with any comments that the researcher considered important about the respective spring. The criteria are listed below:

1. **GEOGRAPHICAL LOCATION, ACCESSIBILITY:** The ability to access a thermal spring, through land, air or sea transport. Accessibility depends on the geographical location and varies depending on whether the spring is located in a central urban area, the periphery, or in an inaccessible area like remote islands, mountains and border regions of Greece. [Grade: 1 inaccessible areas. (By definition, border, islands, and mountains above a certain altitude) 2 when it is on a rural network but far away, 3 when it is in proximity to a large urban center and a good road and 4 when it is adjacent to or within main cities or towns].

2. **INTEGRATION INTO THE NATURAL ENVIRONMENT:** The natural landscape is considered as part of the cultural heritage; as such, it includes natural configurations in areas of particular geological formation, protected areas of flora and fauna with global scientific value, and places of natural beauty that need to be preserved. Thermal springs are considered thusly as parts of natural landscapes with significant natural features such as the terrain, vegetation, atmosphere, colors, textures of rocks and geological elements, etc. [Grade: 1 when the spring is in a city or on a road, or in a location with no natural landscape, 2 when it is on the outskirts of a city, 3 when it is in the natural environment and 4 when the environment is of particular beauty, such as Natura areas, forest, mountain, lake, etc].

3. **INTEGRATION INTO AN URBAN ENVIRONMENT:** Settlements of any scale (village, town, city, metropolis), are considered as potential urban places, and condensers of human civilization. Thermal springs are developed in relation to settlements, to a greater or lesser extent. This relationship is two-way, as the development of a settlement may be due to a thermal spring and vice versa. [Grade: 1 when it is far from large cities and outside small settlements, 2 when it is on the margin of a small settlement, 3 when it is in a small and medium-sized settlement, or near a large city, and 4 when it is within or on the boundary of a large city or within a town].

4. **INSTITUTIONAL RECOGNITION OF THERMAL SPRING:** Greece is one of the richest countries in natural sources of mineral water, hot and cold, with varying physicochemical composition and plenty of indications for application in modern natural hydrotherapy. According to data from the Hellenic Geological and Mineral Research Authority (EAGME, formerly IGME), in Greece there are 822 recorded sources of thermomineral waters, of which 750 are usable in relation to their healing properties. For the official certification of a natural resource located within a designated geothermal field as 'thermal', a joint decision of the Minister of Environment and Energy and the Minister of Tourism is required, following the agreement of the Committee for the Protection of Thermal Natural Resources, as well as the recommendation of the Hellenic Survey of Geology & Mineral Exploration and the Coordinator of the Decentralized Administration regarding the available flow and temperature. [Grade: 1 to an unidentified spring that has not submitted a file, 2 to a spring that has submitted a file, 3 to a spring that has received a Government Gazette and 4 to a spring with authorized license].

5. **OWNERSHIP:** As documented according to official data from the Ministry of Tourism, it refers to the status of operation, maintenance and touristic development of a thermal spring, by a public or private body or a combination of both. Regarding hydrotherapy facilities, 38 belong to municipalities, 37 to private individuals and 7 to the state. Note. The operating status is subject to change. The data for the study have taken into account the existing status. [Grade: 1 the thermal spring that is private property, 2 the thermal spring whose facilities are a combination of private and public entities (e.g.

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reduced prices to certain groups of patients, Hellenic Public Properties Co), 3 the thermal spring that has facilities belonging to the municipality or the state, 4 the thermal spring that is located in a natural environment without infrastructure and is freely accessible to the public].

6. **THERMALISM INFRASTRUCTURE:** Thermal springs that are attached to hydrotherapy facilities, isolated or connected to built infrastructure, i.e. groups of buildings related to thermalism activities, and the different healing and wellness practices offered by the place. This includes the thermal infrastructure, the tourist accommodation, the development projects and their spatial planning are directly linked to the development dynamics of the thermal spring. [Grade: 1 when there is no infrastructure (such as a natural trough on the beach, next to a river, etc.), 2 when there is rudimentary infrastructure or ad hoc ones, 3 when there is a hydrotherapy center but no hotel or hostel, 4 when there is full infrastructure (hotel, hydrotherapy center, etc.). Note: this criterion refers to whether infrastructure exists in general regardless of whether it is currently operating or not. While the criterion concerning the current state of operation (see below) examines whether the facilities are operating presently].

7. **TYPE OF TREATMENT:** In Greece, thermal natural resources are officially certified for specific types of hydrotherapy (balneotherapy, inhalation therapy, drinking therapy) and mud therapy. [Grade: 1 drinking therapy, 2 inhalation therapy, 3 mud therapy, 4 thermal bath therapy].

8. **OPERATING TIME PER YEAR:** It refers to the period of time during which a thermal spring is accessible. If it is a hydrotherapy center, the hours, days and period within its operating time. [Grade: 1 when open only with special status (such as appointments or only a few hours) or not at all, 2 when open 6 months with store hours, 3 when open year-round with store hours or open for 9 months all day or with store hours, 4 when open all year round and almost all day].

9. **CURRENT STATE OF OPERATION:** Several thermal springs are currently abandoned and non-functioning; others are under-functioning in a formal or informal way (as in Lagada baths and Eleftheres respectively). Some free-access thermal springs (unfenced facilities) are considered as presently operational. [Grade: 1 when facilities are currently not operating, are abandoned, 2 when there is an informal or typical operation in a very small part of the facilities, 3 when facilities are operating with deficiencies and 4 when they are operating normally].

10. **FREE USE BY THE GENERAL PUBLIC:** Thermal springs that exist in an open-air, unfenced state, that have a natural flow in the environment, forming ponds, troughs, etc. located in a public place and therefore access by the general public is free at all hours, days, seasons. Accessibility to the general public may be temporary and unrelated to ownership (may be a concession by the owner). [Grade: 1 spring that is not accessible and 4 springs with open access facilities for the general public].

11. **TIMELESSNESS – AGE:** This is important for our particular scope of research considering that thermalism, as a healing practice, according to reports by Herodotus and Hippocrates, was born 2,500 years ago in the Aegean Sea. The operation of certain thermal springs over time is documented through archival material, photographs, literary texts, archaeological findings, written or oral testimonies, such as myths, stories, etc. The score on this criterion depends on the historical periods for which there is evidence for the operation of the thermal spring. [Grade: 1 the modern facilities created in the late 20th or early 21st century, 2 the springs operating since the beginning or middle of the 20th century, 3 the springs for which we know that they have been operating since the 19th century, 4 the thermal springs with known and uninterrupted operation since antiquity or Byzantine times].

12. **CULTURAL HERITAGE:** Recognition of places with particular historical importance, carriers of tangible and intangible cultural heritage. The material heritage includes building facilities such as monuments, oaks, baths or other bathing infrastructures of the past, which, due to their particular architecture, homogeneity and location, have exceptional global historical, architectural and scientific value. The intangible cultural heritage of a thermal spring is traced in written or oral evidence, representations, tools, and objects that reveal knowledge and techniques of historical significance, or

describe myths and stories of healing practices and thermalism, worship of gods in related sanctuaries and other body-centered bath practices. [Grade: 1 if the installation is modern, 2 if there is a reputation for use in antiquity or earlier, 3 if there are any minor archaeological remains or if the spring is located near a major cultural site, 4 if there are important archaeological and other historical findings or if the spring is located within an archaeological site or site of great historical and cultural importance].

13. **GEOGRAPHICAL NETWORK OF THERMALISM:** The possibility of organizing and integrating thermal springs that have common characteristics, as nodes in an expanded network. They can be related to geographical proximity, integration into a network of geomorphological parameters, cultural heritage, correlation with an urban place, type of thermal spring and its therapeutic property, etc. [Grade: 1 when the thermal spring is isolated in a geographical location, 2 when there is a relative geographical proximity, 3 when it is in close proximity to other springs, 4 when it is part of a larger system of thermal springs].

14. **COMBINATION WITH OTHER ACTIVITIES:** According to the new bio-psychosocial model of the World Health Organization, the concept of health is not limited only to the absence of disease, but also extends to the presence of physical, mental and social well-being. This is exactly the idea that thermalism comes to serve, which can be combined with other cultural, athletic and leisure activities. Thermal springs can offer similar parallel actions and be recognized as a supralocal tourist destination. Apart from the facilities of the thermal spring, the existence of activities such as sea bathing, hiking, speleology, observation of fauna, flora, visiting cultural sites, etc., in its immediate vicinity is considered. [Grade: 1 when there are no other activities nearby, 2 when there are at a distance of half an hour or up to 20 km on a mountain and 40 km on a road axis by car, 3 when there are activities in the vicinity and are accessible by car, 4 when there are several other activities in the immediate vicinity of the spring, accessible on foot. Each researcher should judge and grade based on these data].

15. **DEVELOPMENT DYNAMICS:** As a matter of fact, Greek thermalism attracted the first form of tourism in the modern Greek state. However, and although from a geological point of view Greece could become one of the largest thermal centers in Europe, its springs remain mostly unexploited and thermal tourism has never managed to gain significant traction compared to its archaeological and leisure destinations. Still, many resources exist in proximity, to each other and with other points of interest (POI), forming networked entities with a high potential for growth through empowering strategies. Development dynamics is a complex criterion that utilizes findings from all the previous criteria in critical reciprocity. A thermal spring can therefore be evaluated on the basis of a combination of elements, such as location, correlation with important elements of cultural heritage, integration into an interesting natural landscape or in proximity to a large urban center, or combination with other activities, etc. [Grade: 1 for minimum development dynamics, 2 for small, 3 for moderate, 4 for high].

16. **IMAGE AND REPUTATION, SUPRALOCAL DIMENSION:** The positive image attached to a thermal spring (brand) as perceived by the general public; how famous it is, how often it appears in the media, in google searches or how it is perceived by the public (e.g. on public reviews). The breadth of this reputation, local, supralocal, national or international. [Grade: 1 for unknown or only locally known springs 2 for springs that are known in the area of the prefecture and at a distance of up to 100 km, 3 for springs that are known in the wider region and somewhat in Greece and 4 for springs that are known throughout Greece and abroad].

3. VISUALIZATION

In the next stage, graphical symbols were drawn based on the criteria and placed on a map. The graphic symbols consist of circles, coloured surfaces and a cross. Specifically, in each symbol there are 5 concentric circles with different color, thickness and type of line, depending on the type of criterion and its score. Between the circles the surfaces created (rings) have colors with different

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intensity corresponding to scores. The cross corresponds to four criteria and the score is given by the line thickness of each of its legs. A further criterion is represented by the position of one of the inner circles with the score corresponding to each of the four quadrants of the circle.

The symbols corresponding to the thermal springs are placed on a map of Greece. Each symbol is drawn in 16 different layers, in order to provide the possibility for the comparative observation of all thermal springs for each criterion. Also, the map is drawn at several scales of analysis, so that it is possible to monitor the thermalism in Greece as a whole and in regions. The map is digital and is linked via hypertext technology to a multi-criteria database (excel) that includes the scores and observations of the researchers, as well as reports of the researchers evaluating each spa. The above can be seen in the figures.

A/A	CRITERION (1-16)	GRAPHIC SYMBOL
01	Geographical location, accessibility	Red 1, color intensity
02	Integration into the natural environment	Green, color intensity
03	Integration into an urban environment	Red 2, color intensity
04	Institutional recognition of thermal spring	Gray, color intensity
05	Ownership	Cross - right, line thickness
06	Thermalism infrastructure	Cross - up, line thickness
07	Type of treatment	Circle position in each quadrant
08	Operating time per year	Cross - bottom, line thickness
09	Current state of operation	Purple, shades
10	Free use by the general public	Purple, solid – dashed line
11	Timelessness - age	Cross - left, line thickness
12	Cultural heritage	Blue, intense color
13	Geographical network of thermalism	Red, line thickness
14	Combination with other activities	line thickness
15	Development dynamics	Number of outer minute circles
16	Image and reputation, supralocal dimension	Yellow, color intensity

Table 1. Graphic symbols of multicriteria analysis

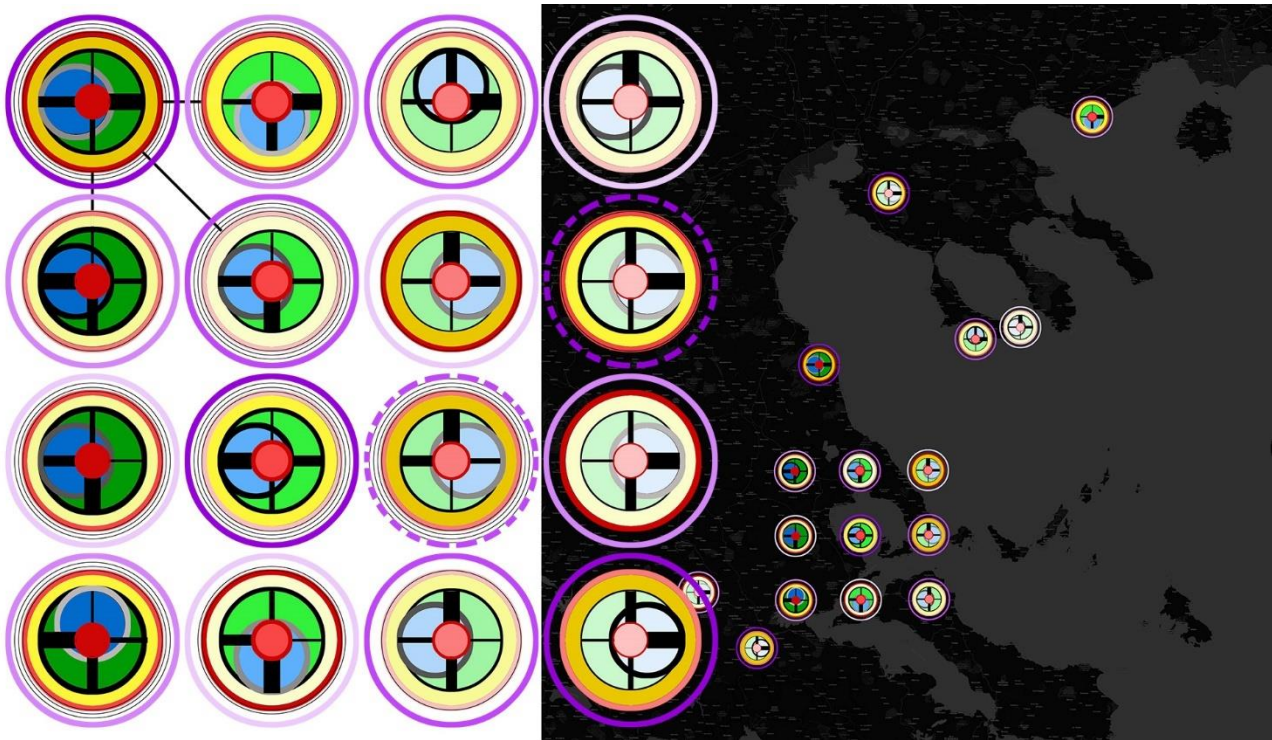


Figure 1. Graphic symbols of multicriteria analysis on a map

4. MACEDONIA AND THRACE

4.1. Multicriteria Analysis

In Macedonia and Thrace there are 30 certified thermal springs. Together with Sterea Ellada (36 certified spas, 13 of which in Edipsos and 10 in Kamena Vourla) they stand as the two regions richest in thermal springs in Greece. These are mainly individual facilities that are not connected to larger thermalism settlements. The thermal springs of Macedonia are particularly distinguished for their exceptional natural surroundings (such as the proximity to waterfalls, lakes, the sea) and for the Byzantine and Ottoman facilities with ceramic tiles and ornamental decorations (such as the thermal baths in Agistro, SEDES and Lagadas). A problem found in their historical consistency is the disruption of the architectural landscape by self-serving contemporary building facilities, that rather cover the architecture of the old baths instead of highlighting it; as it typically happens in Lagadas where the elongated contemporary building creates a barrier against the view of the old baths; or in Agistro, where the large-scale hotel literally ‘swallows’ the little, yet historically significant and well-preserved, bath building from the Byzantine era. But the most important problem that is recognized on a larger scale is the widespread desolation of formerly prosperous facilities that are either not operational today or operating in a rudimentary manner. Among the reasons for this situation, we find the large size of the facilities and the binding institutional framework that makes them difficult to maintain by a private individual; along with their remote location, that makes them less accessible compared to other destinations. Still, their importance to the collective heritage of each place is found significant, once we account for the nostalgic recollections of the local inhabitants who talk with nostalgia about a glorious past, when the facilities were crowded with visitors. Unfortunately, only worn-down traces of this past remain today...

Central Macedonia

	Analysis	Conclusion
01	3 springs are in places with difficulty in access, 5 springs are in a provincial lowland network but relatively far away, 5 are in proximity to a large urban centre and a good road and 3 are next to or inside central cities (Souroti, SEDES, Lagada).	Springs are equally distributed in hard-to-reach and central areas.
02	5 springs are in the outskirts of the city, 6 are in the natural environment and 7 are in an area of special beauty (Pozar, Apollonia, Kanistro and Agia Paraskevi of Halkidiki, Doumbia and Alikí Kitrous).	Several springs are located in natural surroundings, and several in areas of special beauty.
03	7 springs are far from large cities or outside small settlements, 8 springs are located on the border of a small settlement, and 1 spring is located on the border of a large city (SEDES in Thessaloniki).	In the majority of them, the thermal springs are not located in urban areas, but in small settlements.
04	The Picrolimni mud treatment centre is not a certified thermal spring, 4 springs have submitted a dossier for evaluation, 5 have received a gazette and 6 operate legally.	Most springs operate legally and are certified.
05	3 springs are privately operated, for one thermal spring its facilities are a combination of private and public entities, 12 springs have facilities owned by the municipality or the state.	Most springs are controlled by government agencies.
06	4 springs have rudimentary or improvised infrastructure, 3 have hydrotherapy or drinking water facilities and the remaining 11 have full infrastructure, hotel, hydrotherapy.	Most springs have healing and hosting infrastructure (regardless of the fact that most are currently suspended)
07	4 springs are for drinking therapy, 2 for mud therapy and the remaining 10 for balneotherapy.	Most springs offer thermal balneotherapy.
08	7 springs today are not working and the remaining 9 are open all year round and almost all day.	About half of the springs are currently suspended.
09	7 springs are not working today and several of them are abandoned, in one there is a formal operation in a very small part of the facilities (Lagadas), and 8 are working normally, of which only 4 have treatment facilities (balneotherapy or mud therapy).	The overall picture is that most springs today are not working or underperforming.
10	13 springs are not accessible and 3 springs are freely accessible to the general public, of which only one is a bath of mud spring (Alykes Kitrous).	Thermal bath springs are not freely accessible to the general public.
11	3 springs have contemporary facilities created in the late 20th or early 21st century, 4 springs have been in operation since the early or mid-20th century, 3 springs are known to have been in operation since the 19th century, and 6 thermal springs have known and uninterrupted operation from antiquity or Byzantine times (Souroti, Picrolimni, Giannes, Lagada, Agistro, Sidirokastros).	There are several springs for which there is evidence of long-term operation.
12	In 4 springs the facilities are contemporary, in 5 there is a reputation for use in antiquity, in 2 there are some ruins of minor importance or the spring is located near a major cultural site, in 5 there are important archaeological and other historical findings.	There are several sources that have historical significance.
13	6 springs are located in geographical locations that are inaccessible and for 10 there is a relative geographical proximity.	No geographical network of correlation of the springs is found between them.
14	In 5 springs there are no other activities nearby, in 4 springs there are activities within half an hour, in 6 springs there are activities in the vicinity and are accessible by car and for one (SEDES) there are other activities nearby (of the city of Thessaloniki).	They generally exist in the vicinity or at close distances from springs and other activities.
15	One spring shows minimal development potential (Loutrochori), 6 have low potential and 9 have high development potential.	The dynamic growth index of the thermal springs in the region is relatively high.
16	Four springs are relatively unknown or only locally known, 5 springs are known in the area of the prefecture and at a distance of up to 100 km, 3 springs are known in the wider region and 3	The reputation of most springs is local or supra-local, although one spring (Pozar) is among the best known internationally and two are of great reputation.

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springs are known throughout Greece and abroad (Poazar, Sidirokastro, Agistro).	
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Eastern Macedonia and Thrace

	Analysis	Conclusion
01	3 springs are in inaccessible areas, 3 springs are in a provincial lowland network but relatively far away, and 1 is in proximity to a large urban center and a good road (Krinides Kavala).	Most springs are not very easily accessible.
02	5 springs are in areas of outstanding natural beauty, and 2 are in the natural environment.	Generally, they are integrated into the natural environment.
03	3 springs are distant from large cities and settlements, 2 springs are on the boundary of small settlements, and 2 springs are located in a small-medium settlement.	In general, no spring is located within or on the boundaries of a major city.
04	3 springs have received a Government Gazette and authorized license (Traianoupolis, Krinides and Psarotherma) while 4 springs have received only a Government Gazette. Only 1 spring has filed an application and is awaiting recognition.	So almost 90% of the springs are certified.
05	6 springs (75%) belong to the municipality or the state, while only 1 is privately owned (Eleftheres).	Therefore, only 25% of springs are proprietary.
06	2 springs (Traianoupolis and Eleftheres) have full infrastructure, with hostel, hydrotherapy center etc. 2 springs (Krinides and Psarotherma) have only a hydrotherapy center without a guest house. 3 springs have informal (Paranesti) or rudimentary infrastructure (Echinos, Parenesti and Potamia).	Most springs have some decent infrastructure.
07	7 springs are for balneotherapy and 1 for mud therapy (Krinides)	Almost all springs involve balneotherapy.
08	3 springs are open all year round, 2 springs are open six months at store hours, and 2 springs are open only by special appointment or closed.	Many springs seem to have limited hours of operation.
09	3 springs operate normally, 1 spring operates with deficiencies (Potamia), 1 spring (Paranesti) operate informally and 2 springs are abandoned (Traianoupolis and Eleftheres).	Most springs operate but not all of them officially.
10	4 springs are freely accessible by the general public, while the rest 3 have restricted access.	Half of the springs are freely accessible by the general public.
11	1 spring dates back to the late 20th century, 4 springs have been operating since at least the 19th century. The baths of Eleftheres have been known since antiquity, but the thermal town was built in the 20th century. 2 springs have had a diachronic function (Traianoupolis from the 4th century AD and Krinides).	Most springs have had a historical past, either remains or tales about their function, which attests diachronic function.
12	2 springs have archaeological findings (Traianoupolis has Roman baths from the time of Trajan and the baths of Eleftheres have remains of Ottoman baths). 1 spring is close to a great archaeological site (Krinides is located in the wider area of Philippi, one of the most important archaeological sites of Macedonia where one can find ancient thermae, the ancient agora, the ancient theater of Philippi, etc.). 3 springs maintain a reputation for functioning since antiquity and 1 spring is a modern facility (Echinos).	Most springs are within archaeological and historical environments that attest their diachronic presence.
13	All springs are located in relatively close proximity to each other.	The springs can constitute a geographical thermalism network.
14	2 springs have other activities in close proximity. 4 springs have other activities within half an hour. 1 spring has no other activities nearby.	The average of 'other activities' for all springs is within half an hour.
15	1 spring has great development potential (specifically at the baths of Eleftheres about 21 forest acres have been declassified in order to build a new hydrotherapy center as well accommodation and catering facilities). 3 springs have moderate development potential (for example, Echinos, although inaccessible, has interesting infrastructure in nature as well as Potamia, the surrounding natural and archaeological landscapes and their connection with the baths of Echinos). The remaining 3 springs have little development potential.	Some springs can be further developed due their proximity to nature, existence of thermal infrastructure and other activities or archaeological landscape nearby.

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16	5 springs are known in the wider region and in the Greek territory (especially Krinides), 1 spring is known within the boundaries of its prefecture (Traianoupolis), and 1 spring is only locally known (Potamia).	Some but not all springs have a wider or supralocal reputation.
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4.2. Travelogue



Figure 2. Map of thermal springs in Central, Eastern Macedonia and Thrace

The travelogue was organized in November 2023, with the aim of getting to know the thermal springs of Central, Eastern Macedonia and Thrace first-hand. The trip lasted four days and 11 locations were visited. The route is shown on the map.

On the first day of the travelogue, the first stop was Alykes Kitrous in Katerini, a thermal spring for mud therapy. Alykes is a coastal wetland, a lagoon at the mouth of three rivers, Axios, Loudias, Aliakmonas, in which there are therapeutic mud baths. It consists of an earth pit with mud next to the salt pans. Its use is informal, and access is free to the public; which contributes to Alikis Kitrous' natural resource remaining a lived place. According to the testimonies of residents and salt pan workers, the baths are often visited by busloads of people. But when the Travelogue visited the place, it was found to be deserted.

The next stop was Loutrochori Skydras, otherwise known to the locals simply as "Baths", due to the existence of a thermal spring. This is a small, country village with a square, church, a park and the thermal spring found as you drive straight to its centre. It is assumed that ancient baths existed there from the time of Alexander the Great, but no archaeological findings exist to substantiate this claim. The residents also claimed that years ago the village had a lot of visitors because of the 'baths'. However, its current image exuded abandonment and decay. What is considered as 'spa facilities' lie mainly as a privately owned swimming pool that once operated in the backyard of the local priest's residence.

The third stop was the famous Pozar Baths (thermal springs of Loutraki Aridaia). These are perhaps the most famous thermal destinations in Greece, with a large number of visitors coming from Greece and abroad throughout the year. The word "pozar" is Slavic and it means fire. The thermal spring is located on the border with North Macedonia at the foot of Mount Kaimaktsalan. There is evidence that establishes the operation of the Pozar Baths since antiquity. Their main feature is the waterfalls

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from the stream of Agios Nikolaos fall next to a natural cavity of warm water, offering the visitors a unique landscape along with an impressive multi-sensory experience, at the same time. Integration with nature is absolute. The facilities are extensive and renovated. The baths operate under public administration, carrying a low cost of entry for the bathers. In several other parts of the river in the wider area there are additional thermal spring outlets, which have been shaped into pools by the residents and visitors. In the area there is also a speleological park with 17 caves and findings from prehistoric times. Every July there is an annual music festival, the "pozaritika".

On the second day of the travelogue a visit was made to the mud therapy facilities of Picrolimni in Kilkis. Picrolimni is a small, roughly circular lake located 33 km north of Thessaloniki. It was known since antiquity for its healing properties. The facilities that once operated there are now abandoned and in ruins. The privately owned business was closed due to financial reasons. The natural scenery is amazing. The large flat areas of the adjacent moor with the bushes moving in the wind and the cloudy sky combined with the deserts, seemed 'haunted'. An evocative atmosphere was created when visiting this place, along with a sense of regret for all that existed before and lie today destroyed. We encountered the same sentiment in a video on YouTube, through the penetrating descriptions from members of a local institution, and especially through the testimonies of residents who used to visit the mud facilities when they were in operation.

For the Sidirokastro baths, located near Promachonas in Serres, just before the border with Bulgaria, the prevailing feeling is that they are cold, medical facilities. The contemporary modern buildings, the hydrotherapy centre and the hotel, dominate the area and unfortunately fail to highlight the Byzantine legacy that the baths once carried. The old Byzantine buildings have been destroyed and the hammam has been renovated twice, in 1930 and 2000. Most of the bathing pools are covered and still carry their Byzantine architectural characteristics. There are also waterfalls in the area. Since 2023 the baths were operating illegally with a debt of 2 million euros and their operation is currently suspended.

Next stop was the baths in Agistro, which are very close to the border with Bulgaria. There lies one of the most important Byzantine monuments, a magnificent domed bathhouse, covered with luxurious tiles and a marble fountain, which unfortunately has been literally swallowed up by the modern hydrotherapy centre and hotel. The natural landscape in the surrounding area is remarkable.

On the third day a trekking expedition started with a visit to the abandoned baths of Nigrita, a provincial town about 25 km from the city of Serres, located in a purely agricultural landscape with straight, even roads crossing the plain of Serres, north of Mount Surpa. Ten years ago, a spa and a fountain with drinking mineral water operated at the site. The ruins of a Byzantine bathhouse are still preserved there and remain unused. Further on, among trees and meadows, old baths from the facility are now used as watering troughs for animals...

From the coastal road between Amphipolis and Kavala, south of Mount Pangaion and about 45 km southeast of Kavala, a small perpendicular road leads to the valley of Marmaras, an area of particular natural beauty. There lie the thermal springs of Elefthera, which have been known to exist since antiquity. What the visitor sees today is a mysterious settlement in abandonment and in full integration with the lush surrounding nature, giving the impression of being haunted. The bath settlement consists of 31 that still remain standing, the oldest of which is an Ottoman bath of the late 18th century. The area became a spa town when in 1908-1910 the tobacco merchant Zachos Zachou took over the rights to exploit the springs from the Ottoman government. The architectural design project was undertaken by renowned architect Aristotle Zachos, who also designed a few hotels nearby (Amphipolis, Pangaion). Today the settlement is completely abandoned, but it is occupied informally for long periods of time each year by groups and individuals who have taken advantage of the facilities to turn them into makeshift residences. Within the premises there is a working swimming pool, and there are several natural 'pools' on the riverbanks which receive many visitors.

The region of Eastern Macedonia and Thrace includes 3 of the most unique spa destinations in northern Greece: Thermios Paranestios Baths east of Drama, located on Mount Rodopi in an inaccessible location, Psarotherma on the island of Samothrace and Thermios Echinios Baths in Xanthi. In all three cases, these are makeshift free-use facilities in beautiful locations with particular characteristics for each one: the 'troughs' of Paranestios are sheltered in tin shacks; the Thermes of Xanthi are located on a hill overlooking a valley; and the Psarothermas (plural) consist of a series of open-air rectangular pools featuring the famous 'hot pedestal' on top of the hill facing the sea. It is a rectangular pool measuring approximately 2 x 3 metres and 80-100 cm deep, which is visited daily during the summer by hundreds of holidaymakers. During our trek we visited the Thermae Echinou of Xanthi. The community of Thermes is located 45 km from the city of Xanthi and consists of four Pomak settlements hidden in the mountains: Upper Thermes, Middle Thermes, Lower Thermes and Loutra Thermes. It is hidden in nature alongside streams where hot water gushes out, drawing from the rich geothermal field of the wider area of Xanthi. It is said that, in the past, the Pomaks used to put their sheep and goats in the natural pools of thermal water created on the hillsides, in order to cure them of orthopaedic and other problems. There are over 40 springs in the wider area where thermal water gushes out. The springs attract visitors from all over the region of Eastern Macedonia and Thrace, Thessaloniki and regions of the southern Balkans. In 2021 a number of individual open-air pools (baths) were created. Integration with nature and the mountainous Pomak environment is absolute. Although it is a very hard-to-access place, these exceptional infrastructures with their particular sculptural aesthetics and their relationship with nature attract a large number of admirers. It should be noted that the facilities are very clean and neat, as they are well-taken care by both their managers and their visitors.

On the last day of the trek, we visited two loutrotopoi in Thessaloniki, the SEDES baths in the east of the city and the Lagada baths in the north. The SEDES thermal baths are located at the eastern edge of Thessaloniki, namely, in direct relation to a metropolitan urban area, developed in a pine wooded area of 500 acres which extends on both sides of the road leading to Halkidiki. The baths used to be operational, but the facilities are now in ruins. Their architecture, although not of Byzantine period, their integration into the natural environment and their proximity to the large urban centre make them quite interesting. There are some remains of ancient baths and constructions of Byzantine architecture on the site, which could possibly show potential. The baths of Thermi have been known to exist since antiquity.

The last stop was the Lagada Baths. The bathing facilities are located in the settlement of Lagadas, 20 km north of Thessaloniki. The main street of the settlement carries the name "Loutron" (transl. "bath"), which signifies the great importance these hold to the local community. In the facilities, which resemble a large multi-purpose park, modern and old structures of Byzantine heritage coexist. Unfortunately, same as in Sidirokastro, the Byzantine heritage structures are concealed by the contemporary building which imposes a cold generic façade of pure medical character. The operation of the facilities today is found to be inconsistent and lacking: while there were reportedly supposed to be a number of outdoor and indoor pools in operation, our visit found that only the two Byzantine pools are in operation, while the rest of the bathing facilities are abandoned in an old and dilapidated wing of the modern building. It is worth noting that the word "unacceptable" is mentioned about 30 times in the visitors' book. Although the premises are surrounded by a large span of open green spaces, which would have us expecting that the facilities' integration into the natural landscape would be at least acceptable, unfortunately, the landscape again shows a great deal of decay with most of the outdoor facilities being in a state of under-use, obsolescence and desolation. As in other similar cases, the bathing facilities are managed by the municipality.

Overall, the majority of the eleven Loutrotopoi in Central & Eastern Macedonia and Thrace that we visited were found to be either non-operational or operating below their nominal potential, and the general impression we acquired is one of decline. An interesting correlation that we found is that the

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level of decline increased with the size of the infrastructure; or, that the prosperity of the Loutrotopoi was inversely proportional to the scale of the facilities attached to them. This makes sense, once we connect the cost of maintenance to the utilization of the facility: where maintenance costs were high, the facilities were under-utilised, and the lack of maintenance was evident; in contrast, where the natural landscape was taking prominence and the structures were make-shift and freely utilized and maintained by the visitors, the situation was much more acceptable and the visitors were happy to join in the general vibe. Ultimately, it looked like the facilities that were more tightly (or genuinely) connected to the natural landscape attracted more visitors.

5. CONCLUSION

As the above study shows, both through multicriteria analysis and in situ empirical observation, during our field trip the most important nominators for the sustainable operation of places with thermalist interest proved to be the type and scale of the facilities, the type of use (public, free, open-air or private, controlled, covered) and the proximity / embeddedness to an interesting natural landscape. Accessibility does not seem to be as important, since the large number of visitors at the Pozar Baths, which are located in a remote area of true natural beauty, find no problem coming in large numbers every year, while other places which are located conveniently close to an urban area, e.g. such as SEDES, Traianoupoli and Lagada, still remain unpopular and, by result, in decline.

This creates the premises of a discourse about the notion of ‘capitalization’, which now appears irrelevant to a discussion about a Loutrotopos’ potential for development; since intangible qualities such as ‘genuineness’ surface as a much more resilient classifier of value, than medical capacity and infrastructure. Furthermore, the value that comes from the institutional certification of a spring’s healing properties, and/or the organized infrastructure that’s attached to it, seems to be disproportionately unimpactful to the wider public, considering their manifest acceptance of makeshift structures and/or untreated natural formations as places of healing, regardless of the fact that bathing in untested and uncertified waters potentially holds great hazard to public health. This draws an argument that a Loutrotopos’ appeal lies beyond the mere certification of the medicinal value of the thermal spring, as it is arguably evident that the value of ‘topos’, namely the intangible quality of a place, is equally critical to the value of ‘loutro’, namely bathing in healing waters.

In conclusion, our research showed rich and tangible evidence that ‘Loutrotopoi’ are, above all else, inextricably embedded in a wider socio-cultural context that also includes folk culture and a hard-to-grasp sense of place, which is by no means measurable by prescriptive quantitative metrics. This calls for the development of an expanded set of qualifiers, along with tools that reflect a holistic understanding of the problem, unearth and examine the character of the subject area, and connect specific medicinal requirements with a humane sense of healing.

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Elements of urban design to ameliorate urban heat island. The Case of Nikea, Piraeus, Greece.

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Abstract

Mediterranean cities, with their specific climatic traits of hot summers and mild winters, are highly susceptible to the urban heat island (UHI) effect, exacerbated by urbanization practices. The UHI, characterized by elevated temperatures in urban areas compared to surrounding peri-urban regions, stems from human activities like using heat-absorbing construction materials and dense urban development. Factors such as urban topography and geometry contribute to heat retention by hindering natural ventilation. Poor urban planning worsens thermal discomfort in outdoor spaces. This paper details an experimental study in a post-refugee urban neighbourhood in the Attica metropolitan region, designed in the 1930s. The area's urban layout, featuring open public spaces in each city block, facilitates landscape design experiments. Using ENVI-MET software, the authors explore diverse UHI mitigating strategies, including high albedo materials, and water bodies. The findings contribute valuable insights for future research and analysis in mitigating the UHI effect in the urban Mediterranean context.

Keywords: *landscape design; urban design; thermal heat island; Athens-Piraeus; urban greening; high albedo materials*

1. INTRODUCTION

The theoretical discourse on the quality of life in urban centres has sharply highlighted the role of natural elements in the urban fabric since the early Industrial period. The theoretical discussion begins with references to the poor living conditions of factory workers in the early industrial centres of Great Britain [1] initiating a reflection on the balance between anthropogenic and natural elements in urban environments. In the first decades of the 20th century, the idealization of the countryside led to the urban planning practice of garden cities, with well-known examples such as Letchworth Garden City in Great Britain [2]. In the subsequent decades, environmental concerns on the quality of life in metropolitan areas put in the forefront the role of open public spaces. Urban regeneration across various scales, is gradually being associated with a series of environmental issues, which acquire measurable form through quantitative recordings, environmental indicators, and relevant measurements [3,4]. For Greece, Law N.1337/83 constituted a milestone in highlighting the significance of open public spaces by recognizing its contribution to improving the quality of life. According to recent relevant literature, different scales of outdoor spaces can positively contribute to the improvement of urban microclimate [5]. Particularly, in the metropolitan area of Attica, the necessity for such holistic interventions is deemed essential due to a variety of factors. A fundamental parameter is the fact that many parts of the urban fabric were created under the pressure of historical circumstances, related to significant demographic flows. One such demographic flow that determined the future of urban and rural areas in Greece was the refugee influx following the Asia Minor

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Catastrophe of 1922. Despite the pressures for a fast-housing rehabilitation, most of the urban refugee settlements, followed basic design principles, including the presence of outdoor spaces of different scales within the city blocks [6,7]. Surveying the entirety of the refugee settlements in Attica in previous research the refugee enclave of Nikaia serves as a fruitful field for exploring different landscape scenarios and their impact on urban microclimate [8].

2. THEORETICAL CONTEXT

2.1 Contemporary challenges of urban microclimate in Mediterranean cities and the role of open public spaces

Urban microclimate challenges in Mediterranean cities, marked by temperature extremes and changing precipitation patterns, pose multifaceted issues affecting liveability and sustainability. High temperatures, heat waves, and prolonged intense sunlight contribute to thermal discomfort and heat stress for residents in these urban environments. [9]. Moreover, climate change has led to alterations in precipitation patterns, resulting in water scarcity, and affecting the overall microclimate [10–13]. In addition, the accelerated growth of Mediterranean cities has led to increased impervious surfaces, reduced green spaces, and a rise in energy consumption, exacerbating urban heat island effects [9,10]. According to relevant literature, the phenomenon of urban heat islands is associated with the rise in temperature in urban areas compared to suburban and rural areas.

The term was first introduced in Luke Howard's work, *"The climate of London"* (1833), focusing primarily on the temperature increase in urban areas during the night [14]. Urban thermal stress in Mediterranean cities arises from factors such as buildings serving as heat reservoirs, surfaces with conventional materials impeding natural cooling, restricted air circulation, lack of vegetation for water evaporation, and the re-emission of long-wave solar radiation. The term "urban thermal stress" characterizes warm enclaves within cities, encompassing both daily and nocturnal temperature variations. In the case of Athens, according to research conducted at 30 stations in the city and suburbs, this difference reaches up to 10°C [3]. This phenomenon is more pronounced during the summer period and affects the temperature of the atmospheric air as well as the surfaces of buildings and urban outdoor spaces (ibid). It is particularly intense in warm climatic zones, including the Mediterranean basin [15,16]. Especially in urban centers classified under tropical and subtropical climates, the issues are even more pronounced, with researchers thoroughly studying alternative urban topographies aiming to mitigate the phenomenon [17]. Illustrative of the scale of the problem is the fact that 30 cities in Europe and over 120 cities worldwide are grappling with the urban heat island issue (ibid).

A natural consequence of this phenomenon is the increased energy consumption for providing thermal comfort inside buildings, thereby burdening the energy balance of cities. Additionally, the use of conventional materials that absorb high levels of solar radiation adversely affects temperature variations in cities [18]. Furthermore, higher population densities further intensify the challenges related to heat, air pollution, and congestion in urban areas. Given all these, well-designed open public spaces act as vital components in enhancing thermal comfort by providing shade, natural ventilation, and greenery, mitigating the adverse effects of high temperatures. Moreover, green public spaces contribute to biodiversity, improve air quality, and offer recreational opportunities, fostering a healthier urban environment [19]. Open public spaces serve as social hubs, facilitating community interaction, cultural activities, and public gatherings that contribute to the social resilience of urban areas [20]. Specifically, the proximity of residential areas to urban green spaces is particularly beneficial for the elderly, children, and individuals with respiratory problems [19,21].

As exemplified in the book *"Urban Microclimate: Designing the spaces between buildings"*, modern design approaches focus on creating suitable microclimatic conditions for various outdoor activities [22]. From this point of view, integrating sustainable design principles, such as increasing green

infrastructure, promoting mixed land use, and incorporating climate-responsive architecture, is crucial in addressing microclimatic challenges.

3. Previous Studies on mitigating UHI in the Mediterranean Region

Urban planning and design significantly influence Urban Heat Island (UHI) mitigation. Well-designed urban layouts with blue-green infrastructure, high-albedo materials, mixed land uses, and smart growth principles reduce heat retention, enhancing microclimates. Reflective surfaces can play a role in mitigating climate change by reducing the demand for cooling energy, which in turn decreases greenhouse gas emissions associated with energy production [10]. The diminished heat absorption due to increased solar radiation reflection is a key contributing factor. It is advised to strike a balance between positive and negative impacts by employing medium albedo (approximately 0.4) on walls, while surfaces such as pavements are recommended to have high albedo values (exceeding 0.7) [11,13,23,24]. Studies also explore the microclimate effects of high albedo surfaces, including their impact on local air temperature, humidity, and wind patterns [10,13]. Ongoing research continues to refine our understanding of the benefits and potential drawbacks associated with high albedo surfaces in different contexts. When studying the Urban Heat Island (UHI) effect, researchers also typically focus on various water-related elements to understand their influence on urban microclimates [25]. In particular, Mediterranean cities often have natural or artificial water bodies like lakes, rivers, fountains, or coastal zones. Researchers study how these water bodies act as cooling elements, moderating temperatures in the surrounding urban areas [26]. Evaporation from water surfaces can contribute to cooling. It is important to mention that the majority of studies focus on large-scale water body elements. There are a few studies that examine the impact of different scales of water body elements on UHI [27]. Urban greening, as a UHI strategy, involves integrating vegetation and green spaces within urban environments to enhance overall environmental quality [16,28,29]. In the context of ENVI-met simulations, consideration is given to various types of urban vegetation, encompassing trees, shrubs, and green roofs [25]. ENVI-met facilitates the modeling of shading effects induced by green elements, allowing an examination of their impact on temperature patterns across different urban locales [30]. Vegetation aids in cooling through evapotranspiration, releasing water vapor into the atmosphere. Studies on mitigating Urban Heat Islands (UHI) offer valuable guidance for optimizing urban planning strategies to maximize cooling benefits in urban design.

4. About the selected case study

According to relevant literature, European cities exhibit significant diversity in their socio-spatial structure and organization. Mediterranean metropolises display a hybrid condition, balancing between compact urbanity and forms of urban sprawl [31]. Specifically, in the case of Greece, both urban and rural areas were decisively affected by the settlement of the Asia Minor refugees in 1922 [8]. This demographic influx of 1.5 million refugees drastically altered the country's growth rate [32]. Out of the 47% of the refugees that settled in urban areas, 48% were directed towards the urban agglomeration of Athens-Piraeus (ibid). As a result, a total of 46 refugee settlements were created outside the urban fabric of Athens and Piraeus [6]. The pressure of historical circumstances inevitably influenced the design of the urban space, as it became vital to secure housing for a large number of new residents in a short period. Despite the challenges of refugee housing rehabilitation, the building blocks in the urban refugee settlements typically ensured the existence of open communal space (Fig.1 and 1a). There were also examples of refugee garden suburbs, as seen in the case of Nea Filadelfeia [8]. However, in most cases, these were settlements with high building densities. After the 1960s high building coefficients have been granted, significantly influencing the urban topography, as seen in the case of Nikaia. Despite the above-mentioned difficulties, the value and significance of urban outdoor spaces were recognized through Law N1337/1983 and Presidential Decree 23.02.1987

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[33]. The area of study provides an urban layout of city blocks connected through intermediate open public spaces and pedestrian alleys. These spaces facilitate further research on the role of open public spaces in mitigating urban heat islands by employing different design strategies.



Fig.1: The selected case study, administrative borders of the Municipality of Nikea, authors' work

Fig.1a: The selected city block, building heights, vegetation and surface cover material, authors' work

3. METHODOLOGY

ENVI-met, a crucial environmental modeling tool, enables comprehensive simulation of temperature, wind patterns, and air quality at a high spatial resolution. This capability significantly aids in understanding how design choices influence the local climate, making ENVI-met indispensable for researchers and practitioners striving to shape sustainable and comfortable urban environments. The study focuses on exploring the impact of various Urban Heat Island (UHI) mitigating strategies on a city block scale, in the post-refugee settlement of Nikea, Piraeus Prefecture. The city block, with varying building heights from 3m to 15m, incorporates a communal open space. Assessing microclimatic characteristics, the study performs six environmental simulations for two selected summer days, representing typical and warmer conditions. Simulations include existing configuration (Existing Configuration), replacement of pavement with high-albedo concrete (Design Scenario 1), and addition of water elements (Design Scenario 2). Spatial air temperature distribution is analyzed at 16:00, the warmest hour, and midnight, encompassing a comparison between daytime and nighttime temperature variations.

4. RESULTS AND DISCUSSION

4.1 Existing configuration

Figure 2 outlines air temperature distribution at 16:00 during a typical summer day in the current configuration. Temperatures range from 30.5 °C to 32 °C, with asphalt-covered streets exceeding 31.5 °C. Warm air from these streets affects the northern areas, gradually cooling towards the central and southern regions. In tree-covered and concrete pavement zones, temperatures range from 30.8 °C to 31.4 °C, while the south and east experience lower temperatures (30.5 °C to 30.8 °C) due to shade from nearby buildings. PET indicates 'extreme' heat stress in the west, with the central and east areas experiencing 'moderate' and 'strong' heat stress. Midnight sees a decline in air temperature, with a range of 28.0 °C to 28.6 °C. The southern and eastern parts record the lowest temperatures (28.0 °C to 28.3 °C), and the central region, featuring tree cover, ranges from 28.3 °C to 28.4 °C. Surrounding streets exceed 28.6 °C. Figure 3 illustrates notable air temperature reductions, especially in the western part, where daytime temperatures exceeded 3.0 °C. In other areas, reductions fluctuate between 2.5 °C and 3.0 °C.

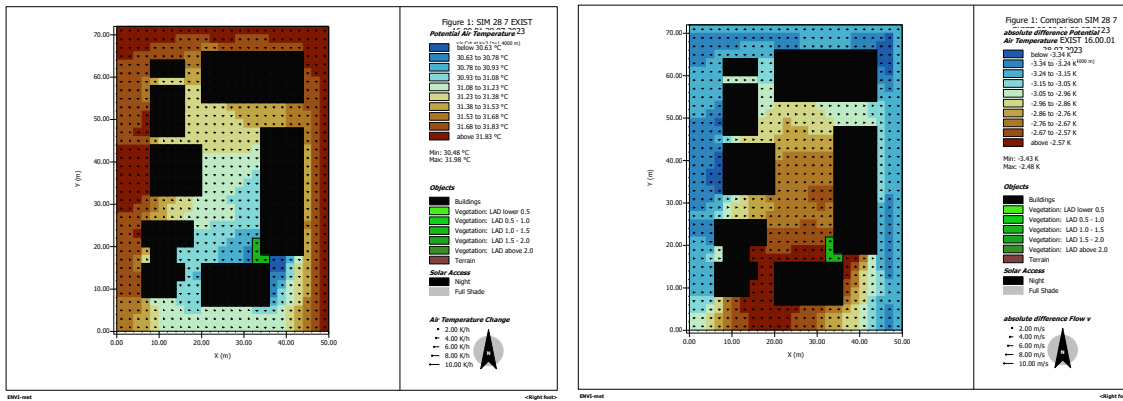


Fig. 2: Simulation 28_7_2023 existing situation, 16:00, authors’ work

Fig 3: Simulation 28_7_2023, existing situation- comparison day – night, authors’ work

Figure 4 depicts air temperature distribution at 16:00 on a warm summer day (21_7_2023), showing a notable 4 °C increase in both maximum and minimum temperatures compared to a typical summer day. The study area exhibits a thermal pattern differentiation, with temperatures ranging from 34.0 °C to 37.3 °C. Higher temperatures are observed in western streets, exceeding 36.3 °C. PET values reflect increased heat stress ('extreme') in the west and slightly lower stress levels ('moderate' and 'strong') in the central and eastern areas. At midnight, a predictable temperature decrease is observed, with a range of 30.0 °C to 33 °C. The most significant reductions (exceeding 4.0 °C) occur in the western and northern parts, while other areas experience temperature reductions ranging between 3.0 °C and 4.0 °C (Figure 5).

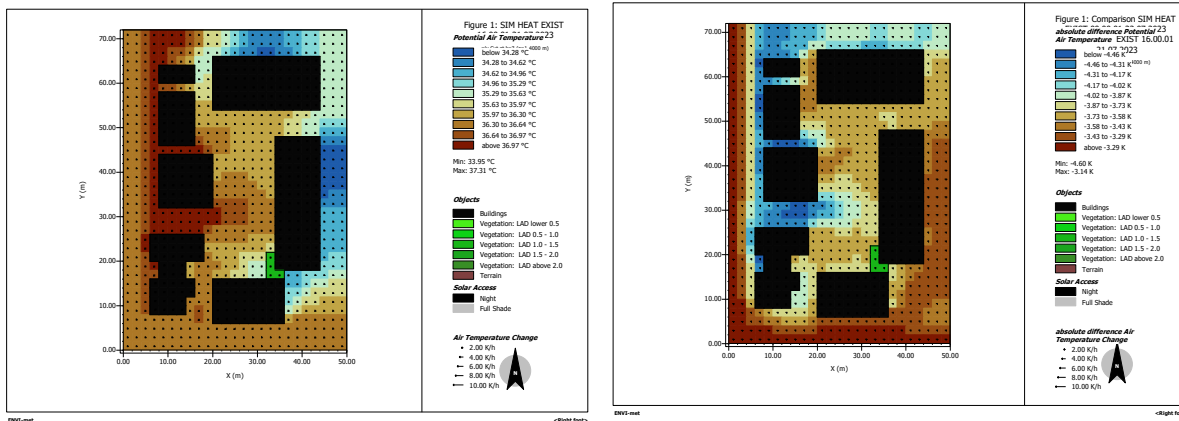


Fig. 4: Simulaton 21_7_2023, 16:00 existing situation, authors’ work

Fig.5: Simulation 21_7_2023, existing situation, comparison day – night, authors’ work

4.2 Design Scenario 1

Figure 6 illustrates Design Scenario 1 at 16:00 on a typical summer day, revealing air temperature patterns resembling the existing configuration but with reduced minimum and maximum temperatures (30.2 °C to 31.6 °C). A slight decrease of approximately 0.5 °C, attributed to high albedo pavement materials, is observed compared to the current setup. Unaltered surrounding streets continue to exhibit the highest temperatures, exceeding 31.5 °C due to asphalt heat retention. Warm air from these streets penetrates the study area, elevating temperatures in the northern part and gradually cooling toward the central and southern regions. In the central part, air temperatures range from 30.5 °C to 30.9 °C, exhibiting a slight decline from the current configuration. The south records the lowest temperatures (30.0 °C to 30.5 °C), with a minor reduction (about 0.1°C) attributed to shading, tree cover, and high albedo pavement compared to the existing setup. PET values, though

slightly lower, still indicate elevated heat stress levels, with lower estimations in the central and eastern areas ('moderate' and 'strong' heat stress) and 'extreme' heat stress in the western part. At midnight, the area maintains consistent thermal patterns compared to noon, featuring lower air temperatures ranging from 27.9 °C to 28.6 °C. Figure 7 depicts air temperature reductions between 2.3 °C and 3.2 °C, notably observed in the surrounding streets. In the southern and eastern parts, the smallest temperature variation (28.0 °C – 28.2 °C) indicates a 0.1 °C reduction from the existing configuration. The central part, with tree cover and high albedo pavement, experiences temperatures ranging from 28.2 °C to 28.3 °C, reflecting a 0.1 °C reduction. However, surrounding streets continue to produce the highest air temperatures, potentially exceeding 28.6 °C, contributing to a heat load similar to the existing configuration.

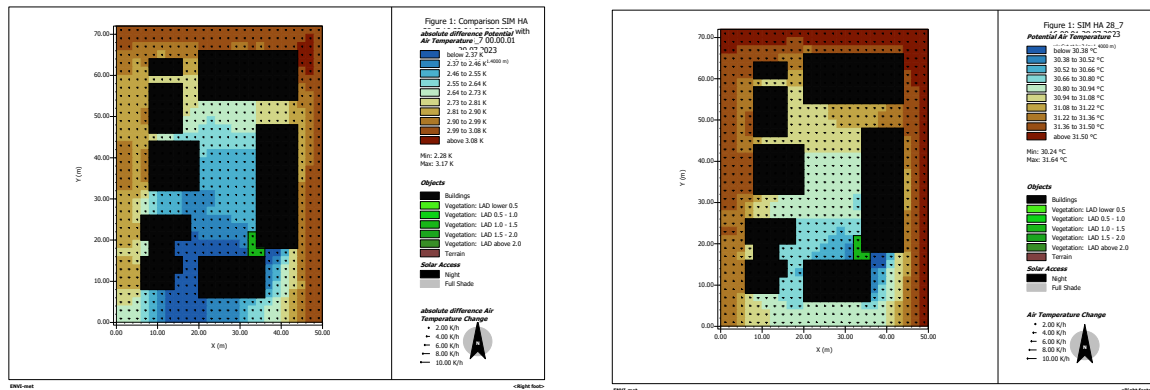


Fig.6: Simulation 28_7_2023, 16:00, scenario with high albedo materials, 16:00, authors' work
Fig.7: Simulation 28_7_2023, 16:00, scenario with high albedo materials, comparison day and night, authors' work

In Figure 8, Design Scenario 1 at 16:00 on a warm summer day displays an increase in both minimum and maximum air temperatures (3.5 °C to 5 °C) compared to the typical summer day of the same scenario. The spatial distribution shows temperatures ranging from 33.7 °C to 36.5 °C, with the highest values exceeding 37.0 °C in the western part's surrounding streets. The central part experiences temperatures between 35.6 °C and 36.2 °C, while the lowest temperatures (below 34.0 °C) are found in the eastern part, likely due to shading from nearby buildings. PET values align with thermal conditions, reflecting higher heat stress levels in the western parts and lower levels in the central and eastern areas, corresponding to 'strong' and 'extreme' heat stress conditions throughout the study area. At midnight, a decrease in air temperature compared to noon is observed, with consistent maximum and minimum values. The air temperature ranges from 29.8 °C to 33.2 °C, and the most significant reductions, exceeding 4.0 °C, occur in the western and southern parts of the examined area. In other regions, air temperature reductions fluctuate between 3.3 °C and 4.0 °C (Figure 9).

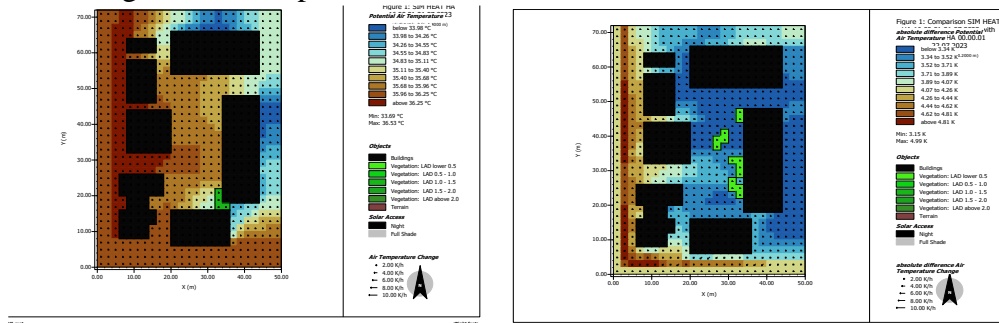


Fig. 8: Simulation, 21_7_2023, a scenario with high albedo materials, 16:00, authors' work
Fig.9: Simulation, 21_7_2023, a scenario with high albedo materials, comparison day and night, authors' work

4.3 Design Scenario 2

Figure 10 shows air temperature distribution in Design Scenario 2 during a typical summer day at 16:00. Thermal patterns are similar to the current configuration and Design Scenario 1. With strategically placed fountains, minimum temperatures decrease by over 6 °C in specific areas. Maximum temperatures in surrounding streets see a slight reduction of 0.4 °C, possibly due to the fountains. The study area follows a thermal pattern, with warm air from surrounding streets gradually cooling towards the central and southern regions. Fountains contribute to a significant cooling effect, with the central part experiencing the lowest temperatures (25.1 °C to 28.9 °C), a reduction of up to 5.5 °C compared to the existing configuration. PET values indicate 'moderate' to 'strong' heat stress, with 'extreme' heat stress in the western part. At midnight, temperatures range from 21.3 °C to 28.6 °C, with a decrease from noon ranging between 2.5 °C to 3.4 °C. The central part and areas around the fountains show the least temperature variation (21.3 °C – 25.7 °C), indicating a potential 5 °C reduction compared to the existing configuration. Surrounding streets register higher temperatures, contributing to a slightly lower heat load than the existing configuration, likely due to the fountains' cooling effect.

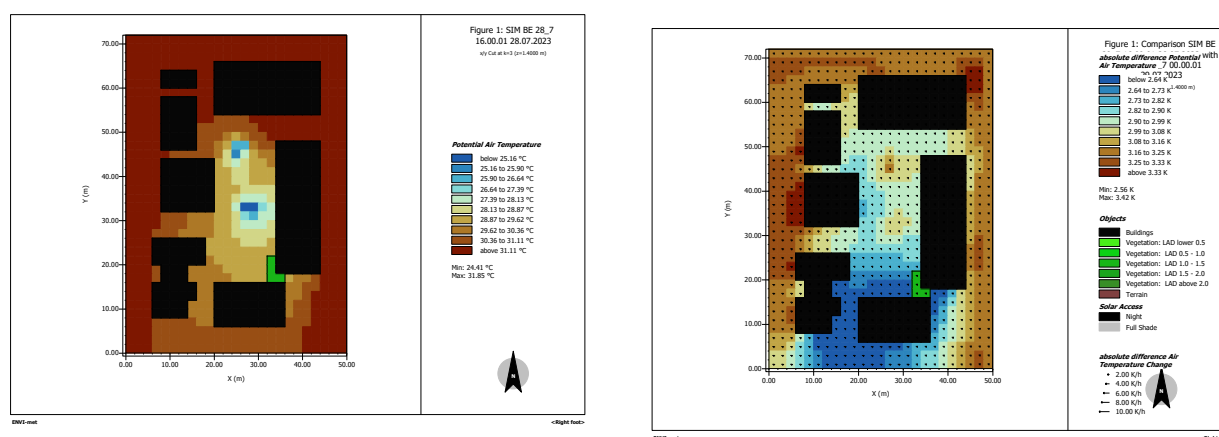


Fig.10: Simulation 28_7_2023, 16:00 scenario with water body elements, authors' work

Fig.11: Simulation 28_7_2023, comparison day and night, scenario with water body elements, authors' work

In Figure 12, Design Scenario 2 at 16:00 on a warm summer day displays similarities in minimum air temperature values, but an increase of around 5.5 °C in maximum air temperature compared to the typical summer day of the same scenario. The air temperature varies from 24.2 °C to 37.3 °C, with the highest values exceeding 36.0 °C in the western part's surrounding streets. The central part, featuring two fountains, experiences the lowest temperatures, ranging between 25.5 °C and 29.4 °C, showcasing the significant cooling effect provided by the fountains. PET values are slightly lower than those in both the existing configuration and Design Scenario 1 during the warm summer day. For most of the study area, PET values range between 'moderate' and 'strong' heat stress, while higher PET values corresponding to 'extreme' heat stress conditions are observed in the western part. At midnight, there is a decrease in air temperature compared to noon, with consistent maximum and minimum values. The air temperature ranges from 22.4 °C to 33.2 °C, and reductions compared to noon vary between 3.2 °C and 4.8 °C for most of the study area (Figure 13).

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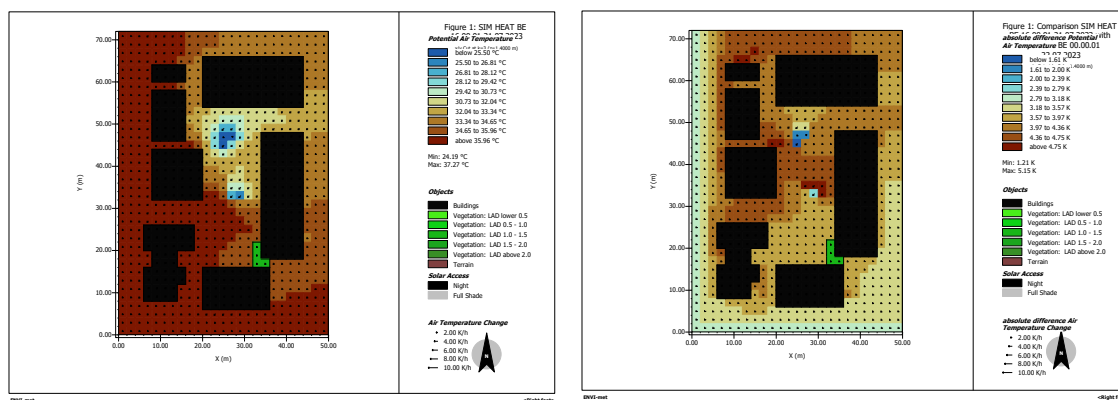


Fig.12: Simulation 21_7_2023, heatwave, Design Scenario 2, 16:00, authors' work

Fig.13: Simulation 21_7_2023, heatwave, Design Scenario 2, comparison day and night, authors' work

5. CONCLUSIONS

This study assesses urban heat island (UHI) mitigation strategies in a densely populated area of Athens, focusing on a city block in the Nikea post-refugee settlement. Microclimatic simulations for a typical and warm summer day were conducted under three scenarios: existing configuration, Design Scenario 1 (high-albedo concrete pavement), and Design Scenario 2 (addition of two fountains). While adverse thermal conditions were observed in all scenarios, Design Scenario 2 showed the most favorable outcomes, demonstrating the cooling effect of fountains. PET estimations indicated thermal discomfort levels across scenarios. The highest air temperature and PET values were consistently observed in surrounding streets with low-albedo asphalt, while lower values occurred in shaded areas. Despite nighttime air temperature decreases, thermal discomfort persists. The study suggests that incorporating water elements, as demonstrated in Design Scenario 2, may positively impact the UHI phenomenon. Future research could explore the cooling effect of water elements across multiple city blocks and develop a design methodology for application in similar urban settings. Combining various UHI mitigating strategies holds promise for improving outdoor thermal comfort in hot Mediterranean metropolitan areas, particularly during heat waves.

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Presentation and Analysis of Accessible Cases that Contribute to the Development of the Greek Tourism Industry

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Extended abstract

The participation of disabled people in daily life has gained increasing significance and is strongly promoted by international regulations and governments. The inclusion of disabled people in social and economic activities offers them equality, high satisfaction, and essential social and economic benefits for all stakeholders. Adding to this issue, high participation promotes society's sustainable development and should be strongly encouraged. According to research by the University of Sussex, the European market has suffered a loss of USD 148 billion by not sufficiently serving the needs of disabled people. Also, more than 1.3 billion people present some kind of disability. These figures show an important and lucrative market segment, which should be more emphasized. People with disabilities (PwDs) have specific needs, and monitoring and responding to them with tailor-made services is recommended. Applying universal design, most needs of everyone, especially people of every type of disability, including the elderly with reduced mobility and people with temporary difficulties, can be satisfied. Tourism is a primary industry worldwide, and its accessibility is gaining significant interest. Tourism companies are losing too much money because, in many cases, they do not provide sufficient services that are accessible to all. Tourism is an essential need for disabled people, and places providing proper services gain significant social and economic benefits. Greece, with its distinctive natural environment, landscape, and cultural identity, has a strong tourism industry, and offering more accessible services can achieve higher returns. The current study presents and analyses accessible places and edifices for disabled people in Greece, particularly accessible hotels and beaches, while suggesting improvements. In this framework, research focused on online discussion with a group of twelve (12) disabled people and experts. The outcome shows that although services provided to disabled people have significantly improved in the last decades in Greece, there is still room for significant improvements. The present paper introduces a holistic approach focusing more on the autonomy of disabled people and the provision of higher-quality services in all travel chain. More accessible beaches and hotels are recommended. The provision of accessible information about the provided services is essential, and towards this, the use of new advanced technologies is helpful. The creation of a fully accessible small island as a model and the proper promotion of this initiative are proposed. The study provides essential insights for policymakers and academics to improve their knowledge about the examined subject and the quality of the services provided services.

Keywords: *accessible tourism; Greek tourism industry; disabled people; a holistic approach.*

1. Introduction

The tourism industry's importance is indisputable. Tourism has traditionally focused on those who participate rather than those who are excluded [1], such as those who are marginalised, omitted, overlooked, or ostracised from travel based on factors such as low socio-economic status, ethnicity, indigeneity, age, gender, sexuality, ability, or the intersectionality of these areas of identity.

The growing population of elderly and disabled people around the world requires exceptional support and services. According to the World Health Organisation [2] report, over 1.3 billion people (or 16% of the global population) live with some form of disability, constituting the largest minority group in the world. Adding on these spouses, children, and caregivers, the final figure exceeds 2 billion people. Almost 50% of people aged more than 60 have some disability. Also, travellers with disabilities tend to have 2 to 3 escorts. Consequently, there is a significant market opportunity for destinations and companies that sufficiently serve these people, which can significantly enhance their revenues [3].

Accessible tourism involves collaborative processes between stakeholders, enabling people with various access requirements—including mobility, vision, hearing, and cognitive dimensions of access—to function independently, with equity and dignity. This approach ensures the delivery of universally designed tourism products, services, and environments for the benefit of people with disabilities (PwDs) [4]. Tourism is an essential need for PwDs, and studying in detail their needs, more convenient services should be provided [5], seizing the opportunity for more people to travel, leading to increased visitors, longer stays, extended tourism seasons, and consistent income for the tourism industry, and local economies. Furthermore, societies and governments reap significant gains from new employment opportunities, augment tax revenues, and provide an accessible environment for both residents and visitors. Offering accessible services in all travel chains, including hotel accommodations and beaches, is essential for those people to travel more. Therefore, countries that invest more in PwDs needs are expected to have significant economic and social benefits. In addition, respecting the environment, these efforts lead to higher sustainability.

Greece has a strong tourism industry, and emphasising accessible tourism will have significant benefits. The study aims to identify the main issues and obstacles that limit the further development of accessible tourism in Greece and propose some improvements. The current paper further discusses accessible beaches and hotels.

An online focus group technique was applied, and participants (n=12) with some disability and those with significant work experience and knowledge of the tourism industry were selected. The study's primary outcomes show that although considerable progress has taken place in the last years regarding accessibility, much more action is required. A more holistic approach that includes sufficient services in all travel chains of PwDs is needed. Also, the services of beaches and hotels should be better adjusted to the real needs of PwDs.

The current study provides significant insights and knowledge on an exciting subject for policy-makers, practitioners, and academics.

2. Literature review

In this part of the study, the relevant literature about fundamental issues on disability, accessible tourism in general, and the Greek reality are briefly presented.

On a global basis, PwDs are the largest minority group [2, 6]. Estimations [7] indicate significantly high percentages of PwDs in some countries (e.g., United Kingdom: 20.7%) and demonstrate that walking disability is the most recurrent type of impairment. The high figures of PwDs will further increase due to the ageing population and diseases [8]. The International Classification of

Functioning, disability, and Health (ICF), supported by the World Health Organization (WHO), suggested the 'biopsychological model', which combines biological, psychological (thought, emotion, and behaviour), and social (economic, environmental, and cultural) factors related to PwDs' daily-life [9]. Thus, participation, inclusion, and equality are highly required, and travel and tourism are basic needs for all.

Although increased globalisation leads to a uniformity of consumers' lifestyles, the emergence of various forms of thematic tourism is significant. It requires specific actions and services according to the travellers' needs [10]. Over the last decades, the focus has shifted from 'disability and tourism' to 'accessible tourism', and there is an increased academic interest in this topic [11]. Accessible tourism is a relatively new and evolving research field. The first definition of accessible tourism is removing barriers that prevent impaired people from enjoying a tourist experience [4, 12]. It has evolved, reshaping the entire tourist environment (physical, informative, online, attitudinal aspects, etc.), adopting the universal design to allow its use by all population groups, regardless of age, condition, capacity, or impairment [4,12, 13]. The complexity of disability as a physical and social phenomenon presents a challenge to be addressed in future accessible tourism studies [14].

Accessible tourism involves collaborative processes among stakeholders that enable people with access requirements, including mobility, vision, hearing, and cognitive dimensions of access, to function independently, with equity and dignity, by delivering universally designed tourism products, services, and environments. This definition adopts a whole-life approach where people benefit from accessible tourism provision throughout their lifespan, including those with permanent and temporary disabilities, seniors, obese individuals, and families with young children [4, 15]. Thus, stakeholders such as governments, international agencies, tour operators, and end-users, including PwDs and their organisations (DPOs), are involved and should collaborate to provide the proper services in an accessible tourism context. A thriving tourism product needs effective partnerships and cooperation between private and public enterprises [16] and across many national, regional, and international sectors [3]. Finally, a facilitative and supportive legislative framework focused on the real needs of PwDs is required [17].

Increasing market opportunities for accessible tourism have been identified due to improved quality of life. Disabled tourists tend to be loyal, spend more, and enjoy longer stays in their destinations, and they have 2-3 escorts/caregivers, although their behaviour differs from country to country. This situation is strongly influenced by welfare policies that determine the disability model implemented and affect the extent to which PwDs are integrated into day-to-day life. WHO [18] considers the accessibility of tourism facilities, products, and services fundamental to any responsible and sustainable tourism policy. Northern European countries are regarded as champions in this respect.

Accessible tourism is already profitable in many parts of the world and is expected to increase rapidly [19]. In 2012, accessible tourism contributed 3% of Europe's GDP (786 billion euros) [20]. In Europe, relative to population, France had 10 million people, and the United Kingdom had 11 million people with accessibility needs. Spain also has a significant part of PwDs who are eager to travel, and in the Netherlands, younger travellers with disabilities are interested in travelling. In 2012, the more attractive destinations for people with specific accessibility needs were America, Africa, and the Middle East. Regarding countries, China (61 million), the United States (32 million), and Brazil (32 million) were the most favourite destinations [21].

Access to information is essential for travellers with disabilities, and technological advancements offer vital solutions [22]. Because of their complex needs, which require more explicit services [23], these technologies facilitate PwDs' daily lives within and outside their homes [24, 25, 26].

Research in the field is a critical issue that has shifted the focus from demand to supply. The travel experience of PwDs includes different stages with distinct characteristics, and those require in-depth study [27].

Emphasis on accessible buildings, facilities, public spaces, and information used by PwDs is essential and encourages those people's participation in social life [28]. Providing accessible and easy to use from PwDs hotel websites is vital [29]. In addition, accessible hotel accommodation is essential for PwDs. Those should be designed in such a way as to meet the needs of individuals with disabilities, mobility limitations, or those with other requirements, and must provide various amenities to ensure that all guests enjoy high-quality tailor-made services. Wider doorways and hallways to accommodate wheelchairs and mobility aids; lowered light switches and countertops to reach easily; toilets adjusted to those people's needs; tactile signage and visual alarms for guests with hearing or visual impairments; and accessible spaces and pathways throughout the property are all crucial [30]. In addition, accessible beaches are essential for travellers with disabilities. Technology offers high awareness toward the wide use of hotels and beaches by PwDs [31]. Finally, a more holistic approach is required in which PwDs enjoy services in all sectors of their daily lives [25, 32], including their travel experience.

In Greece, the rights of PwDs are constitutionally guaranteed and promoted. The introductory legally binding text on the rights of PwDs is the UN Convention on the Rights of Persons with Disabilities (UNCRPD), signed on December 13, 2006, and entered into force on May 3, 2008 [33]. Greece ratified this convention by law on April 10, 2012. The guiding principles of the Convention include respect for dignity, autonomy, choices, independence, non-discrimination, full participation in society, diversity, and equal opportunities [33].

Greek governmental organisations have issued specific guidelines for building infrastructures and public spaces [34], considering the PwDs' needs.

Greece has a strong tourism industry. In 2023, annual revenues were 20,456 million euros, which increased by 15,7% of those in 2022, and the number of travellers was 32,735 thousand, which rose by 17.6% relative to 2022 [35]. The facilitation of accessible tourism will significantly contribute to extending the tourism period and increasing revenues and tourism traffic, the two significant challenges of the Greek tourism industry. According to the INSETE study [36], Greek tourism services need to become more diverse, equal, and inclusive to achieve sustainability goals and accommodate the needs of PwDs, need to raise awareness, improve accessibility to public spaces, ensure access to accurate information, provide reskilling and upskilling opportunities for tourism employees, and targeted actions should be implemented by the private sector to facilitate the travel experience of those people.

Relevant studies are scarce in Greek literature, but the main ones are briefly presented below.

A study [37] about accessible tourism in Crete reached contrasting conclusions. In most service areas, disabled tourists were highly satisfied, as many hotels, archaeological sites, and other locations met accessibility standards. Conversely, the study's participants noted deficiencies in transportation and urban planning for tourism purposes. The authors concluded that with the necessary focus and investment, Crete could emerge as a significant, accessible tourist destination.

To increase accessible tourism figures, the development of accessible infrastructure and training of stakeholders is recommended for the two areas of Drama in Greece and Mersin in Turkey, as both destinations have significant advantages. This study is part of the MEDRA project, which promotes the development of accessible tourism in these two destinations and can be further applied to countries with similar characteristics [38].

Another study [39] examined the potential of accessible tourism in Greece and found that the supply and services to disabled customers are not entirely satisfactory. Demand for accessible tourism in Greece remains low due to the lack of appropriate infrastructure and easy access to public transport means at Greek tourist destinations. Furthermore, the Greek tourist industry does not fully comprehend the dynamics and size of the accessible tourist market.

A study [40] that focused on assessing the satisfaction of tourists with disabilities who visit Greece found problems in infrastructure, such as transportation, accommodation, and entertainment, and the provided services are not appropriate for those people to move around safely and comfortably. Tourists are delighted with employee services, but no established mechanism exists to certify, monitor, and evaluate accessibility standards.

It is recommended that Greece and the Republic of North Macedonia cross-border cooperate to develop standard brand services and promote accessible tourism. This will offer significant, mainly financial benefits to both countries and promote sustainability in degraded border areas [41].

The sustainability and quality services issues in accessible tourism have been overlooked in Greece. In contrast, the importance of accessible tourism in developing the Greek tourism industry is high. Particular attention should be paid to ‘design for all’. Also, several accessible beaches were introduced in 2004 to serve athletes in the Olympic Games and Paralympics, but most should be created to serve this customer segment. Available specific wheelchairs to facilitate the movement of PwDs, accessible showers and chemical toilets, resting areas, kiosks and parking areas to accommodate the needs of these people are essential [42].

Conclusively, the above studies highlighted the significance of accessible tourism in Greek tourism and identified specific problems, mainly related to the lack of proper infrastructure. Similarly, the current study emphasises the potential issues and difficulties of accessible tourism in Greece.

3. Methodology

Technological improvements have facilitated the emergence of online focus group [43], which was applied in the specific study to collect the required information. This research method gathers several participants in a virtual environment to interactively discuss issues they know very well with a group moderator [44]. The role of a moderator, who is mainly a study researcher, and he/she leads the discussion, is critical [45].

In the specific research, twelve participants (n=12) from various fields related to the study’s objective discussed the examined issues using Zoom services, and valuable information was collected. All the respondents have rich experience and knowledge of the subject under examination. The discussion lasted three (3) hours. The first author of the study was the focus group moderator.

The following table 1 presents the study’s participants and their professions.

Participants Number	Participants Professions
1	A person with kinetic problems (hemiplegia)
2	A person with kinetic problems (triplegia)
3	A person with cognitive impairment
4	A person with visual impairment and a guide dog
5	A person with hearing impairment
6	Architect-Caregiver of a person with tetraplegia
7	Caregiver of a person with visual impairment
8	Hotel manager

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9	Professor in social sciences
10	Executive working on tourism board
11	City Hall's high-ranked manager responsible for minority issues
12	Designer of disabled people services

Table 1: Study’s participants and their professions.

The primary outcomes of the focus group discussion are presented in the following part of the paper.

4. The focus group discussion outcomes

All the participants agreed that all stakeholders should try to make our environments and the tourism experience more accessible and our societies more inclusive. In Greece, a more holistic approach should be applied. Complete accessible services must be provided in all the basic infrastructures such as transportation, hospitals, public services, shops, etc. Creating an accessible environment is a long-term project; despite past years' efforts, there is still a long way to go. Public transportation, buildings, streets, pavements, and squares are inaccessible to disabled persons. There are many obstacles for pathway drivers of blind people on the sidewalks, which usually end up in inaccessible places and they have narrow spaces. Ramps and pedestrian access boards are not correctly constructed, and some obstacles are placed on them. Various attempts have been made to implement access laws, but unfortunately, they do not sufficiently apply.

Understanding tourists with disabilities' needs is a complex issue. Specific geographical, cultural, political, and sectoral contexts influence the nature of tourism management and the accessible tourism visitor experiences. The needs of each individual vary, and analysis of the tourist experience must consider the type of disability/dimensions of access (mobility, hearing, vision, cognitive, and others) and the required level of support. There are travellers with severe disabilities who require a high level of support in their accommodation and travel experiences at a higher cost. On the other hand, travellers with mild forms of disability travel more easily without too many changes in infrastructure. However, if more convenient services for people with severe disabilities are provided, more of them will probably travel. Going on holiday, disabled travellers need more specific, reliable information and advice about their travel destination. These issues are resolved by the virtual websites offering valuable tips.

City Hall’s Manager for minority issues (participant no. 11) mentioned that they intend to train their employees to assist PwDs and mark appropriately various places in the city that PwDs (with hearing and vision problems) usually visit.

Disabled participants (no. 1-5) declared that the absence of a lift or an adapted bathroom in the hotel accommodations often turns a pleasant trip into a betrayal. To avoid these unpleasant surprises, reliable information about accessible places and details is necessary. Many small and large-scale operators, local or not, must also provide this information. Sufficiently trained hotel employees should offer high-quality services to PwDs. Those people using tourist guides collect valuable information to avoid unpleasant circumstances and to know well in advance what they will meet. Regarding the interior part of the hotels, “*the height of the reception counters must be 80 cm and not the 120cm that we usually find*”, and ramps should also be provided. All the switchers must be at lower heights than usual, and the food counters' heights at the restaurant areas should be adapted for wheelchair users. The availability of accessible toilets in hotels is essential; those should have sufficient room space. Of course, there is expected to be a long indoor ramp or access mechanism to the hotel pool and a blind access guide in the outdoor areas.

An architect-caregiver (participant no. 6) mentioned the importance of accessible beaches based on the successful operation of the first organised beach on the Voula peninsula (S. Athens) at the current PIKPA social welfare rehabilitation centre, which provides access to PwDs and mainly to people with mobility disabilities. This project was very successful, mainly because of its comprehensive intervention. It took care of the entire accessibility chain, i.e., seamless access from the point of entry to use and exit without gaps and omissions. Similar projects should be applied to other beaches within or near big cities. Another successful initiative is implementing the seawater access mechanism solution of SeaTrac on 225 beaches on the Greek coast, which allows elderly people and people with movement difficulties to enjoy their baths.

A professor in social sciences (participant no. 9) proposed transforming a small island into a model 'accessible island' with all the required infrastructure. This initiative must be properly promoted.

Executive in tourism board (participant no. 10) highlighted the importance of volunteers' participation in assisting PwDs travel and accommodation experiences, mainly in 'smaller places', and towards this, the creation of a relevant database, where they will state dates and location of availability, to help PwDs on their journey is essential. He mentioned that "*accessible tourism is much broader and more human than a technology solution or a certification mark*".

5. Discussion and Conclusions

The provision of fully accessible services to PwDs facilitates the participation of these people in daily activities. Travel is an essential need of PwDs. Understanding the relationship between disability and tourism contributes to developing accessible tourism, which is gaining significant importance in social and financial terms, and countries heavily invest in this direction. The involvement of all stakeholders in designing services for all people is necessary. In addition, the continuous assessment of the satisfaction of tourists with disabilities from the infrastructure, tourist products and services they use during their holidays is essential to offering tailor-made services [40].

Greece is at the forefront of the global tourism industry, and by investing more in accessible tourism, significant benefits are expected. The primary issue is to provide tailor-made services to PwDs' needs. Towards this, and based on the disabled people and experts' perspectives, the current study identifies some main issues that may contribute to the further development of accessible tourism in Greece.

The primary outcome of the current study is aligned with similar studies [39, 40, 42] that although the Country has improved the provided services to PwDs, more improvements should be made, mainly in infrastructures. In addition, a more holistic approach should be adopted that is focused on improvements in all travel chain of those people.

Tourists with disabilities require reliable, accessible information for all travel experiences. This includes information on accommodation facilities, transportation options, hospitals and tourist attractions. Virtual navigation systems and specific platforms inform and assist PwDs in travelling more easily. Fully accessible hotels and beaches are essential for travellers with disabilities, and both should be adjusted to their needs. Regarding the accessible hotels, lower heights in the reception and the switches, ramps, accessible toilets, and easier access to swimming pools are among the most required issues. Beaches should offer fully accessible services from the time a disabled person arrives there until departure. Sufficient employee training is vital to providing high-quality services to PwDs. Also, creating an accessible small island as a model that offers fully accessible services all year round is recommended. The involvement of volunteers in facilitating the PwDs' travel experience is essential, particularly in small destinations. More advanced services may mobilise people with more severe disabilities to travel. Also, all these people travel with caregivers, and their needs and opinions

should not be ignored. All of the above must be promoted appropriately, mainly through electronic platforms.

Overall, the study highlights the importance of collaborative efforts, awareness, and investment in infrastructures and technology to enhance accessibility in tourism for PwDs. The Greek tourism industry should see this segment more as a business opportunity. Hotels and beaches must be adjusted to PwDs' needs and continuously assessed. Emphasis on traditional Western European markets to attract travellers with reduced mobilities is recommended.

Studies focused on this issue provide valuable insights and knowledge to policy-makers, practitioners, and academics and lead to the improvement of the services offered. More in-depth qualitative interviews and quantitative studies with a large sample could be applied in future studies.

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Urban Cultures & Public Open Spaces - Digital Sound Installation as a Form of Public Art

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Extended abstract

Once a Digital artwork is installed, a new condition develops and the space around it changes. Particularly, Digital artwork and Public space along, constitute an instrument of measuring space and time, a sum of knowledge that is capable of re-organizing our spatiotemporal perception. Hence, a number of questions rise, such as: Is the environment of any Public space suitable for hosting a Digital work of Art (by means of an artwork could saturate a place in its conceptual manifestations)? Is any Digital artwork powerful enough to transform -through minimal and marginally discreet or indiscreet interventions- the Public space in such a way that we shall be able to experience it in a more conscious way?

In this sense, we can understand the thinking that considers Digital Art Installations in Public Spaces to be subversive structures of architectural power, since as soon as they appear they lure us into the beautiful world of genuine aporias: What is that composes the identity of the place? Why the limitations of the place are a matter of awareness (considering that our understanding depends upon the recognizable, the marvelous and the uncanny elements that define the identity of a place)? How the additional element of an Art Installation makes us aware about certain spatiotemporal notions that we were unable to realize as significant?

The text is based on the way which our senses are triggered in our contact with both the physical and the digital elements, thus, it specifically refers to a Sound Installation in a Public Space. The immateriality of the medium and its power to enkindle cerebral activity lead us to examine the function of digital Sound artworks as a conceptive operation itself and at the same time, as a project of a contemporary idea, which responds to present, social and existential issues. See it as a memory revitalization, a sustainable proposition, an interesting statement, an experimental hypothesis or a brilliant strategy, a Digital Sound Installation exists in a broader sense, as a profoundly subversive force, addressing to the multidimensional, different approaches and discourses upon the cultural renegotiation of the Public open spaces.

Keywords: *Digital Art; Sound Installation; Cultural Renegotiation; Public Open Space; Social Engagement*

1. INTRO: URBAN WINDS

The conditions are changing our observation, the frame changes the text. Therefore, endowed with mobile ratios that are affected by regularly altering causes, this is ultimately a world of intentions. What it is interesting here, is the conditions of this world continuously are changing our perception of it; changing the subject, the object and our cognition of the space and time. Matters of cognition, the space and the time, the ambience of an environment, the scale of the things, their proportion, the intervals of our attention, and the vectors of the motions around us are constantly twinging our sense of understanding. Mainly because we need to hold on our thought in order to implement our thinking on any subject of a real situation.

"The gaze perceives the world under conditions, knowledge is obtained under conditions", Nietzsche wrote in the *On the Genealogy of Morals* [1], to remind us that the understanding of the world is governed by circumstantial preconditions such as identity, gender, geographic and social origin,

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cultural and political systems of value in relation to an indefinite, predominant current system of values. All these evasive preconditions create the basis for the birth of idiosyncratic behaviors, since they connect to an already, educationally shaped, ability to perceive the world. Our ability regulates our capacity to internalize new information and relieves its interaction with the old ones.

If all the above are happening as true, then, we cannot be sure of the true value of the assumptions and theories we cherish to address to ourselves –or to others- thereafter, the only thing that remains for us to do is to create narratives about that which we think we know for sure, or, on the contrary, narratives which are consciously given as unsure. Yet, some artists create art-works, not to acquire a recognition of a truthful confession, far beyond that, they expose the complex relationship that sustain their existence, thus, their relationship to the world. To propose such a traumatic relationship is a starting point, where the preconditions produce conditions, and that's a very intriguing development of the start we made.

Diving deeper in to this aspect and more often than not, if our starting point is the succession of forms, our findings are forms of discontinuity, whereas, if our starting point is the discontinuous forms, our findings are forms of succession. There is a peculiar link between our intentions and findings, which leads from the circuit of seeming repetitions to the circuit of apparent "fragmentations". As a result, a communication based on free-associations arrives that allows the emerging of gaps, and if there are no better circumstances, in this zones where meaning is in dispense, artists find a lush place to experiment. To experimented, here means, to assume different, or even new, relationship between the parts of a narrative, between utterances and fragments, traditions and new revolutions. It also means an exploration of an environment that does not allow the development of the concomitant relationships, on the contrary, it opens a field for investigation [2].

This act that often appears as a mapping technique. Mapping is an exercise in analogy, a process of interpreting a real place, condition, situation, event, in an abstract (graphic) language, while at the same time it evolves the process of transforming an abstract finding into a legible object. Digital Media artists experiment in this field with the scale of things (conditions, situations, events) and the senses of vision and audition as the limited and psychologically dependent possibility of human's perception addressed to the world. Moreover, their artwork presents us with its own Aesthetics that concerns the interrelated and inseparable relationship of the subject (human) with the object of its attention (environment). Yet, a digital artwork cannot rhetorically impose a certain concept on the Public space, or a significant aesthetic quality. All it can do is offering to the visitor a powerful stimulus to reconsider his cognitive process and communication with the space in which it stands. In the present text, the digital artwork specifically refers to a Sound art Installation.

When an object produces sound, it produces pulsating movements that are transmitted to the environment. The relevant description would pictorially present us with spherical sound waves that are emitted in all directions through the air, at the level of the atmosphere. Certainly, to approach the occurrence of sound we need to assume a "transmitter" a "transmitted object" and a "receiver". In this sense, the transmitter is a sound-generating body and the receiver is the human body, explicitly, the skin and the ear. The transmitted object (that which is transferred between transmitter and receiver) is the sound-signal, a 'signifier'.

Herman Kolgen [3] seems to know a lot about the skin, much more about hearing and even more about acoustics, how the hypothalamus of the human brain "disorganizes" and its functions are "deregulated" when it receives certain sound-signals. "Urban Wind" (2015) is a Sound Installation, part of a larger series entitled "Windfields". The common element that runs through all parts is based on the dynamic characteristics of the wind, the flow of air, so, het places sound sensors in various locations of the city that receive data from the speed and direction of the wind. Gathered data are analyzed into groups of clusters of sounds that they governed by their own rules (accordions) and are finally transmitted as an euphonic "soundscape". Harmonies you've never heard or thought before, make you feel the contraction of the tiny muscle at the base of each and every pore.

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2. 2066

In a poetic and an ultimately urban sense, Public Space is the place of physical coexistence of individuals, while a non-relational flow between Art and Public Space is often observed, a situation that is frequently represented through its typical qualitative features, that are, the "individual", the "space" and "art". If we think about the Installation of a digital Sound-piece, any any surface of the built volumes in a Public Space turns into an osmotic membrane, as if any kind of material alters to a piece of blotting paper. The limitation of the urban space changes into a correlation: the transit of the relationship between individuals and space and the activity of continuous exchange of meaning between the sound-piece and the space, are in a constant negotiation at the level of the perception, to the person who experiences it. The physical (or architectural) and the digital (or audio) elements are mutually absorb each other.

Indeed, the immaterial nature of a digital sound-work gives a feature of an identity to the common abstract world we share, a world that changes spatially from step to step, temporally from one moment to another. Furthermore, as a creative act a sound art-work repeatedly cross the line between being eligible and ineligible in its shift to formulate and address an aesthetic and for that critical subject-matter. Regarding the duration of this time-based media, a digital sound-work seems to insist on a communication with the individuals that experience on the open public space that hosts it. This condition of communication is like a slowly liberating process regarding the humans. By catching our attention, it creates for us "capsules" of time intervals within which we can think about how this element of the space affects us. The slot of time during our uncertain wandering between what we know about a space and what is really "happening" in it, offers us the possibility to understand the multi-significant aforementioned identity of the public space in which we have found ourselves in.

By all means, to move freely in an open Public space (in any space) presupposes the apprehension of the nature of the environment in which we move, understanding somehow its identity. And while an open space entails many kinds of contradictions, we let the information we get from it to be recorded as subconscious knowledge, until a moment where an unexpected event "happens" and overturns our perception of it. In other words, when we are entering in an environment where there is a digital sound Installation, something is created that develops our thinking as it simultaneously reminds us of something familiar and introduces us to something unutterable. Suddenly we hear "something".

Hans Rosenstrom's [4] sound installation "2066" (2016) provokes to a visitor a strong doubt about their ability of their senses, puts them in an alertness to what is happening and whether that which is happening is revealed in the tangible dimensions of the Real. Three transducers, (his chosen type of 'speakers'), are inserted into five granite boulders, placed in the open space of Värtapiren harbor terminal in Stockholm, Sweden. The speakers transmit a vibration to a metal rod that penetrates the stone and is attached to a small metal plate. If someone lies on the surface of one of these stones and rests his head on the metal plate, the vibration from the speaker is transmitted as clear sound into her/his head. At the same time, these auditory pieces on ideas about how the world will look like in 50 years from now, seem to arrive from indeterminate sources, testing our power for a perceptual representation of space.

Space is an entire whole to which 'I' continuously refer to, in order to determine my position. Such a relation becomes possible in the appreciation of the dimensions interposing between oneself and any other point of this space that is clear to one's ability. A shift sweeps the space in its entirety, in order to succeed in being finally pinpointed by its subject. Such a shift is only perceptible within the spatial and, of course, temporal dimensions. It cannot be perceptible otherwise and in this sense, it can be said that space is a kind of form of the 'content' shift as well as the word is a kind of form of the 'content' knowledge. Further to that, the public space includes certain segments occupied by objects, as well as unoccupied, free segments, which in order to define them, one delineates them within a kind of mind-set. It is 'named' (i.e. 'free space') in order to be somehow intelligible, somehow

measurable in order to be nominated with an apprehension. Which changes, not only in each step but also, at any and every second that the focal function shifts.

An appropriation of a space often ends to an invention of ‘a topos of personal projections’, accompanied with an assertion of a name and meaning. It gradually becomes the prerequisite locus of a series of personal, positive or negative, signs and connections. Then, space, as both prerequisite and a terrain of a appropriation, refers to:

a. the reproductive ratio (i.e. systems of perspective) and
b. the empirical proportion (i.e. the individual, subjective state of perceiving the space and the empirical, objective state which answers to one’s requirement for apprehending the notion of space). Our individual sense of a space is engaged with the observations about perceptive debilities, cognitive reductions: the visual pyramid does not exhaust the entire possibilities of apprehending a space. Because the view differs as we move from a specific point A to a specific point B, although neither the space nor the perception about the space changes. Being at the point A delimits the entire entity of the space, because being at a certain point leads to an overview of a certain sight. However, a certain point of view cannot verify the remaining part of the space (the one that is not included in the territory covered from the sight A) as a non-existing. Moreover, the perception of the space is developed through ceaseless negotiations made by the individual who acts in it. At long last, space is a state of perception, likewise time is a matter of perception. Our perception of space and time coincides to the perception of our being (the recognition of the ‘I’ who witnesses the space). Indeed, the subject of the perception is always there, the subject itself is the reason and the ‘account’ of the perception [5].

We need to have these in mind in order move on to the auditory space, for the auditory ability is not bent on our intentions, it is not driven by a pre-determined focus of our perception (from A to B). The sense of audition is directly related to the all-dimensional perception of space, for that reason, it presents us with a vast spatial and functional range. Then, even the "silence" of one space is different from the "silence" of some other place, only because their physical and cultural characteristics differ. The mixture of the physical with the cultural characteristics is an obscure matter as it can be seen in the distinction between ordinary listening and reduced listening. According to Schaeffer [6], ordinary listening is divided into the four categories; listening, hearing, attending and understanding. Reduced listening is achieved by repeated listening, which enables the listener to focus on the intrinsic features of a sound, disconnected from its context. Reduced listening is a tool for investigation and for shifting listening attention intentionally, from the contextual to the inherent features of sound.

Criticism of reduced listening points out the difficulty of recognition of the contextual associations of a sound. Still following Schaeffer, in *Sound Unseen* (2014) he explores acousmatic sound (a sound that one hears without seeing its cause), a characteristic group of sounds we are dealing with in our everydayness. When both of our ears are stimulated, the difference between the intensity and the frequency at each ear, over time, has a major effect on sound perception: The term *binaural hearing* is essential for localizing sound sources; sound arrives at each ear at a slightly different time and with quite different intensity. The brain uses these differences to determine the location of sound in space. As a result, an analysis of an auditory scene depends upon the sensitivity of binaural hearing to the frequency information that comes from different sound sources [7].

3. L'OBJET SONORE¹

We arrive at two interesting bench marks; the first one deals with our conscious awareness of our auditory sense of listening and the second one responds to our engagement with the product of our hearing. I shall continue with some specifications in correspondence to the chain "transmitter - transmitted object - receiver", since they entail important aspects to the design of a sound installation for an open public space. Conscious awareness of hearing is an activity that consists of the semantic chain "stimulus – transduction – perception". Though to some degree is affected by later processes of cognition and various levels of conscious processes, hearing is itself pre-conscious. The conscious awareness of listening is as an attentional process, which means that it is active and concerned with the chain "cognition, memory, interpretation and interaction". Built upon the ability of hearing, listening moves beyond the plain auditory function, in as much as, it includes short-term and long-term memory along with the notion of interpretation. For that reason, listening is considered as a conscious activity. To elucidate the matter I shortly give the relevant theoretic approach of Barry Truax [8], Michel Chion [9] and William Moylan [10].

Truax described three general modes of engaging with the acoustic soundscape: listening-in-search, listening-in-readiness, and background listening. Listening-in-search is listening for something by means of actively seeking it out from the acoustic range of relative silence to all-encompassing sounds. According to Truax, this is listening "**...at its most active, involving a conscious search (...) for cues (...) detail is of the greatest importance, and the ability to focus on one sound to the exclusion of others (...) is central...**" (Truax, p.22). Listening-in-readiness is when something that is important or significant becomes audible, even though one does not consciously listening for it. As such, it represents "**...an intermediate kind of listening, that in which the attention is in readiness to receive significant information, but where the focus of one's attention is probably directed elsewhere.**" (Truax, p.22) This mode of listening "**depends on associations built up over time, so that the sounds are familiar and can be readily identified even by "background" processing in the brain. (...) Even when a sound is unfamiliar or unexpected, this type of listening is ready to treat it as new information and evaluate its potential significance.**" (Truax, p.22). Background listening occurs when a sound is still not an object of attention, yet, it cannot be ignored. Background listening "*...occurs when we are not listening for a particular sound, and when its occurrence has no special or immediate significance to us.*" (Truax, p. 24). This usually occurs when the sound is familiar and expected element of the sound environment.

Chion also described three general modes of engaging with the acoustic soundscape: **causal listening, semantic listening and reduced listening**. **Causal listening** is triggered in order to gather and identify information about a sound's cause (source). According to his obvious semiological approach, causal listening is the common mode of listening, a primary mode of understanding the world around us. "*When the cause is visible, sound can provide supplementary information about it (...) When we cannot see the sound's cause, sound can constitute our principal source of information about it.*" (Chion, p.25). **Semantic listening** is triggered in order to understand and interpret the meaning that 'transmitted object' carries, such as language. It involves a learned association of sound patterns and meanings, thus, "*...is entirely differential. A phoneme is listened to not strictly for its acoustical properties but as part of an entire system of oppositions and differences.*" (Chion, p.28). **Reduced**

¹Pierre Schaeffer (1967) distinguishes the term L' objet sonore, as an "auditory object for human perception" separating it from its quality as a "computational or electroacoustic object for composition".

listening describes a mode of attention focusing to the qualities or characteristics of the sound itself. **“Reduced listening takes the sound – verbal, played on an instrument, noises, or whatever – as itself the object to be observed instead of as a vehicle for something else.”** (Chion, p.29). Further, he insists that **“...the descriptive inventory of a sound cannot be compiled in a single hearing. One has to listen many times over, and because of this the sound must be fixed, recorded.”** (Chion, p.30).

Moylan described four general modes of engaging with the acoustic soundscape: First of all, the critical listening and the analytical listening; their difference involves isolation versus context. Critical listening focuses on the qualities of the sound itself, enabling an **“...evaluation of sound quality out of context...”**. Analytical listening searches for the relationships between sounds for an **“...evaluation of the content and the function of the sound in relation to the (...) context in which it exists.”** (Moylan, p.90). In support of these two listening modes, Moylan conceptualizes some crucial elements, that are: *sound event*, *sound object*, *perspective*, and *focus*, a familiar contextualization due to Tschumi’s views regarding the group of perspectives that the notion of a *city* includes [11]. These conceptual elements underlie those of Truax and Chion. Thus, the sound object formulation is closely related to the *L’ objet sonore* of Pierre Schaeffer. A **sound event** refers to the shape or contour of sound over time, **“the shape or design of the musical idea (or abstract sound) as it is experienced over time”** and **“...a complete musical idea (at any hierarchical level) that is perceived by the states and values of the artistic elements of sound (...) the sound event is understood as unfolding over time, and is used in analytical listening observations”**. By contrast, a **sound object** is defined as a focal point for evaluation, considered outside of their original context: it is the object of critical listening. In this sense, a sound object is **“...sound material out of its original musical context”** and **“...a conceptualization of a sound as existing out of time, and without relationship to another sound (except its possible direct comparison with another sound object).”** (Moylan, p.91). **Focus** is the act of directing one’s attention to specific elements in the environment in order to apprehend information. **“Focus is the act of bringing some aspect of sound to the center of one’s attention”**. **Perspective** is the hierarchical level at which one is focusing. **“Perspective is the perception of the piece of music (or of sound quality) at a specific level of the structural hierarchy”** (Moylan, p.92).

In need to assemble, sound affects us; it alerts, distracts or concentrates us, while it develops into the space around us. To return to Truax, sound often functions as an auditory listener’s engagement and immersion to the space. Among our genetic ability and our perceptual vagueness of listening while we are traversing through our cities, the idea of designing a digital sound Installation for an open public space appears as an arduous task. Hence, to work upon it, we need to take on an advance survey regarding the space in quest along with the conditions that affect the propagation of a sound-piece: Particularly,

I. A complete record of the referent open Public space need to be made, which concerns observations about:

a) The wider spatial arrangement of the elements surrounding the space, b) The complex principles that govern the identity of the space and c) The elucidation of information than is not found in the visible order of things, such as, the identity of the society that grows around it, which include but are not limited to: a) Observations about the historical, cultural, social and economic conditions that have shaped the present state of the place, b) Apprehension of the structures and balances that develop between the specific open public space and the individuals it hosts and c) The artistic intention of the one who observes and records, as seen through the choices and the decisions made and appeared in the recording material and its arrangement.

II. An evaluation of the properties of sound in reference to the exact conditions of a given open public space; an in situ case-study on:

a). Refraction (fluid change), b). Diffraction (acoustic shadow), c). Clarity (sound permeability), d). Reverberation (acoustic quality of a space), e). The linear and non-linear acoustics, f.) The aero-acoustics. g). Speed (depends on atmospheric temperature, thus, the medium through which a sound-wave is propagating, h). Due to the sound-wave nature (frequency, wavelength and amplitude), the spectral distortions that sound-waves undergo once they interposed by natural or artificial objects, then, during their propagation, sound-waves can be a). Reflected, b). Refracted c). Attenuated by the medium [12].

While sound is a pulsing vibration, a precise evaluation of factors that interfere with its propagation comprises also a significant matter of attention. The main factors affecting sound propagation in open spaces are:

a) The distance between transmitter and receiver: This is an important issue because it determines the perceived intensity of the sound in relation to its nature (spherical, cylindrical or plane wave), b) The height (from the surface of the ground) and angle (any change above or below of 45° from its axis) of the transmitter: The relative adjustment is necessary, especially in those cases where the receiver does not have a strictly specified position in space, c) The atmospheric absorption of the sound: The levels of humidity in the atmosphere significantly affect sound propagation, while the change in values affects its clarity and speed, d) The direction and intensity of the wind: The wind tends to bend the sound waves towards the ground, in the direction of its breath, e) The nature of the ground: It includes the anaglyph form of the ground and its height variations which affect a smooth sound propagation. Also, the quality of the soil and the type of nature that thrives into the place in quest are an important regulatory element of sound propagation. Specifically, vegetation on an outdoor scale does not have a fixed form, so their growth curve (the height and the density of foliage), mainly the inclusion of their evergreen or deciduous character in the seasonal change, needs to be taken under consideration [13].

Moreover, Digital sound is a subject analysed under different scientific fields that offers a desirable knowledge towards a composition of a Digital sound Installation for an open spaces, such as:

a). Electroacoustics; a field that examines electronically generated (synthetic) sounds, particularly *sine wave*, a periodic wave whose waveform (shape) is the trigonometric sine function, rely on electroacoustic engineering. b). Audio signal processing; a field referent to the electronic manipulation of audio signals using analogue and digital signal processing. c). Environmental acoustics; a field of studies concerned with the control of noise produced by human activities and machineries, thus, anything else that might be considered as auditory disturbance. d). Musical acoustics; a field dedicated to research and describe the physics of music and its perception, in other words, how sounds employed as music work. It includes among others: the human voice, computer analysis of music and composition; the perception and cognition of music. e.) Psychoacoustics; the research on this field tries to explain how humans respond to what they hear, whether that is noise or music. In many branches of acoustic engineering, a human listener is a final arbitrator as to whether a design is successful, for instance, whether sound localization works in a surround sound system. f). Bioacoustics; a field of studies on sound production and hearing of animals and plants, thus, recently evolves human functions and organs [14].

4. OUTRO: THE FORTY PART MOTET

Janet Cardiff's [15] *The Forty Part Motet* (2012), originally produced by Field Art Projects supported by Arts Council of England¹ presents us with an excellent example of the power of sound Installation to create three-dimensional audio scenes. The sound-piece is based on Thomas Tallis's sixteenth-

¹ <http://www.fieldartprojects.com/index.php/about>

century choral composition *Spem in Alium Nunquam Habui (In no Other is my Hope)*. Forty speakers arranged in eight groups of five forming a large oval. Each singer's voice, recorded separately, emanates from a single speaker. In an immersive installation, where each speaker initiates a different vocal recording. The voices meet together to produce a composition that envelops the audience, which is able to emotionally interact with the artwork. The use of spatial audio technology overlapping to acoustic engineering approaches, turning the audience to active participants in the meaning-making process.

With their intangible form and their technologically autonomous nature, we could see the digital sound art-works that move through entities of a space, as a sustainable resolution for culturally re-advancing an open public space. Auditory perception is responsible for interpreting and understanding our sound environment. Since it awakes our cognitive functions, we can see how sound provides for us a more consistent knowledge about the space. Yet, the construction of a sound Installation coincides to the creation of a system. A system relates to the notion of 'concept' that provides an account for the system and it lays the foundation for its manifestation. The materialization of a concept refers to the creation of a spatiotemporal dimension defined by the ambiguous relationship of "here" and "now" and the social dimension defined by the complex relationship of "me" and the "other". Thus, it is always a subject of continuous experimentation, an open and therefore unlimited in thought and means process [16].

To avoid any misunderstanding, a digital artwork cannot be a decisive metaphoric or a metonymic attitude, decisive for the identity of the space. As a digital art Installation cannot be a substitute for a deficient relationship between ourselves and the world, it also cannot take the place of an object of desire within a traumatic "void". It is not the counterfeit corpus of an absence of a political, social, personal care for our environments. Although, it can be some kind of (metaphoric, metonymic, etc.) expression of such an absence, inscribing the site of our relationship with an experienced loss, of a deficit or the "void" [17]. Thereafter, a digital sound-work (by definition ephemeral in its duration; any projection of personal affiliation is short-lived) leaves an open feedback system for the "individual", the "space" and the "artwork" itself [18]. By any social or individual connotation (carried through memories, propositions, statements, hypotheses or strategies), a digital artwork exists as a profoundly subversive force, an exemplary subject that offers the exciting prospect for us to cultivate possible ways in which, digital and physical public spaces could be designed to expand each other's conceptual existence.

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The sustainable reconstruction and new use of the old University building in the city of Ioannina

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Abstract

The concept of "sustainable development", which appeared at the end of the 20th century, is a tool for criticizing various development options based on a long-term planning policy and has essentially connected the environment to several social and economic issues. In order to achieve a sustainable urban development, it is necessary to combine different urban planning models, that will have some features in common, such as interconnected public spaces, as well as the provision of effective and efficient public transport. One of these models of urban planning is the "compact" city model, which was first mentioned in the Green Paper on the Urban Environment (1990). One of the objectives of this model is the renovation of empty and abandoned buildings and the creative readjustment of their uses, as well as traffic relief through the reduction of motorized travel.

In the context of the cities' transition towards smart and green development, this paper will focus on the reconstruction and adaptation of the original use of the old University building of the city of Ioannina. The main goal of this paper is to enhance the importance of the sustainable reconstruction and reuse of the specific building, in accordance with the specifications of inclusive design in urban areas, taking into account its historical and social identity.

The building was constructed at the end of the 1950s, and has remained vacant since 1996. In 2000, a partial reconstruction was carried out in the northwest part of the building, where public services such as the tax office and the transport and communications department of the regional unit of Ioannina were housed, while the rest of it still remains unused and in poor condition. The building is only 1.4 km far from the city center, therefore its reconstruction and transformation into an energy self-sufficient building, as well as, the relocation of the public services located in scattered buildings around the city of Ioannina, to it, will contribute to the green city development. Principal aim is to concentrate a large number of public services in one building and provide easy accessibility for all city residents, and the corresponding use of "green" means of transport.

Keywords: *sustainable urban development; "compact" city model; green development; Ioannina*

1. INTRODUCTION

The accelerated growth of cities, the disproportionate consumption of natural and social resources, and the traditional systems that cities rely on for resource provision make cities unsustainable. The world is at an unprecedented level of urbanization, with half of the total population living in cities, consuming 60% to 80% of global energy production, while the urban population is expected to grow from 7 billion to nearly 10 billion by 2050 [1].

According to the report of the Brundtland Commission and the procedures of the UN Commission on Environment and Development, one of the strategies aimed at limiting energy consumption, reducing pollution and protecting natural areas is the reuse of urban areas and utilization of existing buildings [2].

Due to the urgency of the climate crisis, in the last decade the planning of cities has become the basis of sustainable development having people as a priority, making the city more environmentally friendly and accessible for all people [3], connecting its history to the aesthetics and architecture [1]. The main objective of sustainability is the improvement of the environment and it requires a radical change in the structure [4] and operation of modern cities, in a way that satisfies the needs of the present generation, without limiting the satisfaction of the needs of future generations [5]. Sustainable cities should minimize their use of resources, create open spaces that are attractive and useful, minimize the need for car travel by prioritizing low-energy modes of transport such as walking, cycling and using public transport, provide personal safety in public spaces and be accessible, affordable and inclusive for people with disabilities and people from different cultures [6].

The purpose of this paper is, in the context of the smart and compact city, to highlight the concept of a sustainable and resilient city through the reconstruction and reuse of the abandoned part of the old University of Ioannina.

To be able to achieve a sustainable urban development, different urban planning models must be combined, which, however, will have some features in common, such as interconnected public spaces, as well as the provision of effective and efficient public transport [7]. The debate on the ideal form of a city is as old as the science of urban planning, while the environment has been the most recent element introduced into this debate [8].

The "compact city" model, which, in recent years is been found in a large number of urban policy texts and aims to increase densities and revitalize urban centers with significant energy, economic and social benefits, [8] is one of the leading examples of sustainable urbanization. Compact city planning and development, over the past 30 years or so, has been the preferred response to sustainable development challenges [9].

2. THE "COMPARE CITY" MODEL

A key issue that arises in the context of the debate on the sustainable city, is the search for the urban planning model or models in terms of: the distribution of functions, the density and the hierarchy of its structure (center – local centers – suburbs). Some people argue that by changing the shape, size, density of housing, design and location of activities in cities, will result in energy gains of “up to 150%”, from reducing motorized travel, increasing efficiency in production, distribution and consumption of energy and a more rational utilization of renewable and non-natural sources [8].

The form towards which several researchers converge is that of the “compact city” [8]. In the “Green Paper on the Urban Environment” in 1990, the European Commission has advocated such an urban model as the most sustainable, giving as much emphasis on the criteria of architectural "urban design" as on the arguments of ecological sustainability [2]. The 'compact city' model suggests that future growth needs should primarily be met through densification within the current urban boundaries [2] According to the President of Technical Chamber of Regional Department of Western Greece, Vassilis Aivali, the urban form of the compact city, in relation to other urban forms, gathers the most environmental benefits for achieving sustainability. These benefits of compact urban development do save land and space, saving energy, the reduced demand for transportation and the resource efficiency [10].

The basic principles of a sustainable urban planning that will fuel the development and management of the compact city are the following:

1. Coherent housing development.
2. Mixing of land uses alongside integrated urban and transport planning.
3. Securing and protecting important open and green spaces.
4. Strengthening of city centers and other central areas.

In particular, with regard to coherent residential development, the main objective is to contain housing development within the existing urban structure. Increasing population density and activities can be

achieved through 'land recycling', which means a more efficient use of land. The exploitation of the abandoned or underutilized areas of the city in which the natural environment has already been encroached by urban infrastructures, the reuse and utilization of the empty building stock, the addition or extension to existing urban structures are the most important measures in the direction of the greatest possible exploitation of it [11].

2.1. CHALLENGING COMPACT URBAN DEVELOPMENTS

Although the environmental benefits of the compact city are especially important, it is questionable whether the characteristic of high density could become socially acceptable [12], since it would probably require a change in people's priorities, sequencing the values of nature and environment [2]. Although research and policy support more compact cities, referring to greater density, diversity, mixed land use, sustainable transport and green spaces, promoting this model today in Europe as an optimal form of urban development, this approach to sustainable urban development is associated with some conflicts and controversies, since the research to date regarding its energy efficiency demonstrates uncertainty in what it entails with high energy benefits compared to other urban models [8][9].

More specifically, with regard to transport, which is responsible on average for 40% of a city's energy consumption, it is strongly disputed that the compact urban form implies a reduction in motorized travel [8].

In addition, the "compact city" produces high levels of noise pollution due to the close proximity between residences, transport lines, business activities and service facilities, so the concentrated impact of dense populations on the environment and the lack of planning to control noise pollution can have direct negative effects on human health [9].

Finally, studies such as Breheny's, 1992, 1997 and Neuman's, 2005 argue that there is a case for compact urban developments to increase land and housing prices creating social exclusion of some groups, as well as according to Burton, (2000) even to increase crime levels [9].

In the search for a universal model of the sustainable city, Guy and Marvin (2000) consider it crucial to recognize that there is no single future, vision or model, but many different ones that can co-exist, supported by different sets of social interests, bridging the techniques and social considerations of each city [13]. Therefore, it is important to highlight the possible consequences of the different proposed city models, in the light of the criteria for a sustainable development and always in relation to the most important objectives that have been set [2].

3. SMART CITY AND ACCESSIBILITY FOR ALL

We could give many definitions for the meaning of a "Smart City". Although the original goals of a Smart City were primarily technology-oriented, contemporary views of Smart Cities point to the inherent importance of people, community, and governance. The concepts of 'for all', 'accessibility' and 'inclusion' are increasingly encountered in the dialogues about modern smart cities [6].

The term accessibility is defined as "the characteristic of the environment, which allows all persons, without discrimination of gender, age and other characteristics, such as physical condition, perception, nationality, to have access to it, which means all people to be able to autonomously, safely and comfortably approach and use the infrastructure, as well as the services (conventional and electronic) and the goods available in the certain environment" [Greek Law 79/A/9-4-2012].

The goal of having inclusive and accessible cities is a globally recognized need [13]. Cities across the European Union are making efforts to make the physical, built and digital environment more accessible for people with disabilities (mobility impairment, visual or hearing impairment) as well as for disabled people such as the elderly, pregnant women, people with temporary injuries, parents with prams, etc., with the aim of being able to fully participate in all areas of life. Accessibility is essential

for the equality, autonomy and independent living of all people, improves the quality of life and contributes to the creation of inclusive cities that thrive [15].

Globally, many built environments fail to meet the accessibility needs of people with disabilities, despite the fact that people with disabilities fight to improve their accessibility of the built environment [6]. Although in the past decade, new initiatives and practices have been developed in various sectors in order to make cities more accessible for all [15], as Mr. Antonis Harokopos (President of the Regional Federation of Disabled Persons of Western Greece and the Southern Ionian Islands) points out, “we continue to see and experience deficiencies, mistakes, inappropriate and outdated planning in infrastructure, transportation means and systems of movement, parking, poor workmanship on roads and sidewalks, up to the drivers of vehicles who park in front of ramps and crossings or on sidewalks” [16].

There is an urgent need to revise construction, urban and architectural planning, in order to take into consideration, the needs and requirements of people with disabilities [6]. A city is accessible when all its residents can live in it and use all objects and services without problems, such as being able to use public transport for their transportation, moving around the streets without encountering obstacles, have direct access to all public buildings and receive information in forms so that they can read and understand [15].

4. THE CASE OF IOANNINA

4.1. HISTORICAL REVIEW - URBAN PLANNING DEVELOPMENT OF THE CITY OF IOANNINA

The city of Ioannina, also known as Ioannina, Giannena or Giannina, is the largest city of the Region of Epirus as well as of the Decentralized Administration of Epirus - Western Macedonia. It is built in the center of the basin, on the western shore of Lake Pamvotida (altitude 470m.) where there is also the picturesque island (Island of Ioannina), on which there is a small settlement and various monuments and attractions, such as the last residence of Ali Pasha are found [17]. Furthermore, the city of Ioannina is the Region's main attraction pole of Epirus, since it gathers a large part of the urban population as well as the employment of the Secondary and Tertiary economic development sectors. In addition, the city attracts a large number of students, who consist an important part of life in the city.

The residents of Ioannina, especially the prominent Epirotian intellectuals, had attempted to establish university schools since the early 1950s. The building complex chosen for study began its operation as a University institution in 1964. The first department established that year was that of School of Philosophy as a branch of the corresponding School of the Aristotle University of Thessaloniki starting its operation with two hundred students, while in 1970 an independent Higher Educational Institution (H.E.I.) was founded in Ioannina.

During the period of the Ottoman Empire, the city had a confused urban structure and until its inclusion into the Greek state, consisted of districts-mahalades, which replace the concept of a building block. Also, the market was of great importance in influencing the organization of the city, giving that way to the city the characterization, at the beginning of the 19th century, of the "city-market". In the second half of the 19th century, the development of the city is polycentric, combined with the central position of the settlement in the wider area. The city of Ioannina will change after its accession to the Greek state in 1913. The general urban planning policy followed by the Greek state regarding the newly incorporated cities has decisive effects on the formation of its urban structure. In 1915, a zoning plan for Ioannina was drawn up, while in 1934 the first decree for the city plan was issued. Since 1984, successive expansions of the city plan have been observed, resulting in almost a doubling of the settlements included in the city plan.

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The study area is located in a central part of the city, between the historical and commercial center of Ioannina and the new University, thus creating an open front of communication and connection of the city and its inhabitants. In the area around the plot of the old University of Ioannina, it is observed that most of the buildings around it are two or three-storey ones. In addition, the space around the study area is mainly for residential purposes and is accompanied by ground floor shops. There are also buildings that house educational and housing areas as well as a student residence building of Ioannina located in the southeast part of the plot.

4.2. STUDY AREA – THE BUILDING OF THE OLD UNIVERSITY OF DOMPOLI

The research of the present study focuses on the building of the old university of Ioannina located on Dombolis street. The construction of the building dates back to 1950, in the 70s a section was added to the south-east of the plot, since 1996 it has remained vacant. In 2000, a partial reconstruction of its northwestern part took place to house some public services, such as the tax office and the transport and communications department of the regional unit of Ioannina. Until today, no repairs have been made to the remaining unused part of the building, as a result the building does have considerable damages. The unexploited part of the building is the one located at the front of the plot, where the central entrance to the building complex is located, and is visible from the main road (Dombolis Street) (Figure 2).

BUILDING OF THE OLD UNIVERSITY OF IOANNINA



Figure 1. Plan of the building of the old university of Ioannina (created by the authors)

The building complex is housed in a plot of land with a total area of 10.231,14 m² and has a Π layout around an atrium, which is currently used as a parking space. The complex consists of 4 floors and the total area of its floors is 13.569,67 m², while the total area of the vacant building is approximately 6.925,40 m² (Figure 2).



Figure 2. Floor plans of the old university of Ioannina (Department of Environment and Urban Planning of Ioannina)

In the context of the transition of cities towards smart and green development, with the aim of utilizing the existing buildings of the city and having free access for all citizens as a guiding principle, is proposed the reconstruction and adaptation of the original use of the old university building of the city of Ioannina. It is highly suggested the transfer, to the unused part of the building of some public services which are scattered in the city or can be accessible only by car, away from the center, so as to make it easier to serve the residents, to minimize their movements and especially their need for motorized travel, since the building is located only 1.4 km away from the city center.

In 2017, the Department of Environment and Urban Planning of the Municipality of Ioannina relocated to the building of the former Katsikas Town Hall, which is located 6.0 km from the city center. The Department of Urban Planning supports the entire Prefecture of Ioannina, therefore it deals with a lot of people, both with the public and with engineers, as a result of which their movement to this service is mainly done by car. Therefore, its return to the city and its housing in the empty building of the old university of Domboli street, will have a beneficial impact on the accessibility of the citizens as well as to the environment, through the reduction of energy consumption for movement.

In addition, there are some services of the municipality of Ioannina that are housed in separate buildings in the center of the city and which can be moved to the Domboli building, such as the Directorate of Administrative and Financial Services housed in a building on Kaplani Street, as well as the Directorate of Technical Services in Koletti Street, the Customer Service Center Division and the Planning, Organization and IT Division located in El. Venizelou street. The Organization of Social Protection - Solidarity & Preschool Education (OKPAPA) of the Municipality of Ioannina is housed in the city center, in Averof Street, while the Roma branch of the Community Center is housed in KE.PA.B.I., which is located in Archbishop Makariou Street. Therefore, the OKPAPA's services

could also be transferred to the building of the old university of Domboli, so that they are concentrated and no more movements between the services are needed [18] (Figure 3).



Figure 3. Map of the scattered public services in the city of Ioannina (created by the authors)

4.3. TRANSPORTATION AND ACCESS TO THE BUILDING

The transportation in the city of Ioannina is carried out mainly with the use of a car, walking and the use of city buses.

The city of Ioannina is connected to a public transport network in order to serve the citizens within the city's urban complex. The Municipal Bus Service of the prefecture has been active since 1952 and today it has 60 buses, which make 800 daily routes with a total of 415 stops throughout the prefecture [19]. Just outside the building there is a stop which is served by 2 lines 10 and 12 [20], therefore the routes going to this stop should be increased and these buses should be fully equipped so that citizens who have some kind of disability such as mobility problems, can move on their own. Additionally, the traffic lights in the study area have to be replaced with sound ones.

A ramp should be built in the building for the access of people who move in a wheelchair or use a stroller, As well as an elevator and toilets for the disabled should be constructed. In addition, public service counters must be positioned to accommodate wheelchair users.

For the hearing impaired (deaf and hard of hearing people), a "tele-interpretation" station needs to be installed on the ground floor of the central building, facilitating them both in their dealings with the municipal services and in communication, in general.

As far as people with visual impairment are concerned, it is considered necessary to have suitable routes with corresponding guides in each area, an audio description of the area they are in, using an application on their mobile phone and the appearance of strong color contrasts in any obstacles. In

addition, at the entrance of the building, relief plans of the spaces should be placed, ensuring their full accessibility, whereas in all spaces, there should be signs accompanied by texts in braille.

4.4. ENERGY INDEPENDENT BUILDING

One of the goals set by the European Green Agreement with the aim of carbon neutrality by 2050, is the energy efficiency of buildings [21]. Buildings constitute one of the largest sources of energy consumption in Europe and are responsible for around 40% of EU energy consumption and around 36% of greenhouse gas emissions from energy consumption [22]. The instruction aims to achieve a zero-emissions and fully decarbonized building stock by 2050, stating that from 2028 all new buildings should have zero greenhouse gas emissions, the buildings which house, are used or owned by public authorities from 2026, while residential buildings undergoing large-scale renovation will have a time limit until 2032 [23].

The reconstruction of the building will be carried out according to the green transition and energy autonomous buildings. Therefore, the installation of photovoltaic systems will be able to fully cover all the needs of the building in terms of electricity, such as lighting, hot water and the operation of all electrical devices installed in the building. The need for heating or cooling the building can be achieved by installing solar systems or with an electric boiler that will also be powered by photovoltaics. The lighting in the building will be done by installing low energy consumption led lamps. In addition, a thermal facade and energy frames with thermal break should also be installed. Finally, permanent external shades will be installed to protect the building's shell during the summer months, but they will provide the possibility of natural lighting, ventilation and, of course, will not prevent the necessary sunlight entry to the building during the winter.

5. CONCLUSION

The compact city is a popular urban planning model, which is currently being promoted in Europe as an optimal form of urban development. With the term "compact city" it is argued that the implementation of policies aimed at increasing densities and revitalizing urban centers will have significant energy, economic and social benefits. The primary objective of sustainability policy is the improvement of the environment on a global scale, which requires a radical revision of the structure and operation of modern cities. In the context of the transition of cities to sustainable development, a key issue that arises is the search for the urban planning models that correspond to it and in particular in terms of: the distribution of functions, the density and the prioritization of its structure (center - local centers - suburbs).

This work aims at the regeneration and reuse of the building of the old university of the city of Ioannina, in the context of the "compact city" in order to contribute to the sustainability and resilience of the city. The transfer of public services located far from the city center as well as services housed in different buildings within the city is considered necessary in order to reduce energy consumption and the use of motorized modes of transportation.

Furthermore, the reconstruction of the building will contribute to the easy accessibility of the building and services by all residents of the city as well as to its energy autonomy, with the installation of photovoltaic systems and the installation of a heat-insulating shell, providing, at the same time, significant energy, economic and social benefits.

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Designing an urban open-space sound museum at the city of Ermoupolis, Syros

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SUMMARY

Sounds are part of cities and the "emotional" landscape. They are as much an element of urban identity as the visual landscape. However, the relationship between soundscapes, heritage and attractiveness has not been sufficiently researched to date.

The aim of this research was the design and implementation of an urban Open-space Sound Museum in order to promote the rich cultural and historical aspects of Ermoupolis and also increase the attractiveness of the city. The sub-objectives of the research were a) to record and evaluate the environmental noise in the study area and to capture the sound identity of the city, b) to connect the cultural heritage of the study area with its soundscape, c) to redefine cultural tourism through the actions of the Open-space Sound Museum. The methodological approach incorporated both, perceptual and objective assessment tools regarding the sonic characteristics of the case study area. Furthermore, an extensive literature review was conducted.

Additionally, the planning and future installation of an Open-space Sound Museum holds an educational value with the potential to raise environmental awareness among citizens and visitors. The protocol shaped in this research can be adapted with minimal modifications to other areas of rich cultural and environmental values.

Keywords: *Soundscape, city sound identity, Ermoupolis, intangible cultural heritage, tourism, Open-space Sound Museum, public space.*

1. INTRODUCTION

Urban residents face a series of environmental pressures with both short-term and long-term effects. Therefore, sustainable solutions are of major importance [1]. Sustainability is directly connected with conservation and recognises the value of intangible heritage as a cultural resource. The cultural soundscape is a resource and a sustainable tool for social, educational, spiritual and economic local development. Culture shapes a city's identity, community identification, historical continuity and collective representation. This is an important comparative advantage of up-to-date touristic city [2]. This research attempted to find the connection between culture-tourism-soundscape and sound identity in cities. The aim of the study was to create an urban Open-space Sound Museum in order to increase the attractiveness of the city. It is a museum designed for public space allowing visitors to navigate through the proposed path. Such an experiential approach allows visitors to get familiar with the cultural identity of a city and actively participate in its historical continuity.

For this research the sound environment of Ermoupolis in Syros Island (Cyclades, Aegean, Greece) was studied, with focus on the cultural and touristic aspects of the city. Therefore, quantitative and qualitative data were collected in order to define the area's sound identity [3]. Furthermore, in order to portray an accurate representation of Ermoupoli's sound identity, urban noise was studied in an effort to promote urban quietness [4]. Finally, the proposed Open-space Sound Museum, serves as an

educational tool, as it raises awareness on cultural issues, while contributing towards urban well-being.

2. THEORETICAL VIEWPOINTS

Increased quality of life in urban environments can be achieved through the promotion of cultural and natural heritage, including the preservation of history, social equality, vibrant neighborhoods and biodiversity [5].

Neighborhoods contain the basic urban elements needed to function autonomously. Kevin Lynch, an urban planner, in his book 'the image of the city' [6], described the parts of a city and its micro-scale such as the neighbourhood: streets (daily routes), boundaries (natural boundaries such as the sea or mountains), sub-areas, nodes (squares, crossroads) and landmarks.

In sociological terms, the neighbourhood is a living body of the city that evolves with the people who live in it. However, national or international events change neighborhoods. The downward trajectory of a neighborhood is usually: economic prosperity, acute socio-economic crises, institutional and political reconstruction, economic decline [7]. In the case of Ermoupolis, many neighborhoods were "silent" due to the abandonment of their inhabitants (internal migration phenomenon), with environmental, social, aesthetic and economic consequences. This change is reflected in the soundscape.

2.1 Urban Sound Environment

The sound environment in the city is composed of biological sounds, i.e. the voices of all living things in a city (biophony), geophysical sounds, such as the rustling of leaves, the sound of the wind or the sea (geophony) and man-made sounds, i.e. those produced by human works (anthropophony) [8].

The perceptual construct of the sound environment is called the soundscape and is defined as "*the sound environment with emphasis on the way it is perceived and understood by an individual or a society*" [9]. It encompasses everyday sounds and includes sound events of culture and civilization. Each soundscape is created according to the physiognomy of each area and its soundmarks. The soundscapes of the city help to capture the sound identity [10].

Additionally, the sound identity of a city, a neighborhood or an area, is part of the memory of the inhabitants about the culture, the use of the land and sound [11]. Important information about the quality of the sound environment and the acoustic comfort of the surrounding space is derived from the sound identity. In cultural spaces, the interaction of space and cultural sound (landmarks and soundmarks) is related to sound recognition, experience and sound perception.

The propagation of sound in the urban environment is significantly influenced by structural elements. Factors affecting the transmission of sound include the dimensions of the source and receiver locations, the width of the space that shapes the transmission, the materiality, morphology and height of buildings, road layout, volume, open and enclosed space, altitude above sea level, land use and weather conditions. The main physical phenomena that influence the quality of a soundscape are reflection, reverberation, diffusion and absorption of sound waves [12]. Usually, due to the structural materials, several phenomena are observed together, at the same time.

Noise is a multifaceted issue and is subject to both a quantitative and qualitative evaluation [13]. It can be dealt as a sound of increased intensity that can be measured using a sound level meter, or as a negative sound that can be described through a perceptual assessment [14]. Urban noise provides information about the environment and also about the cultural sounds it covers [15]. According to WHO, people can feel comfortable with sounds up to 53 dB during the day and 50 dB at night. Above this threshold, noise becomes harmful to human health. That has a serious effect on acoustic comfort and quality of life of the citizens and visitors [16].

Subjective research tools similar to the CRESSON method that involves expert interviews and questionnaires, can be used to obtain perceptual characteristics of sound environments [17].

2.2 The cultural factor

Cultural environments are the inseparable unity of culture and the natural environment (important cultural landscapes). They include elements of tangible and intangible cultural heritage and associated values, characterised by uniqueness and authenticity [18].

Intangible cultural heritage is manifested in oral traditions and narratives, music and dance, religious rituals, festivals, idioms, social events, theatre, celebrations, soundmarks etc [19]. It is a living reality that changes, develops, enriches and is passed on to future generations, adapting to social and cultural changes. It is an element of the collective identity and memory of a place.

Soundmarks [20] are sounds that are unique and have a distinctive quality that is highly associated with specific people or a community [21]. For example, the church bell or the town clock stand as soundmarks of several areas. Several soundmarks are now extinct or currently absent from an urban environment. Therefore, several “iconic” soundmarks are protected under an UNESCO scheme. Several extinct sounds are documented through literature and oral history and other means. They remain, however, as authentic memory imprints in the city. The authenticity of a sound comes from memory, the impression of the past, its perception and interpretation in the present and the experience of the city's inhabitants. This is captured as personal experience and part of the sound identity [22].

2.3 The tourism factor

Tourism is a complex, dynamic phenomenon with social, economic, cultural and environmental components. It is an ideological formation of history, nature and tradition, largely based on personal perceptions and experiences. The link between tourism and cultural management is authenticity, i.e. the sense of memory [23].

During the last eighteen years, the economic crisis and the pandemic of Covid-19, have affected the tourism sector worldwide. Industry leaders have understood the scale of the problems and are moving towards sustainable directions. The issues raised are: (a) cultural, such as authenticity, promotion and preservation of cultural heritage; (b) environmental, such as sustainable management of natural resources; and (c) social, such as accessibility, inclusion, modernisation of information media, etc. [24] (all of which served as design criteria for the Open-space Sound Museum).

Sounds are part of the traveller's sensory experience. The soundscape can be the main attraction of a place, accompanying and impressing tourists during their visit [25]. The soundscape in relation to tourism has two aspects: a) what the tourist hears or wants to hear, and b) what is caused by the management of the tourist asset: the effort to attract tourists results in a noisy soundscape, which has consequences for the quality and attractiveness of the place.

This study examined the tourist soundscape as an element of the sound identity of Ermoupolis. However, research on sound and tourist experience remains limited [26].

2.4 The museum

Museums are an integral part of the city and its culture. They are a reminder of the history of a place. The new museum model needs to be extroverted, both spatially and metaphorically, and be interactive with its visitors. The COVID-19 pandemic also led to the 'opening' of the museum to open spaces. The aim was to be approached by the public [27].

The museum is a symbol of a city's prestige, enhancing its attractiveness. It is a vehicle of memory and culture, an educational tool for citizens and visitors to a city and all that makes up and surrounds it. It must be up-to-date, open and inclusive [28].

The museum presented in this paper is original and has been designed from the outset in open space. The Open-space Sound Museum is directly related to the two factors of research, culture and tourism in the open space of the city. It attempts to transform the whole city into a network of identifiable urban spaces through the soundscape.

3. METHODOLOGICAL FRAMEWORK

For reasons of objectivity and impartiality, the study of Ermoupolis followed a methodological protocol based on acoustic ecology method, ecoacoustics tools and CRESSON qualitative recording tools [29]. The following table (Table 1) lists the steps and tools of all approaches:

Study on the selected area	Acoustic Ecology Approach	Eco-Acoustics Approach	Methodology by CRESSON*
Step 1	Step 2	Step 3	Step 4
<ul style="list-style-type: none"> • Discussions with locals. Understanding the city. Identification of areas, important landmarks and echoes of Ermoupolis. • Literary research (books, essays, articles, literary texts, documentaries about the area). • Experimental soundings and test soundings to find final areas • Selection of five final regions and points 	<ul style="list-style-type: none"> • a study of the soundscape of the five areas • photographic documentation • Final sound and noise sampling • Data collection based on legal data (Directive 2002/49/EC) • Design in plan, topographic and sectional views (AutoCAD, Photoshop, Rhino) • Spectrogram 	<ul style="list-style-type: none"> • Extraction of acoustic biodiversity indicators (using R statistical software) • Acoustic Complexity Index • Normalized Difference Soundscape Index-NDSI • Noise index of the energy equivalent Leq 	<ul style="list-style-type: none"> • Interviews with five local experts: after listening to one-minute extracts for each point, followed by a semi-structured dialogue • Documentation and analysis of the interview data • The emergence of a city's sonic identity <p>* Centre for Research on Sound Space and the Urban Environment</p>

Table 1. Steps and methodological tools

3.1 Definition of the study area

The factors that contributed to the choice of Ermoupolis were its urban physiognomy, the historical and cultural life of the city and the tourist interest it receives throughout the year. Also its interesting soundscapes (variety of geophonic, biophonic and anthropophonic sounds) and the accessibility of the city for soundwalks. [30]. The collection of bibliographical data on Ermoupolis was framed along three axes: Geographical-Natural, Historical-Architectural and Social-Cultural Context. The scientific literature on the theoretical framework of acoustic design was also studied. Discussions with the inhabitants of Ermoupolis and questionnaires, followed by intensive research of bibliographic and audiovisual material, helped to identify the main landmarks and soundmarks.

The recordings were made in the first half of September, when the tourist traffic was tolerable and the weather was clear, without Cycladic winds. Until the 14th of September 2021, sound sampling was carried out in 3 stages: experimental-research, first level, final level. The preliminary stage consisted of soundwalks and test recordings, where observations and data were collected. Then 5 sub-zones were selected: the main square of Miaoulis, the promenade, the market street, a natural boundary of the city, a neighbourhood. The final recordings were made in 13 locations. The material was then classified and indicators were extracted using appropriate software (objective evaluation). The last step was the semi-structured dialogue (qualitative characteristics of the sound identity).

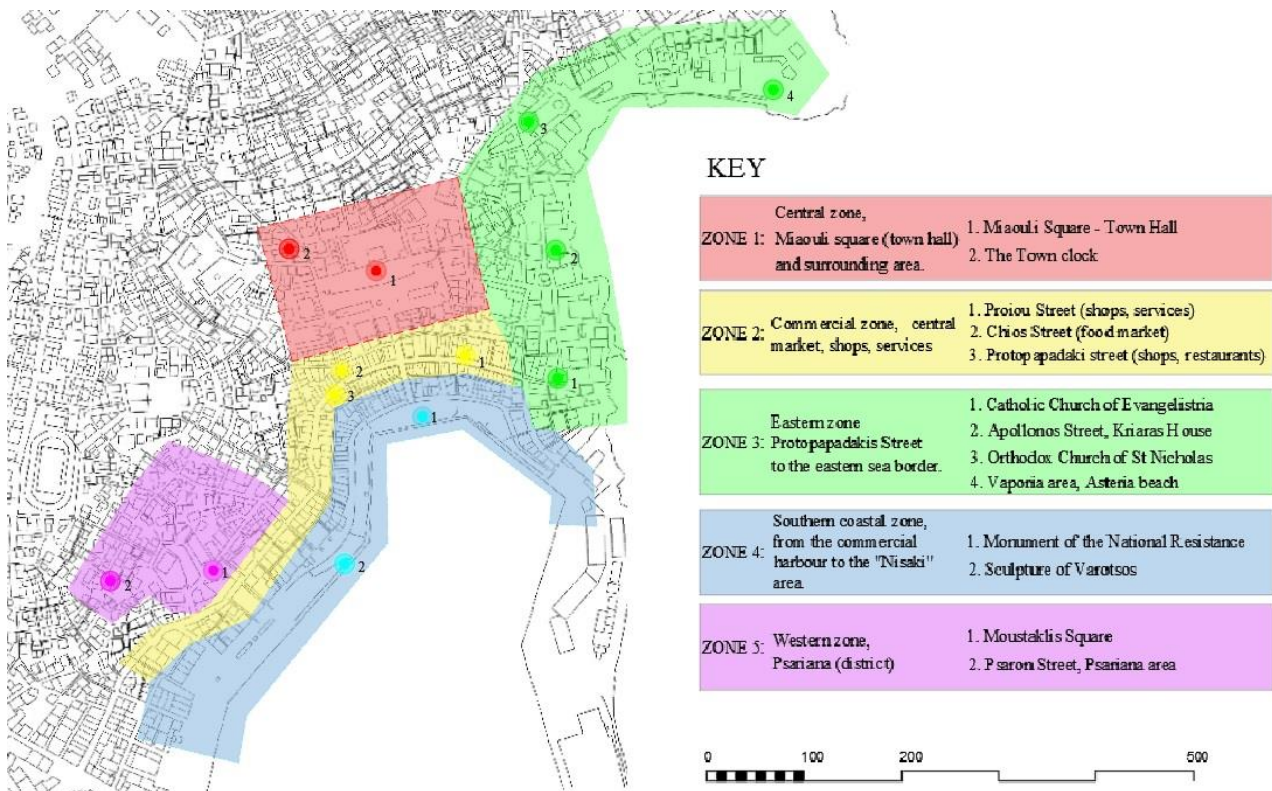


Figure 1. Map of sampling points

3.2 Evaluation tools

a) Objective evaluation tools:

1. Trial and final sound samplings required special recording equipment: a digital recorder and a sound level meter. A specific recording protocol was followed to ensure correct sampling and to avoid natural phenomena such as diffraction and reflection caused by the researcher.
2. Photographic documentation of every point.
3. was written some information about each location, such as buildings, greenery, weather conditions, prevailing winds, comments about the soundscape. And, of course, the date and time of each recording (one in the morning and one in the afternoon).
4. Once the data had been collected, it was processed in the appropriate software, from which the indicator values and spectrograms were obtained [31].

b) Subjective evaluation tools - Methodology of CRESSON

5. Citizens' questionnaires: the questions were related to the study area and the suggestion of cultural soundmarks and landmarks with psychoacoustic characteristics (nice, comfortable, indifferent, etc.) [32].
6. Primary soundwalk - assessment of the quality of the soundscape: During the soundwalk, the researcher listened to understand, collect information and record data. In parallel, objective evaluation tools were used [33].
7. Semi-structured interview: The data collected during the soundwalks were classified. One minute samples of the recordings were selected by the researcher. These were given to a sample of five people relevant to the city and sound science. The questions were about the recognisability of the points and elements heard in the soundscape, the acoustic comfort, the personal feeling of the interviewee. The procedure was repeated for all 13 points, for both recordings (morning and afternoon) [34].

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4. THE STUDY AREA

Ermoupolis is a city that counts exactly two centuries. It is associated with the most important historical events in Greece. Its case remains unique: its financial, cultural and social life became a model for other cities [35]. Today, social and religious divisions and conflicts have been eliminated. The cosmopolitan style of European Ermoupolis and the great financial contrasts no longer exist to the extent they once did. In recent years, Ermoupolis has witnessed major changes in the use of space. This was caused by the historical financial meltdown of Greece until 1950, the collapse of industry and the rapid development of tourism in the second half of the 20th century. The abandoned industrial area with the shells of old industrial buildings considers a 'necropolis'.

The rapid development of tourism in the second half of the 20th century had an impact on the landscape and the soundscape. The lack of parking spaces for cars, the increase in the number of two-wheeled vehicles, the additional demand for water and electricity during the summer months, the touristisation of some areas and, of course, noise pollution, are some of the observations recorded during the survey of the city.

4.1 The soundscape of another time

Literature research on Ermoupolis has attempted to give a sense of the soundscape of the past. From its foundation until the middle of the 20th century, the city was divided into two halves: economically, socially and culturally. The east side was the wealthy area, with great mansions on the sea. On the west side was the shipbuilding and repair zone, the main shipyard and its associated outbuildings; the workers' area. The western side of the city was also the marginal side. The middle class was gathered in neighborhoods such as Vrondado and Psariana, in the middle of the city. The ruling class of Ermoupolis had imposed the Europeanisation of the city, with obvious influences on many aspects of social and artistic life. It's not a surprise that the daily life of the west side is deliberately concealed in 19th century literature, for reasons of external projection [36].

The Asia Minor affair in 1922, a huge number of refugees has settled in the western part of the city, bringing their own culture. The cultural divide in the port bipole expanded: on the eastern side, European plays and operettas could be heard in the Apollo Theatre, the philharmonic orchestras in the square and european music in the ballrooms. On the west side were the traditional dances and songs of Asia Minor, Turkey, Peloponnese and Thrace, the mocking carnival songs, the zebekia. [37]. The new industrial face of the city maintained a good economic level for many years. After the Second World War, the cosmopolitan style faded down. Ermoupolis gradually took on the characteristics of a Greek provincial city [38].

4.2 The soundscape of today

Ermoupolis opens up through its cultural life and its musical history: from the philharmonic orchestra, which is still active today, to the rebetiko music school. During the summer months in particular, prestigious international festivals, cultural events and happenings are organised all over the island to promote artistic education and quality of life.

The intense rhythms of the city are concentrated around Miaouli Square, where the Town Hall is located, a hub of the city. Tourist traffic throughout the year, especially in the summer months, the constant movement of boats, taxis, buses, cars and motorbikes in the port, especially from May to November, the tourist marina with its boats, the constant white noise of the Neorio, the sound of the sea and the wind, complete the soundscape of today.

5. SURVEY RESULTS-DISCUSSION

The quantitative survey carried out in the study area led to the following results Ermoupolis is an urban area with rural elements: the main problem was traffic noise, which masks or resonates with other sounds. This did not happen everywhere, but on the main roads. On the coastal road, for

example, where traffic was continuous, the noise had a constant intensity and monotony. In urban areas, motorcycles were a major source of periodic noise. The main causes were: a) the modification of motorcycles to deliberately create noise, b) the high speed at which they traveled, c) the marble surface of the roads, which causes reverberation. The first two are against the Urban Noise Directive. From the qualitative survey, the following results were certain: in certain locations noise masked sounds that the listener would expect to hear them, such as the sound of the sea, the Neorio, idioms, etc. Cultural sounds such as bells, music, the Divine Liturgy were recognisable, authentic and created a sense of acoustic comfort. Some noisy sounds, such as the boat and the Neorio, created to the interviewees a sense of security because these sounds were associated with economic prosperity and connection with the surrounding islands and the country's major ports. Soundscapes such as Miaouli Square evoked memories of personal experiences. The intimacy of the human element in the neighbourhood's soundscape evoked feelings of calm and elation, but also feelings of indifference as they projected an abandoned area devoid of vitality. Certain qualities and atmospheres, such as the liveliness of the square, the commercial activity in the market, the Orthodox and Catholic masses, the old man singing in the neighbourhood, etc., were perceived by the majority of interviewees as very comfortable and pleasant. Noise from motorcycles on main roads was perceived as annoying. The tourist soundscape in September was not classified as noisy (not too many tourists) because the sounds were integrated into the daily flow of the city. The absence of some old cultural sounds (extinct sound phenomenon) was unpleasant, especially when they were replaced by other modern sounds. In some other places there was the sound masking phenomenon. For example, the white noise of the Neorio covered the sound of the sea at the recording location.

6. PROPOSAL: OPEN-SPACE SOUND MUSEUM OF ERMOUPOLIS

The Open-space Sound Museum of Ermoupolis is aimed at the inhabitants of the city, students and pupils, visitors and tourists, inviting them to get to know the city through an experiential walk and to create memories. The accessibility of the soundwalks allows everyone (the disabled, the elderly, the visually impaired, mothers with prams, etc.) to participate at their own pace.

The museum allows visitors to get to know Ermoupolis by suggesting listening points through an easy-to-use application that is easily installed free of charge on a smart device (Wi-Fi will be freely offered at the selected points).

The proposed path will be displayed on an interactive map (Figure 2), with twenty key points. Each point will give the opportunity for experiential participation and interactive presentation of the history of the site. The listener can follow the sequence of points or navigate freely through the city, recognising and discovering the points of interest. The aim is to revive the historical representation of Ermoupolis' soundscapes and, of course, the promotion of current sounds and cultural qualities of the city.

The museum will operate in time zones during the day. The visitor will be able to choose to walk in one of the proposed zones or in all of them, as he will receive different sound stimuli.

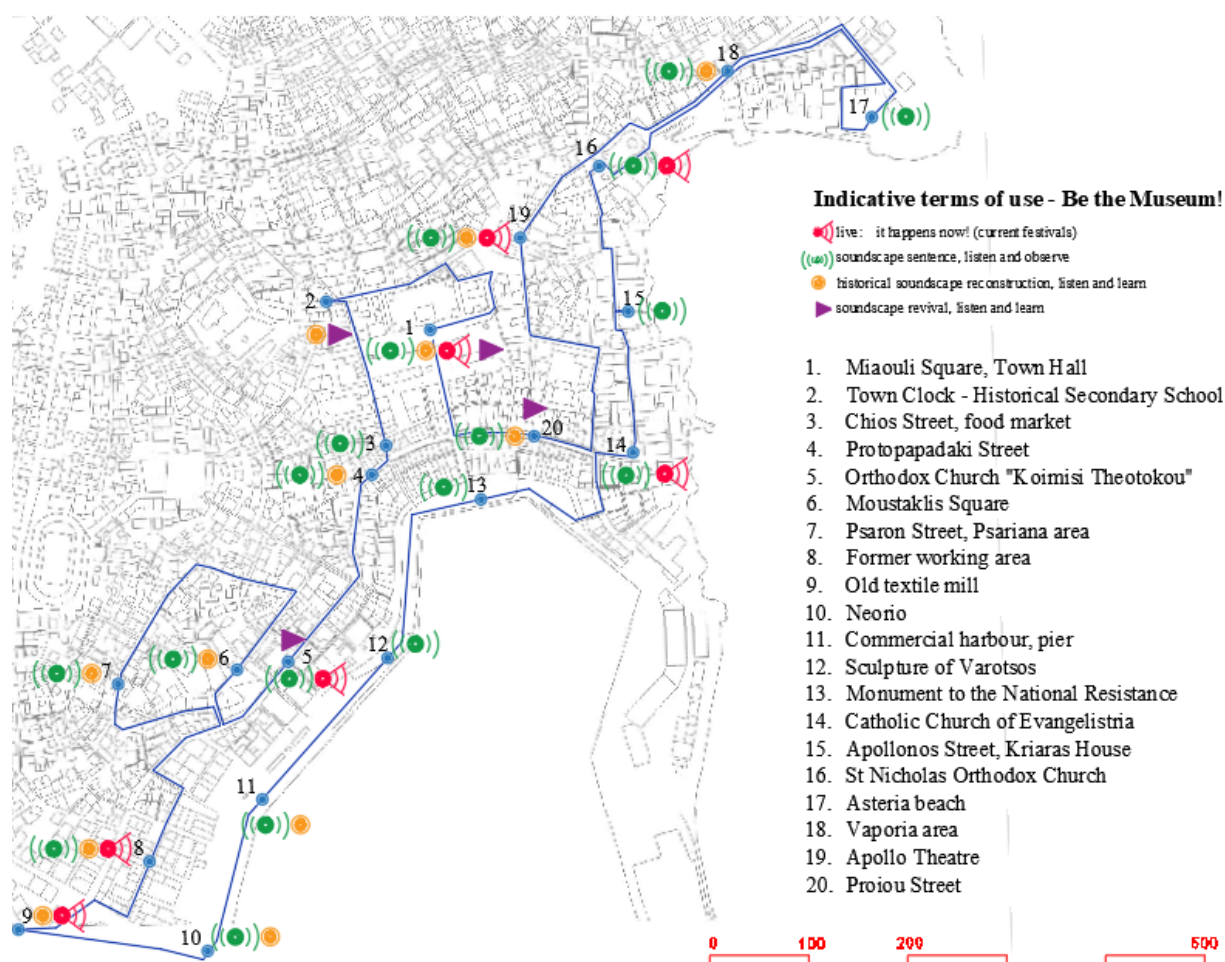


Figure 2. Interactive Application Map

The interactive map shows the points of interest of Ermoupolis as dots, each represented by a different symbol and colour with an explanatory key. Touching the dot opens a new digital window with information about the reference point, the area and the museum's digital facilities. The dots will be numbered from 1 to 20 (this may change during implementation). There will also be QR codes on landmarks around the city that, when scanned with a smartphone, will link to the museum app. Listening stations with speakers or headphones and a seat will be installed at locations where 'historic' soundscapes will be recreated. The listener will be able to sit and listen.

The museum has co-benefits for the city and the environment. The open-space sound museum starts a dialogue with the public space and reconnects the neighbourhood and the citizens. It educates citizens, tourists, children on the culture of the city and also on environmental pollution. It also preserves cultural heritage through the soundscape.

The museum has no costs or expenses for printing, as digital tools are used. The soundwalk is pedestrian (zero ecological footprint). The specificity of the object challenges the traveller to experience the place in a season with sunshine, less wind, normal temperatures, such as spring and autumn. In this way, the tourist season for the island is extended.

7. CONCLUSION

The study captured and recorded the sound identity of the city. The results of the whole study contributed to the proposal of solutions and measures against noise pollution in the city. The recording and assessment of noise assisted in understanding the problematic areas.

The recording of important soundmarks and the possibility of revival and reconstruction proposed by the Open-space Sound Museum, links the soundscape to the cultural heritage of Ermoupolis. The actions of the Open-space Sound Museum add value and quality to cultural tourism, always with a view to authenticity, knowledge, entertainment and the safety of the visitor. The experiential walk allows the visitor to learn, evaluate and reflect on issues of environmental awareness.

The main objective of the project is to redefine humans and their philosophy towards the environment and their activities. The historical past is projected through the soundwalk as it is contained in the sounds and images of today. The soundwalk becomes a historical sonic anatomy that feels the history of the place in the qualities that the soundscape conveys. The perception of these qualities is the attractiveness of the Open-space Sound Museum in the city.

However, Ermoupolis is a living city. The study of Ermoupolis revealed the need to upgrade its neighbourhoods to a new sustainable urban form. The local community should take care of the quality of life of its residents and visitors at the level of the neighbourhood, the street, the sign, the citizen.

The creation of an Open-space Sound Museum in the city of Ermoupolis is part of the sustainable planning of the city: it improves the overall sound environment, revitalises the neighbourhood and promotes the intangible cultural elements of the city. This also makes the city more attractive. The Open-space Sound Museum acts as a research and educational tool, improving the sound environment and raising awareness of noise pollution. Once piloted in Ermoupolis, the ultimate goal is to extend the project to other cities or settlements in Greece and replicability value.

The Open-space Sound Museum is a sustainable proposal that can be implemented in many cultural areas in Greece and the Mediterranean, as it can be transformed to meet the needs of each city and its civil society. The Open-space Sound Museum can become a repository of the city's memory and at the same time a shaper of its contemporary identity.

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Identification of spatial, social and environmental parameters for the design of pocket parks

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Abstract

The major scope of this paper is the investigation of pocket parks and their special characteristics and design parameters. Pocket parks are a type of small-scale urban green spaces and their size is determined by the availability of land rather than by fixed standards. This makes them a unique solution to the urgent need to increase urban greenery in cities with scarce space for larger green areas. Despite their limited size, this type of park contributes to the sustainable development of urban areas and consist a solution for the requirements of the UN's 17 Sustainable Development Goals (SDGs) for sustainable cities.

The paper focuses on examining in detail the characteristics of pocket parks; these design parameters that make small green spaces able to attribute the benefits of urban greening of a larger scale. It identifies the spatial, social and environmental design parameters and presents the typology of small green spaces according to their characteristics. This research and listing of parameters assist in understanding the important elements of a small park. Well-known and representative examples of pocket parks, among the first of their kind and some of the most recent, from the Greek and international urban space, are studied in order to identify the above parameters and compare their characteristics. Emphasis is placed on comparing the results in terms of spatial characteristics, in order to highlight the minor importance of area and size in this type of urban green.

The paper presents an attempt to parameterize a small-scale urban green. The aim is to confirm the assertion of the definition for the adaptability of the pocket park in any vacant urban space through the recording of the parameters and, in the continuation of this research, through the development of a method that combines the data and examines the relationship of all the necessary characteristics in order to create a dynamic form of a successful pocket park.

Keywords: *Pocket park, small green spaces, urban green spaces, design parameters, pocket parks' characteristics.*

1. INTRODUCTION

Urban parks are mostly implemented as large green infrastructure projects exclusively for recreational activities and economies. Currently, 54% of the world's population resides in large cities and is expected to increase to 68% by 2050. [1] The World Health Organization considers that the minimum ratio of green space in cities per inhabitant should not be less than 9 m²/inhabitant, when in the Attica it is 2.5 m²/inhabitant, in Athens 0.96 m²/inhabitant and in Thessaloniki 2.14 m²/inhabitant [2] In almost all big cities in Greece, there are far fewer green spaces than necessary. At the same time, the availability of large urban gaps for urban green space development is insufficient in densely populated cities, in contrast to the small gaps that are spread throughout the urban fabric. Small green spaces, such as pocket parks, by definition can be developed in these small urban vacant lands.

The subject of this research is the pocket park as a type of urban green space that could be developed in any potential urban gaps. It is known by the terms pocket park, mini-park or vesty park, which is a type of small-scale urban green space. Through the study and analysis of the pocket park are identified the characteristics of pocket parks, particularly the spatial, social and environmental design parameters. Then it attempts to create a possible typology of parks in order to record the elements

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that make its park function. Finally, through the analysis and comparison of typical examples of small-scale parks, the spaces are evaluated, and their individual characteristics are compared in order to assure their contribution to the city and its sustainable development independently of its size.

2. INCREASING GREEN INFRASTRUCTURE IN A DENSE URBAN AREA

The concept of sustainable development formed at the end of the 20th century, which essentially connected the environment with various social and economic issues. Sustainability or sustainable development is a tool for criticizing various development options and it is based on a long-term planning policy. The new plan, called *Transforming our world: The 2030 Agenda for Sustainable Development*, included a declaration of 17 sustainable development goals and 169 sub-goals. Among the goals, the 11th is about making cities and human settlements inclusive, safe, resilient and sustainable, and it is defined specifically in sub-goal 11.7 the imposition to provide universal access to safe, inclusive and accessible, green and public spaces, in particular for women and children, older people and people with disabilities by 2030.[4] Urban greening is essential for the creation of a sustainable urban environment. Urban open spaces and green areas have a significant impact on the quality of the urban environment, the quality of life of its inhabitants and its contribution significantly to improving the city image. Their positive impact is undeniable in environmental, economic and social terms. They contribute to improving air quality, cooling and ventilating cities, connecting with the natural environment, providing places for recreation, relaxation, meeting and communication, safety, while at the same time they create an attractive environment, stimulating entrepreneurship and increasing land values.

However, public green spaces are scarce and any effort to create green interventions in cities, such as small parks or green islands, is limited to a few small areas, so its development is now essential to change the local ecosystem and improve the living conditions of citizens, visitors and people passing through these areas. In view of the above, there is a need to increase the amount of green space in the city, and therefore to find ways of securing spaces within the urban fabric and exploiting potential gaps in each neighborhood. Courtyards, pocket parks, parklands, semi-open spaces and pedestrian walkways are familiar urban forms that can be transformed into essential urban green spaces to fill the gap in the original design and create a green network.

In line with the UN goals and granted the existence of densely populated megacities with lack of urban green spaces or generally organized green infrastructure networks, the case of pocket parks is examined as very small urban green spaces that can be developed and adapted in any available urban space in the city and in any neighborhood.

3. DESIGN PARAMETRES OF POCKET PARKS

Pocket parks are very small urban green spaces, whose main characteristics are their size, location, functions and users, and finally their ecological impact on the urban area. The design parameters are divided into three categories: spatial, social and environmental.[based on 5,6,7]

The spatial parameters include all the choices regarding the design impact of the park, the plot with its size and boundaries, its location and the type of neighborhood it addresses, the possibility of visibility and multiple entrances, the openness and clear separation from the sidewalk, the surface and surfacing materials, the seating area, and the choice of the main use, the central element. A pocket park with natural elements, protected from urban noise and equipped with "flexible" seating can promote a positive social perception of these dormant micro-spaces and their function as social meeting places.[8] In addition, accessibility and visibility from the street are critical. The need for fencing, visibility and seating means that people's ability to relax in a space is directly related to their sense of control and security.[9] These specific characteristics regarding the final spatial dimension

of the park can be considered as practical guidelines for the design of functional and successful pocket parks.

<i>Spatial characteristics</i>	<i>Size</i>	<i>1-3 plots in area Their dimensions tend to be proportional to the concept in which they are designed.</i>
	<i>Location</i>	<i>Located within the city Usually within blocks, between buildings, or at the end of streets. They are directly visible from at least one side. Serve a population of about 500-1000 people and an area within a radius of about 400 meters from all dwellings in the service area (10 minutes walk).</i>
	<i>Type of town/neighborhood</i>	<i>Urban shopping centers Mixed-use residential neighborhoods Residential neighborhoods</i>
	<i>Entrances /Accessibility</i>	<i>Accessible from 1 to 4 sides by road Safe access for everyone</i>
	<i>Openness</i>	<i>Degree of openness/closure Number of party walls from underlying buildings Open sides Natural/artificial fencing</i>
	<i>Surfaces and Covering Materials</i>	<i>Vegetation (greenery, trees, vines) Surfacing material Walls of adjacent buildings Shading</i>
	<i>Urban equipment</i>	<i>May include urban furniture (benches, trash cans, lighting) Fixed and mobile chairs and tables</i>
	<i>Focal point</i>	<i>Fountain, pavilion, amphitheater, Main function for the park</i>

Table 1: Spatial characteristics of the pocket park. (table created by authors)

The social parameters include the users, the functions of the park and its benefits for the community. These parameters are determined by the context of the pocket park's integration environment, by its development area. The activities hosted depend on the characteristics of the common area and the needs of its potential users, which also determine its objectives. A pocket park can be located in a business district, a community center or a residential area. It can be designed to provide relaxation, but it can also be configured for community gatherings, events, or educational programs. They can serve as a playground for children, a gathering place for friends, a place to eat, a courtyard in dense suburban areas, or a garden for the community. In addition, these activities can be expanded to include urban agriculture, education, lectures, community kitchens, film screenings, readings, etc.[10] The users and their diversity affect the park's potential and determine the park's amenities and design to accommodate their age, social, and cultural differences. Equipment is selected based on the needs of the most frequent visitors or residents of the area, such as seniors and children in a typical neighborhood or workers in an office district. Therefore, the type of area affects the use of the park, with different social groups visiting the site at different times of the day.[11] Benefits and objectives may include physical fitness, social adjustment, psychological rehabilitation, mental and moral improvement, restoration of attention and neighborhood enhancement; neighborhood involvement in the park design process is encouraged to keep the park clean and safe.

<i>Social characteristics</i>	<i>Functions and Activities</i>	<i>Relaxation _Sitting benches for standing Gathering _Spaces for social interaction Events, education, Sports _open green space Play _Playground Community garden _urban agriculture Public art and literacy opportunities</i>
	<i>Users</i>	<i>Neighborhood residents Citizens of all ages, genders, etc. Welcoming and attractive design for a variety of users</i>
	<i>Benefits or objectives</i>	<i>Located in public or private space- targeted always to the public Enhance the concept of neighborhood Offer the possibility of isolation Psychological rehabilitation Restoration of attention (art) Improve physical fitness Social integration</i>

Table 2: Social characteristics of the pocket park. (table created by authors)

The last category of parameters concerns the environment. Size or shape is not as important a criterion for creating a successful park as the amount of green space available. Small urban parks, such as pocket parks, must be designed to provide the necessary conditions for environmental restoration, all these specific elements of the natural environment to be restored: greenery, grass, soil, flowering plants, shrubs, trees, water, and a size that allows all of these elements and potential users to coexist. [12] Solar access and shading are critical factors influencing the use of a public space, and the creation of spaces in-between contributes to the quality of the user experience. Utilizing solar access and providing natural or artificial shade are important elements of park design, that with appropriate management of lighting and ventilation affect visitor comfort. The orientation of the park is also important for greenery and visitor comfort.[13] Also, the park environment can be designed with environmentally friendly features, including the use of greenery, emphasis on high-efficiency lighting, or the use of solar energy.[14] These design choices contribute to the improvement of the microclimate and the quality of the environment, promoting the comfort and safety of visitors. Furthermore, the creation of a network of green spaces in the city contributes to the preservation of biodiversity and environmental sustainability, while their interconnection with each other and with other facilities and infrastructures improves the social and territorial cohesion of the city. Finally, the connection between public space and other areas of daily use allows the creation of alternative mobility, such as the creation of pedestrian and as links between parks, thus enhancing the social and economic vitality of the area.

<i>Environmental characteristics</i>	<i>Sustainable strategies</i>	<i>Solar access– Shading_ Maximizing natural shading areas Ventilation Acoustic absorption Optical isolation from the street Orientation Trees and Green</i>
	<i>Environmental Design</i>	<i>Lighting_ sufficient lighting at night Environmentally friendly materials_ Permeable surfaces High-efficiency lighting, use of solar energy</i>

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<i>Connecting Green</i>	<i>Creating the green infrastructure network. (ecological routes, habitat networks, riparian zones) Attracting insects and birds. Concentration of plant species</i>
<i>Location and Connection</i>	<i>Explore empty spaces in densely populated areas Provides pathways that lead somewhere Encourages pedestrian movement Connects to the transportation network Connects to near recreational, cultural and community facilities</i>

Table 3: Environmental characteristics of the pocket park. (table created by the authors)

3.1. TYPOLOGY

Pocket parks due to their specific characteristics are difficult to be standardized. Their physical parameters, size, shape of the plot, location vary as do the neighborhoods, their users and the surroundings in which they are created. What they have in common is that they offer to the inhabitants of the neighborhoods a refuge from the rhythms of the city and a 'mean of connection' with nature. They offer different possibilities and functions (passive recreation parks, playgrounds, community gardens, urban orchards, vegetable gardens, outdoor art spaces, gathering places). The following types of pocket parks can therefore be identified on the basis of the function-activity parameter. [based on 15,16]

The limited space that characterizes a pocket park means that a combination of these design elements must be used to make it attractive to many different users.

Open space is one of the most flexible design elements and can support both active and passive recreational activities. Depending on the demographics of a community, playgrounds can be an important feature of a pocket park. They provide opportunities for families to get outside and give children a place to focus their energy and exercise. Community gardens are now recognized as an international phenomenon, and urban gardening is widely seen as a way to improve the local food supply as well as a recreational activity. No precise definition of community gardens has been ascribed, as this would impose arbitrary limits on creative community responses and their local needs. [17] Urban squares or green courtyards can be integrated into a pocket park as a passive recreation area. As a stand-alone design concept, the urban plaza park was popular in large, highly developed urban areas and was promoted as a refuge from the hustle and bustle of the city. Primarily a rest area with tables and seating, an urban plaza may include some aspects of the natural landscape such as trees, flowering plants, vines, or water features.

<i>Functions</i>	<i>Benefits</i>	<i>Park elements</i>	<i>Users</i>
<i>Open green space Active and passive recreation</i>	<i>Physical exercise, Leisure time, Socialization, Creative play or Wildlife observation</i>	<i>Grass surface Walking paths, Planting, Shade canopies</i>	<i>Young children to seniors</i>
<i>Children playground</i>	<i>Creative , free game Physical exercise</i>	<i>Swings Complex playground equipment Adult fitness equipment</i>	<i>Parents and children</i>
<i>Community gardens</i>	<i>Fruit and vegetable production</i>	<i>Orchards-groves Vegetable gardens</i>	<i>Residents of all ages</i>

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	<i>Connection to the land through cultivation</i>		
<i>Urban squares or green courtyards</i>	<i>Recreation Socialization Gathering</i>	<i>Benches, tables seats Trees, flowering plants, vines, water tanks</i>	<i>Users of all ages, interested in outdoor public spaces but not in physical activity</i>

Table 4: A typology of pocket parks based on the social parameter of function. (table created by the authors)

3.2. Funding, Management and Maintenance

Ownership includes responsibility for funding and maintenance. It is not a design parameter, but influences the parameters of the above categories. Depending on the ownership status, sites can be categorized as private public spaces, community-owned, municipal-owned, and public-private partnerships. In private public spaces, a private investor owns and maintains the public space without burdening the municipality and limiting municipal control over the space. Typically, such a space has gates and limited hours of operation. In community spaces, residents organize themselves and apply for permits and initial funding to acquire land, fences, gates, benches, and plants, and take responsibility for operation and maintenance. In municipality spaces, the government owns the site and it is fully responsible for funding and maintenance. This allows for more hours of public access, but limits the local community's sense of ownership and level of participation in the care of the site. In the public-private partnership, the private sector (or a fundraising partner) does not own the space, but raises funds or donates money in cash, materials, or civic equipment in exchange for displaying their logos on the space. This reduces the financial burden on the government while highlighting the social responsibility of the private sector. [based on 18,19]

3.3. Case studies

The pocket park is not a new idea. It was a product of the reconstruction of Europe after World War II. They were created as a way for war-ravaged communities to rebuild public spaces despite shortages of labour and raw materials. Pocket parks could be built inexpensively and relatively quickly in any residential area.

Pocket park in Central Harlem, New York, United States (1965)

The first pocket park is located in Harlem, New York. It is an abandoned urban vacant lot between two buildings that used to belong to the church. On the initiative of the Religious Society of the Community Church of Christ in Harlem and the Park Association., the first pocket park was created in the elongated urban vacant lot with only one open side, shaped like a jacket pocket, on West 128th Street, in Harlem. Located between two existing buildings in the central core of the city, the park is a narrow, linear space. Its walls are covered with ivy, and the space is shaded by several species of native trees.[20]

The term pocket parks was first used in 1960 in New York City to describe green spaces similar to those described above, with a maximum area of one hectare. The idea of pocket parks was adopted by the government and the private sector in the United States as a tool to deal with the urban and social crisis that developed in the 1960s. The need for small open spaces and urban greening has since been addressed with pocket parks, which provide a unique opportunity for "green" breathing space in urban areas. New York City has an abundance of pocket parks, both old and new.

John F. Collins Park, Philadelphia, United States (1979)

One of the most famous is that of John F. Collins Park located in downtown Philadelphia. The park was constructed in 1979 and it is designed by landscape architect John Francis Collins, from whom

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the park takes its current name. The park occupies an area of 360 sq.m. The park's longest side is approximately 37 m. It is defined by ivy-covered walls and the whole is shaded by a variety of native trees. In the center of the park is a waterfall fountain constructed of vertical cast concrete pedestals with shallow steps that provide access to the fountain's thin layer of water. Two decorative iron gates recall the private ownership of the public space. The concrete pavers used throughout the park differ from the more traditional red brick pavers of the surrounding neighborhood. One of the park's most unique features is its furnishings, which include movable chairs and tables. In 2011, the park was renovated and reopened to the public as John F. Collins Park.

Floating Pocket Park, Paddington, United Kingdom (2017)

The Floating Pocket Park at Paddington Basin, on the Grand Union Canal is the first of its kind. It is a 730 sq.m. floating park in the heart of Merchant Square.

The floating park is built on two decked platforms connected to the ground at two points and there is also a separate small pontoon designed to encourage wildlife such as birds and ducks to settle.[21] These paved platforms are made of recycled materials and provide greenery to attract birds and insects, as well as recreation space for the users of the area. In particular, on the first platform there is artificial turf and large elongated beds with low plants (different types of plants, shrubs, herbs, aromatic plants, etc.) and small trees. The beds are elevated, forming a boundary with the canal surface, and removable deckchairs are placed onto the turf. The second area consists of hardscape floor, with four beds of herbaceous plants as central decorative elements. It consists of a modern pavilion bar, a canopy for visitors and it is formed a special area for public and private events with a capacity of 120 guests. In addition, free Wi-Fi in the floating park encourages remote working. Both areas are open to the public all year round. The most important element of the park is the greenery that has been developed to encourage wildlife and the park includes a separate float designed to attract ground-nesting birds.

The specific feature of this pocket park and the reason it has been chosen for the research is its very construction as a floating park. Although an open space and in a densely populated area, it is located away from vehicular traffic, which contributes to the acoustic comfort of the users, the element of water which dominates contributes significantly to the cooling of the park, and in combination with the vegetation contribute to the thermal and visual visitors' comfort created by the whole configuration of the space.

Navarinou Park, Athens, Greece (2009)

The self-managed Navarinou Park is a park in the center of Athens. There was a clinic in the area as early as 1907, which was closed, sold and demolished in 1972. For many years, the land was leased as a parking lot, until the end of 2008. Faced with the threat of the construction of an office building, the residents initiated an event in March 2009 and occupied the site, demanding the transformation of the land into a high green space. The residents took immediate action, breaking up the asphalt, bringing in trucks of dirt, planting trees and flowers, and transforming the parking lot into a park. The park, which has been continuously redesigned, formed into five functional zones: a main gathering area (around a plane tree), a peripheral area with ornamental plants and improvised seating, an activity zone with an amphitheater and a stage for events, a playground, and the park's orchard, which is planted with olive and citrus trees, as well as fruit and vegetables. Although the site was completely paved as parking lot, then the asphalt reduced only on the main driveway and the rest of the ground is made up of soil, gravel and in places mosaic. [22] At the end of 2018, it was decided to convert the entire park into a playground in order to front a series of problems related to both the degradation of the surrounding area and the lack of policing.

The Butterfly Garden, Pocket Garden in Kipseli, Greece (2020)

The Municipality of Athens is trying to achieve the regeneration and maintenance of spaces that have been abandoned for years, and the creation and use of more public spaces. In 2020, a regeneration

program begins with the creation of pocket parks on vacant lots in the Municipality of Athens. Through the "Adopt Your City" program, each potential plot will be assigned to a private company to cover the costs of rehabilitation and maintenance of the park during the initial period of adaptation, while the needs of the plants increase and the visits of the crews become more regular. The agreements vary from case to case, but generally the sponsors adopt the green space for one year. After that, the municipal green services take over. The first park was created in Kipseli. It is a flower garden with various representative species. The individual beds are bordered by a low evergreen fence and the planting of climbing and flowering shrubs transforms one side into a vertical green garden. In addition, the park has special signs next to each plant with useful information about its identity, as well as structures for the nests of useful insects. Thousands of plant species contribute to the creation of an ecosystem that benefits the neighborhood. Its uniqueness lies in this diversity of species and in the environmental benefits resulting from the rehabilitation of a plot of such a limited area.



Figure 1: Collins Park, Philadelphia, United States. Source: <https://foursquare.com/v/john-f-collins-park/20.03.2022>



Figure 2: Conversion of the parking lot into the Navarinou Park, Athens, Greece. Source: <https://www.inexarchia.gr/story/local/parko-nayarino-y-einai-i-psyhi-ton-exarheion,15.03.2022>

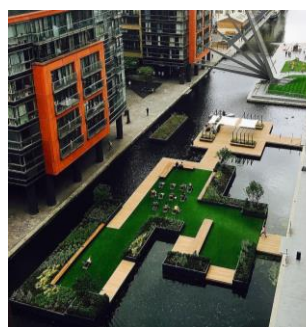


Figure 3: Floating Pocket Park, Paddington of London. Source: <https://secretldn.com/float-ing-pocket-park-paddington/,29.04.2022>



Figure 4: The Butterfly Garden in Kipseli, Greece. Source: <https://www.ecoscapes.gr/projects/51-pocket-garden-01.html,10.02.2022>

3.4. Detecting Parameter in Constructed Parks

Pocket parks, as already mentioned, do not have specific characteristics or a precisely defined size. They can have different shapes, areas, uses, users, and even materials and site compositions. A comparison of the study examples may reveal similarities between them.

		John F. Collins Park, Philadelphia, United States	Parko Navarinou, Athens, Greece	Floating Pocket Park, Paddington, United Kingdom	<i>The Butterfly Garden, Kipseli, Greece</i>
Spatial characteristics	Size	360 sqm	1.500 sqm	700 sqm	100 sqm
	Location	Central Philadelphia, United States	Exarchia, Athens Greece	Paddington, London, United Kingdom	Kipseli, Athens, Greece
	Year	1979	2009	2017	2020
	Entrances/ accessibility	Controlled access from 2 sides	Free access from 3 sides	Free access from 1 side	Free access from 1 side
	Openness	2 sides	3 sides	4 sides	1 side
	Type of city/ neighbourhood	Dense commercial city center	Dense mixed-use residential neighbourhood	Dense mixed-use residential neighbourhood	Pure residential neighborhood
	Surfaces and covering materials	Hardscape surfacing material, Walls of concrete, Natural soil	Dirt and gravel Limited hard surfacing material on the central	One float platform with hardscape material and flower beds ,one	Hardscape surface Flower beds

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			<i>paths and mosaic flooring</i>	<i>with artificial turf and low planting beds, a separate small pontoon only with greenery</i>	
	Urban equipment	<i>Fixed and movable chairs</i>	<i>Fixed improvised seating benches made of wood and stone</i>	<i>Removable deckchairs and beanbags Seating fixed benches on both floats</i>	<i>2 fixed benches</i>
	Focal point	<i>Fountain, trees, ivy- climbing plants on the walls</i>	<i>Gathering place around a plane tree Amphitheatre and stage, Children's playground Orchard with olive trees, citrus trees and fruit and vegetables Perimetric planting</i>	<i>Fixed shade canopy pavilion-bar Flower beds with low vegetation Float with appropriate planting to attract birds and bees</i>	<i>Flower beds with low evergreen fence, flowering shrubs Vertical green garden on one side-wall Special signs with plant information Structures for nests of insects</i>
Social characteristics	Functions and Activities	<i>Relaxation _Sitting benches for rest</i>	<i>Garden care, park maintenance, library, Gathering, events, screenings, classes, collective kitchen, games, sports</i>	<i>Place for relaxation, Events Free film screenings, Music performances Exercise classes Remote working</i>	<i>Place for relaxation and resting</i>
	Users	<i>Neighbourhood residents and area employees</i>	<i>Residents of the wider area</i>	<i>Neighbourhood residents Employees of area</i>	<i>Neighbourhood residents</i>
	Benefits or objectives	<i>Provide the possibility of "isolation" Socialisation- Social integration Place of rest for residents and workers</i>	<i>Improve the term neighbourhood Provide the possibility of "isolation" Social integration Psychological recovery Improve the physical condition of the users</i>	<i>Connection of roads-areas of the canal Isolation from traffic Acoustic comfort of users Protection of biodiversity</i>	<i>Improve the term neighbourhood; Increasing public green space</i>
	Type of urban space	<i>Urban square or green courtyard</i>	<i>Urban square or green courtyard Children playground</i>	<i>Urban square or green courtyard</i>	<i>Green courtyard</i>
Environmental	Sustainable strategies	<i>Solar access- Shading_maximizi</i>	<i>Environmentally friendly materials_</i>	<i>a series of pontoons</i>	<i>3 trees, 160 shrubs</i>

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<i>characteristics</i>		<i>using natural shading areas Visual isolation from the road Trees and Green</i>	<i>Reused materials permeable surfaces</i>	<i>constructed from recycled materials designed to attract ground-nesting birds Thermal, visual and acoustic comfort</i>	<i>and 270 perennials plants</i>
	Connecting Green	<i>Local tree species</i>	<i>Creation of green space</i>	<i>Planting is nectar-rich and changes with the seasons encouraging bees and other pollinators</i>	<i>Variety of greenery Insect attraction</i>
Funding, and Management	Designers	<i>John Francis Collins</i>	<i>Participatory design</i>	<i>Tony Woods</i>	<i>Municipality of Athens</i>
	Funding	<i>William Penn Foundation</i>	<i>Community of citizens / neighbourhood residents</i>	<i>Developer European Land and Property Limited</i>	<i>Municipality of Athens / Deloitte Foundation</i>
	Ownership	<i>Privately-owned public spaces</i>	<i>Community ownership</i>	<i>Public Private Partnership</i>	<i>Public Private Partnership</i>
	Opening hours	<i>limited hours of operation imposed by the owner maintainer</i>	<i>open 24/7, all year round</i>	<i>open 24/7, all year round</i>	<i>open 24/7, all year round</i>

Table 5: Comparison of case studies. (table created by authors)

Comparing the four examples, two from the Greek reality and two from foreign countries, one of the first created in their cities and the other the most recent, we can distinguish their basic characteristics and their adaptability to the features of the site and the character of each area.

Spatial characteristics of a park

Size - location: all four parks occupy a plot of land. In the case of the floating park, the plot was created by occupying the surface of the river rather than an existing one.

Openness - Entrances/Accessibility: The entrances to the parks are different. John F. Collins Park has visibility from both narrow sides in terms of buildings and plantings or additional elements, has two entrances that are controlled because of the private status of the land, a metal gate with adequate visibility into the park. Navarinou Park has three free sides as a plot and with free visibility from most of the sides due to tall trees and low shrubs. The other two parks have a specific passageway for entrance, the flower beds, although surrounding them, are low enough for full visibility to the park and from inside to the street.



John F. Collins Park,
Philadelphia, United
States

Navarinou Park, Athens,
Greece

Floating Pocket Park,
Paddington, Un.
Kingdom

The Butterfly Garden, Kipseli,
Greece

Figures 5,6,7,8: Area maps of the four parks. Source: google maps

City/neighborhood type: In the first example at John F. Collins Park, the park is in a commercial area, the butterfly garden is in a pure residential neighborhood, and the other two are in mixed-use neighborhoods.

Surfaces and Cover Materials: The materials used do not vary from park to park, hardscape material on pathways or throughout, sections of land with large trees or additional low planting beds as in the floating park.

Urban Equipment- Focal point: The main element of urban furnishing is the seating benches, even the smallest park, the one of the butterfly garden, has two benches. All four examples have a focal point, a central element, this is either a tree central flowerbed in the butterfly garden or the meeting point around the banana tree like in the Navarinou park and the bar with the canopy in the floating park.

Social characteristics: Every park serves the users of its area, either they are the employees of the Collins Park commercial centre area or the resident one of Kipseli. They provide a place to rest and relax, as in the case of Navarinou Park, or they offer more functions, such as a playground and events, as in Paddington Park.

Environmental characteristics: The common feature of all the parks is the greenery. The shade and coolness that the park features provide improve the microclimate. The main factor of this benefit is the choice of species and their placement. Then the collection of many plant species to maintain biodiversity and attract birds and insects, or the selection of plant species for each season as in the floating park. And also the effort for connection with the surrounding green areas, the creation of green routes at the neighborhood level to achieve a green network connection are the most important environmental impacts of the above parks. In terms of environmental features, it is essential to be mentioned the recycled (Paddington Park floats) or reusable materials (Navarinou Park) or even the solar park lights used by the Athens Municipality's 'Adopt your city' program.

4. CONCLUSION

In conclusion, through the study and the comparison of examples, we see that their size vary and it is not as important as the other design parameters. They adapt to each type of plot and each type of neighborhood and the better the adaptation and the inclusion of area users, the more successful is the park. They adapt and respond to the range of needs of urban areas whether they are dense commercial city centers or dense mixed-use or even pure residential neighborhoods. It explores the most appropriate design of activities that are relevant to the surrounding population and funding programs to realize the potential of each context even if it concerns as self-management. Their most recommended and common location is near frequent pedestrian traffic, for visibility and for attracting users. Perhaps for the Greek reality, and specifically the Athenian landscape, their common location is any vacant corner plot of land left over in the dense urban fabric. Of course every neighborhood needs a green corner and by this argument no location could fail. However, the other aspects change depending on the context; particularly the desired activities and the design, and the most appropriate funding and maintenance program.

The four study cases reflect the adaptability and transformational potential of the pocket park, with the most important being: 1-The provision of public spaces in dense and high-value environments such as downtown commercial areas (John F. Collins Park, Philadelphia) 2-The reconciliation of the capitalist interest in profit and the need for green space for recreation and socialization in culturally diverse communities (Floating Pocket Park, Paddington) 3-The attraction of biodiversity in

residential neighborhoods (Butterfly Garden, Floating Pocket Park, Paddington) and 4-The community engagement and participatory planning (Navarinou Park, Exarchia)

In this type of project, urban planning is an afterthought design, as the choice of areas to be regenerated does not depend on a plan or large-scale program. These are interventions that come to correct the original design. The pocket park is a product of urban 'interior design' for the benefit of society, a platform, a real social network where people can meet and communicate.[23] Pocket parks are easy to create, as mentioned, as they occupy little space, are low costs projects and satisfy the needs of the local population. They are chosen to be located near notable sites or landmarks, on busy roads or not, and of course in places where there may be easy access. Even the most tiny park benefits its area environmentally. Studying the area and involving social groups and volunteers in the action can further enhance the social benefits and the economic ones as their maintenance depends on them, an important link in order the park never decline and be deserted. But why is it important to study, aggregate features and compare pocket parks? According to William H. Whyte through research, observation of public spaces and questionnaires to users to identify the elements and features that make some public spaces more used than others, it was observed that planting, seating, permeability, flows, focal points, sun access and shade provision were more important than the size of the park or its shape. Although his research concerned New York City squares and small parks, the users' side visitability criteria highlight the importance of the rest of the spatial characteristics of an urban green space. Therefore, the identification of these parameters theoretically through documentation and practically applied through the observation of widely known parks, leads to the need for a standard that ensures these elements without limiting the design freedom required for a neighborhood park of limited size. This standard could be derived through the method of parameterizing pocket park characteristics, and since the biggest issue of this type of greenery is size and specifically the area availability - urban gaps - parameterizing spatial characteristics, independently of the size, it is necessary in order to assure the creation of successful pocket parks. Through parameterization a family of results is obtained rather than a single standardization result. Thus, computational morphological searches do not invalidate human imagination, but instead extend its possible limitations. Parametric logic, in this case, is concerned with the design of spatial elements based on the description of the relationships between them, particularly geometrical relationship. In this sense it allows the redefinition of the final result, by changing one or more components of the object. [24] It is not about defined shapes but about correlations and interconnections of points, lines, surfaces and forces. Therefore, the parameterization of these values will bring about a set of results that ensures the realization of successful spatially pocket parks, excluding from the limitations the size and, in this case, the limited area that it is available by the potential urban voids of densely populated cities.

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BIM applications in design quality following project delivery

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Extended abstract

Building information modeling in Architecture is known as a digital tool that ensures quality in the construction process as it facilitates accurate design, project coordination and cost control. BIM is used in all parts of a project life cycle, starting from the initial concept to building maintenance and facility management. This paper explores possible BIM applications in controlling or enhancing building quality during the building operation phase. Following the project delivery, a series of networked sensors monitor the building's performance and alert in case of maintenance needs. Would it be possible to use this monitoring infrastructure to gather information regarding building use and compare it with design intention, thus creating a type of feedback for the architect? How could this information be organized and become useful in moderating existing designs? Could this type of data be stored and be useful in future projects? What are the best data dissemination strategies? The aim of this study is to propose a conceptual framework for the use of BIM for monitoring user satisfaction following the project delivery stage. The study will cover three phases: First, an extensive literature review regarding design quality measuring strategies. Secondly, the study will explore applications of the BIM-based Digital twin in order to record building use and possible issues regarding user expectations via on-site testing, suggesting a possible link between the BIM collaborative design environment (CDE) and collaborative decision-making processes. Finally, this study will explore BIM applications in design visualization and design option simulations focusing on the degree by which these methods improve decision-making capabilities on issues regarding form and aesthetics. BIM applications in monitoring architectural design quality indicators and collaborative design decision-making processes will be explored through selected case studies.

Keywords: BIM ; architectural design quality; design quality indicators; collaborative design; open data

The value of architecture

It is asserted that architectural design interventions enhance the retail value of property, promote local economies, and contribute to sustainable development. However, most architects have limited feedback on the outcome of their design. There is a lack of robust evidence on the value of good design and an evident need for definitions, frameworks and demonstration methods. Design awards are generally accepted as an assessing method in architecture. However, award systems are based on peer review decisions, often with a lack of transparency, and rarely provide an opportunity to engage users. Such award schemes are concerned with the architectural quality of the building, so they aim at rewarding "prestige" and "headline" designs, without paying as much attention to function and built quality.

In an attempt to raise public awareness on the value of Architecture and the importance of good design, the Architect's Council of Europe published a study on 2020 [1], aiming at addressing a communication challenge and the need to explain the worth of architects' work in terms that make sense to decision makers, such as financing institutions and the general public. The report demonstrates evidence and facts that would supplement the compelling visuals and storytelling that architects are good at already and assist professionals in proving the value of their work. The profession has been weakened by a common misconception that architectural work is driven mainly by aesthetics. This report aimed at finding suitable tools to document and evaluate the different types of value created by good design. Post Occupancy Evaluation was highlighted as a key tool for

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architects and clients to support the quality of projects and identify good practices, as well as economic, environmental, social, and cultural value. POE serves as a valuable resource for architects looking to enhance their understanding of how design decisions translate into real-world performance and user satisfaction. The ability to demonstrate value with data is crucial for winning projects. The importance of measuring design value has increased with outcomes-based procurement that focuses on the value that a building delivers rather than just its form.

Architectural Design Quality and Post Occupancy Evaluation Indicators

The need for systematic methods to evaluate and assess the quality of architectural and urban design led to the concept of Design Quality Indicators. DQIs gained prominence in the latter half of the 20th century as architects, planners, and researchers sought to develop frameworks for evaluating design quality. It could be asserted that a culture of performance measurement was initiated following the publication of *Rethinking Construction* [2] in the UK. Assessing architectural design quality often requires collaboration between architects, engineers, environmental scientists, sociologists, psychologists, and other stakeholders. One key aspect of the DQI should focus on the design intent for the building [3]. In Gann et al (2003), the proposed DQI tool assesses design quality against this intent, reflecting individual respondents' personal and/or professional views. A DQI typically consists of a conceptual framework, a data-gathering tool, and a weighting mechanism, which work together to provide a comprehensive assessment of design quality. The weighing mechanism is essential, as each stakeholder has different priorities regarding the building value. It is essential that DQIs capture diverse perspectives and considerations and account for the cultural, social, historical, and contextual factors that influence architectural design.

The DQI serves as a mediator between customers, end-users, designers, and producers. The process structures questions about the design and provides easily accessible information to design teams. There are subjective and objective DQIs: Subjective design quality indicators are aspects of design quality that are based on personal opinions, experiences, and preferences rather than objective, quantifiable measures. These indicators reflect the views of individuals and groups involved in the design process or using the building. Some examples include user satisfaction and experience, emotional response, perceived value, cultural relevance and contextual fit. Objective design quality indicators are measurable and quantifiable aspects of design quality that can be assessed using specific criteria or standards. These indicators are based on tangible attributes of the design that can be observed, analysed, and compared systematically, such as functional performance, technical performance (structural integrity and compliance with building codes), energy efficiency, material quality and cost-effectiveness.

Advancements in data analytics and computational design have facilitated the development of data-driven DQIs that leverage quantitative data from various sources such as building performance simulations, sensor networks, and user feedback to inform design evaluations. DQIs related to issues such as usability, accessibility, comfort, and user satisfaction are reflecting a shift towards more user-centric design approaches. Finally, due to the increasing concerns over climate change and environmental degradation, DQIs related to sustainability and resilience have gained prominence. This includes indicators for energy efficiency, renewable energy integration and carbon footprint reduction. Following project delivery, DQIs increasingly incorporate life cycle assessment (LCA) methodologies to evaluate the environmental impact of buildings throughout their entire life cycle, including materials sourcing, construction, operation, and demolition. Some of the most commonly used platforms and certificates are LEED and BREEAM. The WELL Building Standard focuses on improving the health and well-being of building occupants, while Passive House (Passivhaus) is a performance-based standard for energy-efficient building design. It must be stressed however that the value of a building design is a multi-factor concept and a fixation with indicator measurements may result in boring and unattractive buildings.

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Post Occupancy Evaluation (POE) in architecture involves assessing the performance of buildings after they have been occupied to understand how well they meet the intended design goals and user needs. The assessment of design quality based on the model by Vitruvius; *functionality* (utilitas), the arrangement, quality and interrelationship of spaces, *build quality* (firmitas), the engineering performance of the building, which includes structural stability and the integration, safety and robustness of the building's systems and fittings, and *impact* (venustas), the building's ability to create a sense of place and have a positive effect on the local community and environment [3]. However, understanding the value of buildings is a big challenge, as different types of building users have different priorities and perceptions of good design. Facilities managers, clients, occupants, owners, visitors, maintenance staff, have varying perspectives on the same facility. The less tangible the aspect to be measured, the harder it is to describe numerically. More often than not, users cannot express their preferences due to lack of technical knowledge and vocabulary [3]. However, the more demanding customers are in their requirements, the better the design outcome [4].

POE involves collecting data, feedback, and insights from building occupants, stakeholders, and other relevant parties [5]. There are three levels of POEs, depending on accuracy, time needed to be performed, tools and levels of invasiveness of user privacy. These are *indicative POEs* which are non-invasive analyses with interviews and photographic surveys, *investigative POEs* which include questionnaires, video recordings and measurements and *diagnostic POEs* which utilise sensor networks in order to monitor and optimise building performance [6]. Apart from evaluating building performance, POE provides valuable insights and feedback that can inform future design decisions [7]. By understanding how occupants use and interact with the building, architects and designers can make informed decisions to optimize building design, operation, and management practices in future projects. Thus, POE promotes a culture of continuous improvement in architectural design and practice. There are several organizations, platforms, and tools that facilitate POE processes and provide resources for evaluating building performance and occupant satisfaction, such as the Building Research Establishment (BRE), US Green Building Council (the organization behind LEED) as well as other toolkits, online platforms and tools. The RIBA Report "Building Knowledge: Pathways to Post Occupancy Evaluation" is a resource that offers guidance on conducting Post Occupancy Evaluation (POE) in the context of architecture and design [8]. This report, developed by the Royal Institute of British Architects (RIBA), provides pathways and frameworks for architects and practitioners to effectively evaluate the success of their design projects. Thus, by emphasizing the importance of evaluating buildings in actual use, a more evidence-based approach to design is promoted, focusing on the long-term impact and value of architectural interventions.

BIM

BIM applications play a significant role in enhancing architectural design quality both during the design phase, as well as following the project delivery. BIM is a digital representation of physical and functional characteristics of buildings. These digital representations are often used to support decision-making throughout the building lifecycle, from initial planning and design to construction, operation, and maintenance. Thus, BIM supports the collaborative design, construction, and management of building and infrastructure projects.

During the design phase, BIM is used as a strong design visualization tool. Highly detailed 3D models of buildings, enable stakeholders to visualize the design in a realistic manner before construction begins. This helps in identifying design flaws and making necessary modifications to improve overall quality. Architects assess design quality by visualizing aspects such as spatial layout, circulation patterns, daylighting, and views within the building model. Additionally, clash detection tools help identify conflicts between various building systems (mechanical, electrical, plumbing), thus ensuring coordination and avoiding modifications during construction. The accuracy of the study results in significant cost reductions. BIM software also includes features for cost estimation and quantity

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takeoff resulting in accurate material quantities and better cost control. Finally, BIM applications assist architects in ensuring regulatory compliance by integrating building codes and regulations into the building models. By generating accurate documentation drawings and reports for building permits, architects can verify compliance early in the design process, minimizing the risk of costly revisions and delays at later stages of the project.

Simulations and analyses within the BIM environment help architects identify opportunities for improving design quality and meeting performance goals. By analyzing factors such as building orientation, materials, and HVAC systems, architects can optimize the design to enhance energy efficiency, thermal comfort, and daylight penetration. Simulations may also be used in various scenarios and analyses in order to evaluate the impact of design changes, operational strategies, and retrofit interventions on building performance and occupant satisfaction. By simulating different scenarios, such as adjusting HVAC systems, implementing different lighting strategies, or redesigning workspace layouts, stakeholders can assess the potential benefits and trade-offs of different strategies before implementing them in the physical environment. This was evident in the BIM Speed competition (2022), where building professionals and students were invited to demonstrate a housing renovation project, using the purpose-built BIM-SPEED platform for collaboration, in a way that allows energy saving for the occupants, improves their comfort while reducing the time and the cost of the overall process. The competition was organised by the BIM-SPEED project, funded by Horizon2020 [9].

Collaboration tools within BIM software enable real-time communication and coordination among architects, engineers, contractors, and clients, improving overall project quality through enhanced teamwork and information exchange. The Common Data Environment (CDE) is a centralized platform for sharing and accessing project information. It is a repository where all project information, data and documentation are stored in an accurate and updated manner. Information is shared, managed, and accessed by all project stakeholders throughout the lifecycle of a construction project. The CDE provides collaboration tools for commenting, markup, issue tracking, and workflow management. DQI tools integrated into BIM platforms enable real-time collaboration and feedback, allowing architects to gather input from clients, consultants, and other project stakeholders to evaluate and enhance design quality. Collaborative design review sessions may be organized, where stakeholders can assess design quality collectively. Thus, stakeholders can resolve issues promptly, and ensure that design quality indicators are effectively integrated into the project workflow [10].

BIM applications support iterative design processes where architects can explore multiple design alternatives and evaluate their impact on design quality. DQI tools help architects compare different design options based on predefined quality criteria, enabling them to optimize design solutions to achieve desired outcomes. By analyzing data such as building performance metrics, material quantities, and cost estimates, architects can make informed decisions to improve design quality and project outcomes.

Digital Twin applications in Post Occupancy Evaluation

The integration of POEs in BIM provides a single source of storage of POE and building data. However BIM models present limitations during the integration with different data sources and systems, mainly the lack of automatic updating. Therefore, the concept of the Digital Twin emerged. In the context of buildings, a digital twin is a virtual representation of building or physical infrastructure asset. It includes not only the geometric aspects of the building but also real-time data from sensors, IoT devices, and other sources placed in the physical building. Thus, a dynamic and accurate digital replica of the physical asset is created. The digital twin continuously synchronizes with its physical counterpart, allowing for real-time monitoring, analysis, and simulation of building performance and behaviour.

A digital twin is composed of a series of elements. These are [6]:

1. a physical asset, its virtual counterpart and data connecting them
2. a visualisation platform
3. an acquisition layer, such as an IoT system (i.e. a system of monitoring sensors)
4. a BIM model, which consists of the relevant geometry
5. AI tools for data analysis
6. synchronization between the physical and the virtual component

A digital twin can continuously collect and analyze data on energy consumption, indoor environmental quality parameters such as temperature, humidity, air quality, and lighting, occupancy patterns, equipment operation, and maintenance activities. By comparing this real-time data with design specifications and performance targets, stakeholders can assess how well the building is performing in practice and identify possible areas for improvement. For instance, occupancy values are standardized during the design stage, as they are based on building regulations (i.e. fire regulations or energy models). Actual occupancy and space use may vary significantly in reality [6]. All building systems and components, such as HVAC, lighting, thermal insulation, and building envelope are thus evaluated. The real-time data regarding building use and performance can be compared with the design intention, i.e. the architectural and engineering specifications, performance targets and user requirements established during the design phase. By analyzing the data in relation to the design intent, stakeholders can identify discrepancies, deviations, or areas where the building is not performing as intended.

Occupant feedback and satisfaction could also be captured by building monitoring sensors. For instance, by tracking occupancy patterns over time, building operators can gain insights into space utilization, occupancy densities, and peak usage hours. Additionally, occupancy sensors can be equipped with additional features such as motion detection or infrared sensors to capture occupant movements and interactions within spaces [6]. User feedback systems, such as interactive touchscreens, mobile applications, or web-based platforms, allow occupants to provide real-time feedback on their satisfaction levels. This feedback can be collected through surveys, rating scales, or open-ended comments and can be integrated with building monitoring systems to provide a comprehensive view of occupant satisfaction and preferences. Wearable devices, such as smartwatches or fitness trackers equipped with environmental sensors, can collect data on occupant physiology (such as heart rate, skin temperature, and activity levels) in real-time [11]. By correlating physiological data with environmental conditions, building operators can assess the impact of indoor environmental quality on occupant health and well-being.

This feedback can provide valuable information and insights into how well the building is meeting the needs and expectations of its users, allowing architects to identify areas for improvement and optimization. By continuously monitoring building performance and comparing it with the design intention, architects and designers can iteratively improve their design practices and inform future projects. This feedback loop enables a more data-driven approach to design decision-making, leading to better-designed buildings that more effectively meet the needs of their users and perform optimally over time. Additionally, digital twins can leverage historical performance data and machine learning algorithms to predict future building performance and anticipate potential issues. By analyzing patterns and trends in data, stakeholders can forecast energy usage, equipment failures, occupant comfort levels, and other key indicators, allowing proactive measures to be taken to optimize building operations and maintenance.

POE using Digital Twins

It is possible to create an occupancy-oriented digital twin for facility management by providing real-time data on occupancy patterns and space utilization within buildings. Sensors play a crucial role in

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the occupancy monitoring process. These could be IoT, camera-based sensors and PIR sensors. They are used to monitor occupancy levels, detect entries and exits from different rooms, and optimize maintenance activities based on occupancy data. By collecting data on occupancy, sensors enable the digital twin to accurately represent the physical building and its usage patterns, allowing for better space management, organization, and maintenance. The calibration and efficient operation of sensor systems are essential to ensure the accuracy and efficiency of the digital twin in reflecting the real-world occupancy dynamics.

The case study presented in Seghezzi, E. et al (2021) focuses on an existing office building at Politecnico di Milano, Italy, which houses the Department of Architecture, Built Environment, and Construction Engineering (DABC). The building is used by university staff for research and administrative activities, and the maintenance and cleanliness of the spaces are crucial aspects of facility management. The IoT sensor network installed in the building consists of camera-based sensors with embedded deep learning algorithms. The sensors are integrated with an online platform, which allows for data visualization, storage, and download.

The findings of the case study highlight the importance of preliminary analyses, supported by Building Information Modeling (BIM), to optimize the planning and installation of the IoT sensor system. The BIM model and the series of simulations that were possible to be made helped identify critical areas for monitoring, determine the number and placement of sensors, and reduce implementation costs. The study emphasizes the significance of data quality, system efficiency, and accurate monitoring of occupancy for effective facility management.

Dissemination Practices

Research and innovation should be encouraged in architectural practices. By developing research strategies, collaborating with universities, and disseminating findings, architects can enhance their services, build relationships with clients, and stay competitive in the industry. Collaboration between universities, practice, and industry is essential to demonstrate the value of design, and there is a need to develop the research and POE skills of practitioners and students. Current practice in building design usually results in feedback from users not being communicated in a form that can lead to design improvements. Information arrives either too late or not in a usable format [3].

The dissemination of Post Occupancy Evaluation (POE) results can vary depending on the objectives of the evaluation, the stakeholders involved, and the context of the project. One of the most common ways to disseminate POE results is through a comprehensive report or documentation that summarizes the evaluation process, methodology, findings, and recommendations. This report may include qualitative and quantitative data, analysis of key performance indicators, and insights into occupant satisfaction, building performance, and design effectiveness. These findings could be presented in workshops, and seminars conducted for project stakeholders, including architects, designers, building owners, facility managers, and occupants. These presentations provide an opportunity to share findings, discuss implications, and engage stakeholders in a dialogue about potential improvements and next steps.

Findings may also be disseminated through academic publications, journals, and conference proceedings, particularly for research-focused evaluations, as well as online platforms, websites, and digital repositories dedicated to building performance evaluation and research. However, most architects do not often read academic journals, so it is important to disseminate findings in an appropriate and usable format [2]. Professional organizations and associations in the fields of architecture, engineering, and construction may communicate POE results through newsletters and other media. The disseminated material can be integrated into educational and training programs for architects, designers, and building professionals.

Conclusion

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Architectural quality assessment is really about defining the goals of a project and documenting its success in achieving them. The DQI documents the variety of physical, aspirational and emotional needs of a building's occupants and serves as a valuable tool for initiating discussions about design priorities, possibilities, and consequences. While it does not provide an absolute measure of design quality (there are subjective and objective indicators of quality), it helps articulate the subjective qualities perceived by different stakeholders involved in the design process and building use. Although a fixation with indicator measurements may result in boring and unattractive buildings, the attempt to document design value helps practitioners learn more about it. Value is thus created from feedback. Economic, environmental, functional, health, social and cultural value is documented and thus communicated.

By incorporating asset management data into a BIM model, architects can create a digital twin of the building that provides valuable information for ongoing operations, maintenance, and renovations, ensuring long-term quality and efficiency. It is evident that advanced digital technologies such as BIM and digital twins in buildings play a crucial role in achieving high design quality and sustainability standards in contemporary architectural projects. However the quality of the data involved is important, as it could lead to inaccurate results. POE is a time consuming and costly process, that should be supported by national policy, by establishing guidelines, setting objectives, facilitating collaborative processes and promoting a culture that values design excellence. POE data is valuable for all stakeholders in the construction industry, so incorporating POE findings into curriculum and training materials that are disseminated helps educate future practitioners about the importance of evaluating building performance and occupant satisfaction.

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In Quest of Sustainable Tourism Strategies in Cultural Heritage Environments: two cases in Rhodes

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Abstract

The study focuses on the investigation of aspects of sustainable tourism in cultural heritage environments. Culture heritage sites not only are historical environments but have specific importance in terms of characteristics and cultural value. Issues of sustainability in historical places are examined in two different sites, the medieval castle of Rhodes and the park of Rodini, which is considered one of the first designed parks in history. The two cases are linked by a central axis which is one of the main entrances to the castle, a path with special importance especially during the tourist season. Parameters of sustainability which will be examined at a later stage of the project are now identified and a relation between the two cases is attempted.

Keywords: *sustainable tourism, sustainable development, heritage sites, Rhodes*

1. Introduction

In a world increasingly threatened by the climate and environmental crisis the word "sustainability" and "sustainable management" of places and environments, buildings and monuments of exceptional importance, is of particular concern to tourism and the alternative activities that are currently being developed to transform and enrich the travel experience. Rhodes is an island with a long history of remarkable tourism development, with a rich historical and cultural heritage and unsurpassed natural beauty. The methodology of the research consists of literature review on issues of sustainable tourism in historic environments and the investigation of specific parameters in two case study areas in the island of Rhodes. This study explores two cases of sustainable tourism that focus on the visitor-tourist's perception and interaction with the man-made cultural and natural resources of the city of Rhodes.

The first case explores the implementation of sustainable tourism practices in UNESCO World Heritage Sites, with reference to the Medieval City of Rhodes. As one of the most important historical and cultural landmarks, the Medieval City faces the challenge of balancing the economic benefits derived from tourism with the imperative of preserving its unique heritage. The research delves into key aspects of sustainable tourism management, including conservation and preservation efforts, community involvement, cultural awareness and education, infrastructure development, crisis management and collaborative partnerships. Through a comprehensive analysis of strategies implemented in Rhodes, this study aims to contribute knowledge and lessons to the broader discourse on sustainable tourism at UNESCO World Heritage Sites.

The second case concerns the reconstruction of an ecological park in the city of Rhodes with the aim of creating a sustainable and ecologically sensitive natural environment in the field of educational tourism. The ecological park will function as a place for alternative voluntary biophilic activities and will combine recreation and education, allowing visitors of all ages, but especially children, to discover the fauna and flora of the island and gain important knowledge and experience about sustainable development. The study proposes to manage and redesign the park so that it can serve as

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a platform for environmental education and awareness-raising for the protection and conservation of the natural environment, thus enhancing the ecological awareness of the younger generations through activities related to water, waste, endemic plants and animals and indigenous local seeds.

2. The City Tourist of the 21st Century Identity, Cultural and Sustainability

Historic European cities, such as city of Rhodes, constitute a complex, open and extremely interesting field for the development of alternative experimental models of experiential urban tourism. The present paper focuses on the possibility to search for the particular idiosyncrasy of the city and the charm of its discovery by means of specialized, custom-tailored offerings in tourist targeting. The possibility to develop and offer choices beyond mass facsimiles, in the form of a customized navigation through the urban landscape and historic time.

In an age of flux, mobility, and perpetual acceleration, but also of widespread standardization in consumer products and services, as is notably the case in the sector of mass tourism, there is ample room for identifying and employing a multitude of different types of approaches to the characteristic idiosyncrasy of a city on the part of its casual visitor.

Urban sites offer today's traveller an equally fascinating field for exploration, new experiences and knowledge. Even during the brief time of their visit, today's visitors of modern historic cities of the 21st century, in this particular case of Rhodes, inadvertently come across the complex nature of the city. The limited time they have at their disposal is an insurmountable obstacle in effectively "reading" the palimpsest of the living city. Thus, their perception of the city is largely based on *viewing*, more specifically, on hastily and haphazardly viewing the city, instead of *living* it, on mass-consuming a plethora of images instead of coming into contact with the substance and the spirit of the place. In this way, modern-day visitors tend to obtain a fleeting, voyeuristic spatial impression of the city, due to the inevitable inability to manage and interconnect the abundance of visual fragments and information they collect [1].

Modern-day mass tourism is characterized, in the overwhelming majority of cases, by programs that are pre-scheduled to even the smallest of detail. The predetermined duration of travel, coupled with information obtained in advance from travel ads, brochures and websites, make for a rigid schedule largely based on being ensnared by the alluring appeal of images rather than on making informed choices or venturing into random exploration. Visitors experience a place through its visual representation and position themselves in this image. Thus, any special feature of a place is neutralized and defused as standardized exoticism and the visitor is converted into a collector of images and impressions [2].

"The uniqueness of any city lies in the specific arrangement, form and function of its spaces and the intersection between these spaces and individual and collective experience. In other words, it is in the idiosyncratic coincidences of time, space and culture that individual urban identities are forged and the rhythms of city life created" [3]. The territorial reality of the city is not exclusively defined by the constructs and form of its built environment. The city is not like its map; quite the contrary – the city is characterized by a stratification of architectural material, collective memory and history.

Authenticity and Identity as multi-faceted concepts have long held a central position in tourism studies. Since the 1970s, it has been argued that escaping from the pressures of society in order to search for more "authentic" experiences is a primary driver in tourist motivation. Modern theories on seeking escapism, authenticity and identity point to each of these concepts as critical in understanding dimensions of tourism and leisure experiences.

3. Case study analysis: a) Implementation of sustainable tourism practices in the Medieval City of Rhodes

The present Medieval city of Rhodes contains elements from the Byzantine, Ottoman and Chivalric periods and this makes it a city of great interest for the preservation of its monuments through time. In 1988 the Medieval City of Rhodes was included in the list of UNESCO World Heritage Sites, a title it retains to this day [4]. The aim of the 20-year Programmatic Agreement (1985-2005) was to undertake action for the preservation, protection and promotion of the monuments of the Medieval City and to take rescue measures in dilapidated monuments, buildings and archaeological sites. Unfortunately, the lack of long-term planning in line with sustainability standards has contributed to the abandonment of residential use and the transformation of the area into a one-dimensional tourist zone, with many problems. The present local inhabitants are much fewer in number due to the tourist growth that the island suffered in the 70's, who systematically converted their residences either into leisure centers, guesthouses or shops of all kinds.

The Medieval City is a living historic city where urban planning and preservation should be addressed considering the pressure of tourism on the inhabitants and the preservation of the city's multi-layered character. The aim is a sustainable and modern city that uses its cultural heritage as a driving force (Figure 1). A list of parameters that appear to be mostly significant are briefly analyzed in order to have a better understanding on the critical aspects that need to be addressed on a historical settlement sustainable analysis. The implementation of sustainable tourism practices in UNESCO World Heritage Sites, such as the Medieval City of Rhodes, involves a multi-faceted approach involving various aspects of conservation, community engagement, visitor management and economic development.

Conservation and preservation:

Strict regulations and guidelines are enforced to preserve the architectural integrity and historical significance of the Medieval Town. Restoration and conservation efforts are undertaken to ensure the long-term preservation of historic buildings, monuments and infrastructure.

Sustainable building practices are encouraged to minimize the environmental impact of construction and renovation projects [5].

Community Involvement:

Local communities are actively involved in decision-making processes related to tourism management through participatory approaches. Economic opportunities are created for residents through the promotion of local businesses, cultural events and handicrafts. Programs are implemented to raise awareness among local people about the importance of preserving their cultural heritage and the benefits of sustainable tourism [6].

Visitors' management:

Sustainable visitor management strategies are implemented to avoid overcrowding and minimize the impact of tourism on the area. Visitor education initiatives are implemented to promote responsible tourism behaviors, such as respect for historical structures and cultural patterns. Tourism flows are monitored and regulated to ensure a positive experience while maintaining the authenticity of the site.

Cultural awareness and education:

Educational programs and guided tours are offered to visitors to enhance their understanding of the historical and cultural significance of the Medieval City. Interpretive signage and multimedia resources are used to provide context and information about the heritage of the site. Cultural events and festivals are organized to celebrate and highlight the rich cultural heritage of the Medieval City.

Infrastructure development:

Sustainable infrastructure projects are undertaken to improve accessibility, transport and amenities for visitors while minimizing environmental impacts. Pedestrian-friendly zones and alternative transport options are promoted to reduce congestion and pollution within the site. Green building practices are incorporated into new construction projects to minimize energy consumption and carbon

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emissions. Environmentally friendly materials are used and energy is conserved through the use of passive systems for heating, cooling and lighting [7].

Crisis management and risk mitigation:

Comprehensive crisis management plans are developed to address potential threats such as natural disasters, vandalism or political instability. Regular risk assessments are carried out to identify and mitigate potential risks to the cultural and natural heritage of the area.

Cooperative partnerships:

Collaboration with local and international organizations, government agencies and stakeholders is promoted to implement sustainable tourism initiatives. Sharing knowledge and best practices with other UNESCO World Heritage Sites contributes to continuous improvement and innovation in sustainable tourism management. Through the implementation of these sustainable tourism practices, the Medieval City of Rhodes aims to balance the economic benefits of tourism with the preservation of its cultural heritage, ensuring the long-term sustainability and resilience of the place in the face of evolving global challenges [8].



Figure 15: Sustainable tourism aspects forming a multi-faceted approach (source: authors)

The actions for the restoration of the monumental ensemble were also enriched in 1985 by the Medieval Town Office with the aim of constructing new networks, restoring road surfaces, maintaining-restoring medieval fortifications, shaping archaeological sites and maintaining-restoring public and private properties. The whole project aimed at transforming the old town into an intellectual Centre of national and global renown. A major objective remains the upgrading of the old town as a place of residence, which is proving to be a key issue in regeneration projects and is difficult to address successfully. In 2012, a new urban planning plan for the Medieval Town of Rhodes was approved with the aim of improving living conditions and protecting its monumental character. Over a period of 20 years, the urban character of the Medieval Town will be improved by dividing it into areas with different uses. The new plan reinforces all sectors and neighborhoods on equal terms by

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allocating green spaces, playgrounds, sports facilities and a community Centre in each of them. It also maintains the limited traffic that prevails in the Medieval City with minor changes to avoid noise and exhaust within the walls. In 2011, regulations were implemented to promote the principles of sustainable mobility. It is necessary to improve the quality of life with the appropriate infrastructure and configurations so that permanent residents stay and new ones come [9].

Restoration actions have a social and economic character in addition to the preservation of the monuments. That is, they aim to restore the neighborhoods of the Medieval Town, increase its population and develop tourism. To achieve this, they do not comply with or infringe the institutional framework for the conservation of monuments. To date, monuments are not included in the urban planning regulations and are not treated as part of the fabric of the Medieval City. For this reason, the development of the historic center must be based firstly on the redevelopment and promotion of its monumental wealth, then on their integration with other uses and finally on a soft approach to tourism. It is essential that restoration efforts create a site of cultural interest as a place to be visited, but also to be in line with modern scientific concepts and theoretical approaches to monument conservation. Sustainable residential development seeks to ensure quality of life, safeguard ecological resources and preserve and enhance architectural capital for present and future generations [10].

The Medieval City has very good accessibility by public transport, as the main bus station is a few minutes' walk away. Also, due to its central location, it is directly connected to the port and the new town. Efforts are currently being made to make this connection with electric vehicles as the construction of cycle paths and pedestrian walkways are in the immediate plans but are progressing slowly. Regarding car use, since the 1970s measures have been taken to restrict car access to the historic center of Rhodes, although parking is allowed by residents. There are controlled entrances for vehicles and the use of electric cars is encouraged. In Rhodes during the summer, the demand for parking is high due to tourism. Only 2,000 parking spaces are offered when demand peaks in summer at 4,000 spaces. This has led to the arbitrary use of every available free parking space. The municipality tries to enforce regulations and impose fines, but illegal parking remains one of the main problems in the area. In winter, the situation is very different, as the demand for parking is significantly lower. It is therefore necessary to think of alternative solutions such as design parking areas further away and serve citizens and tourists with electric vehicles. The medieval city of Rhodes can thus remain connected to the modern city, while keeping its identity intact, mainly for its inhabitants, but also for the tourist community.

With a quick glance at the spaces of the Medieval Town we can list many abandoned green spaces. These spaces can be redesigned and reused by citizens and tourists alike, adding a special character by creating sports areas, playgrounds, and green zones.

As far as education is concerned, the Municipality of Rhodes has expanded its cooperation with the University of the Aegean in the field of tourism, with the common goal of enriching and upgrading tourism education. The University of the Aegean with its academic staff, has the ability to contribute to the local community and its economy, approaching scientifically the issues that concern it. The priority as set by the Municipality of Rhodes and the Directorate of Tourism, is that education is a need for the stakeholders, creating training and certification programs for tourism professions and professionals in many different sectors of tourism. Through the educational process, the adoption of a "socially responsible" attitude towards the development and management of sustainable tourism is achieved through attitudes, projects and practices.

Finally, regarding to tourism businesses, it emphasizes the adoption of standards, environmental management practices and environmental education programs for their staff, as well as the promotion of local products in businesses, while for tourists it proposes seminars on local traditions and the environment.



Figure 16. The Medieval castle of Rhodes from above and an interior street view

b) Ecological park in Rhodes. Educational activities for children regarding sustainable development.

Ecological parks serve as vital hubs for environmental education and sustainable development initiatives, offering immersive experiences for visitors to engage with nature. In Rhodes, Greece, the establishment of an ecological park presents an opportunity to foster environmental stewardship among children through tailored educational activities focusing on water conservation, waste management, and plant and seed management [11]. The significance of ecological parks is analyzed in promoting sustainable development and explores Greek and international case studies to derive best practices for educational programming [12]. Ecological parks play a pivotal role in biodiversity conservation, ecosystem restoration, and environmental education. They serve as living laboratories where visitors can learn about the interconnectedness of ecological systems and human activities. By providing immersive experiences in natural settings, ecological parks foster a sense of appreciation and responsibility towards the environment.

Each of these activities is designed to be interactive, engaging, and age-appropriate, catering to children of varying ages and learning styles. By combining hands-on experiences with informative discussions and guided exploration, these activities aim to instill a sense of environmental stewardship and empower children to take positive actions towards sustainability in their daily lives and communities.

In terms of **sustainability practices – parameters** taken into account these parks are focusing on the following issues:

a. **Water Conservation:** Interactive workshops and demonstrations can educate children about the importance of water conservation, highlighting the finite nature of freshwater resources and the significance of responsible water usage. Activities may include water audits, rainwater harvesting simulations, and discussions on water-saving techniques [13]. More specifically, in a Water Audit Workshop children can participate in a hands-on workshop where they learn to conduct water audits to identify sources of water wastage and opportunities for conservation in their homes and communities [14]. In a Rainwater Harvesting Demonstration they can observe a demonstration of rainwater harvesting systems installed within the park, learning about the importance of capturing and utilizing rainwater for irrigation and other non-potable uses [15]. Also in a Water-saving Techniques Discussion, through interactive discussions and role-playing exercises, kids can explore practical water-saving techniques such as turning off taps while brushing teeth, fixing leaky faucets, and using water-efficient appliances [16].

b. **Waste Management:** Hands-on activities such as waste sorting games, composting demonstrations, and upcycling workshops can raise awareness about the importance of waste reduction and recycling. Children can learn about the environmental impacts of improper waste disposal and explore

innovative solutions for waste management [17]. Explicitly, a Waste Sorting Game will push children to engage in a fun and educational game where they learn to sort different types of waste into recycling, compost, and landfill categories, emphasizing the importance of proper waste segregation [18]. In a Composting Workshop every child can participate in a hands-on composting workshop where they all can learn how to compost organic waste materials such as food scraps and yard trimmings to create nutrient-rich soil for gardening. As well, in an Upcycling Craft Session kids will unleash their creativity by repurposing discarded materials into new and useful items through upcycling craft sessions, promoting the concept of waste reduction and resource conservation.

c. **Plant and Seed Management:** Gardening activities provide opportunities for children to learn about plant life cycles, biodiversity conservation, and sustainable agriculture practices. Through planting sessions, seed saving workshops, and guided tours of botanical gardens, children can develop practical skills and ecological knowledge related to plant and seed management [19]. In a Planting Session, children could get their hands dirty as they participate in planting sessions to establish native plants and trees within the ecological park, learning about the importance of biodiversity conservation and habitat restoration. Likewise, in a Seed Saving Workshop, they would learn about the lifecycle of plants and the significance of seed saving for preserving genetic diversity and promoting food security through interactive workshops and demonstrations. One other idea is a Botanical Garden Tour. Other actions may include tours in Botanical Gardens. Guided tours of the park's botanical garden provide children with opportunities to explore diverse plant species, observe pollinators in action, and gain insights into sustainable gardening practices such as companion planting and natural pest control methods [20].

d. **Green Infrastructure:** Integrating green infrastructure elements, such as rain gardens, permeable pavements, and green roofs, into the design of the ecological park can demonstrate sustainable stormwater management techniques and enhance biodiversity. Interpretive signage and guided tours can educate visitors about the ecological benefits of green infrastructure and inspire replication in urban settings [21].

e. **Renewable Energy:** Implementing renewable energy technologies, such as solar panels and wind turbines, within the ecological park can showcase clean energy solutions and reduce reliance on fossil fuels. Educational displays and interactive exhibits can illustrate the principles of renewable energy generation and encourage visitors to adopt energy-saving practices in their daily lives [22].

As opposed to **social implementation** strategies following interventions are included:

a. **Collaboration with Schools:** Partnering with local schools can enhance the reach and impact of educational activities within the ecological park. By integrating environmental education into school curricula and organizing field trips to the park, children can reinforce their learning experiences and apply knowledge gained in a real-world context [23].

b. **Community Engagement Events:** Hosting community engagement events such as eco-fairs, tree planting initiatives, and clean-up campaigns can mobilize local residents and foster a sense of ownership and pride in the ecological park. These events provide opportunities for hands-on participation and promote community cohesion around shared environmental goals [24].

c. **Multi-stakeholder Partnerships:** Collaborating with government agencies, non-profit organizations, businesses, and academia can leverage diverse expertise and resources to support the ecological park's educational initiatives. By fostering multi-stakeholder partnerships, the park can access funding opportunities, technical assistance, and knowledge exchange platforms to enhance program effectiveness and sustainability [25].

In terms of significant facilities and **amenities** a Café and a playground within the park can offer valuable insights. Incorporating an ecological cafe and playground within the park adds valuable dimensions to the overall experience, providing opportunities for sustainability education and eco-friendly leisure activities:

The Ecological café can offer:

- a. Sustainable Menu: The ecological cafe offers a menu featuring locally sourced, organic, and seasonal ingredients to minimize carbon footprint and support local farmers and producers. Emphasis is placed on plant-based options to promote sustainable food choices and reduce the environmental impact of meat production [26] [27].
- b. Zero Waste Practices: The cafe implements zero-waste practices such as composting food waste, using biodegradable packaging and utensils, and offering incentives for customers to bring their own reusable containers and cups [28].
- c. Educational Workshops: The cafe hosts educational workshops on topics such as sustainable agriculture, food waste reduction, and ethical sourcing practices, providing visitors with opportunities to learn about the environmental and social impacts of food production and consumption [29].

The Ecological Playground can offer:

- a. Natural Materials: The ecological playground is constructed using natural and sustainable materials such as untreated wood, recycled rubber, and natural fibers, creating a safe and eco-friendly play environment for children.
- b. Biodiversity Features: The playground incorporates biodiversity features such as native plantings, butterfly gardens, and birdhouses to encourage wildlife habitat and ecological diversity within the park.
- c. Educational Play Elements: Interactive play elements within the playground, such as water play areas with recirculating systems, sensory gardens, and nature-inspired climbing structures, provide opportunities for children to learn about ecological concepts while having fun [30].

By integrating an ecological cafe and playground into the park, visitors are not only provided with amenities for relaxation and recreation but also opportunities for hands-on learning and engagement with sustainable practices. These features enhance the park's appeal as a destination for families and reinforce its role as a center for environmental education and community empowerment.

Finally, Monitoring and Evaluation can play an important role in the implementation of the project and future interventions for improvement:

- a. Impact Assessment: Regular monitoring and evaluation of educational activities are essential to assess their effectiveness in achieving desired learning outcomes and behavior change among children. Surveys, interviews, and observation methods can be employed to measure changes in knowledge, attitudes, and behaviors related to sustainable development themes.
- b. Feedback Mechanisms: Establishing feedback mechanisms, such as suggestion boxes, online surveys, and focus group discussions, allows participants to provide input on the quality and relevance of educational programs. Incorporating feedback from children, parents, educators, and other stakeholders enables continuous improvement and adaptation of educational content and delivery methods [31].
- c. Long-term Tracking: Tracking the long-term impact of educational interventions on children's environmental attitudes and behaviors can provide valuable insights into the effectiveness of the ecological park's sustainability education efforts. Longitudinal studies and alumni surveys can track participants' continued engagement in environmental stewardship activities beyond their initial experiences at the park [32].

The analysis of the significant design parameters for creating a successful ecological park as identified in this research can be summarized in the following diagram emphasizing in the most significant thematic.

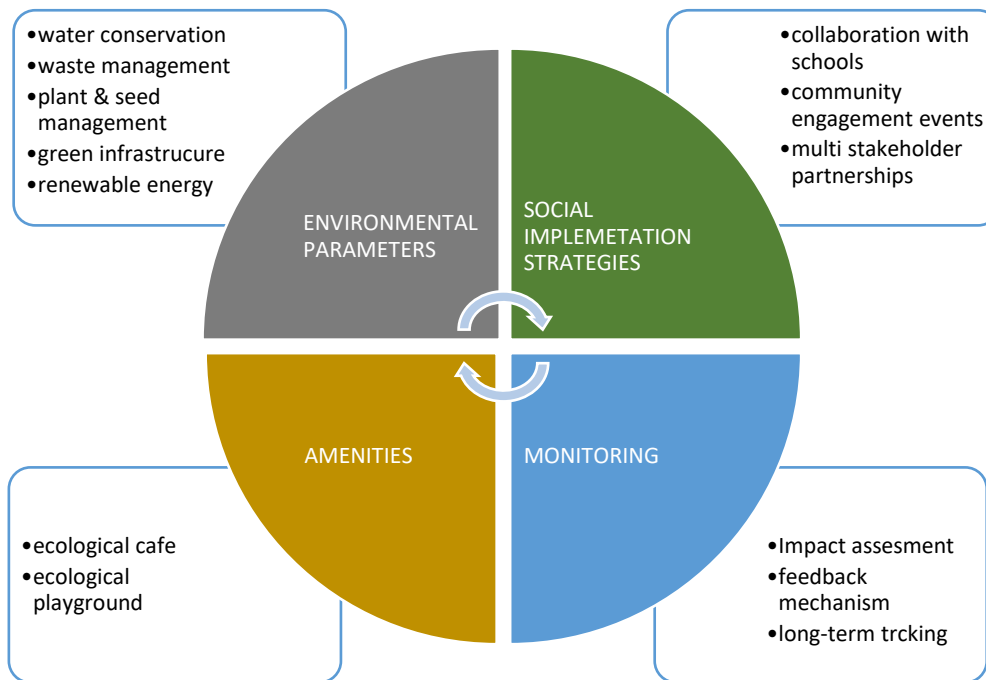


Figure 17: Significant thematic areas when designing an ecological park for children (source: authors)

The site that was selected as a case study is the Rodini Park, located in Rhodes, Greece. It is one of the oldest parks in the world, boasting a history that stretches back to ancient times. This verdant oasis is renowned for its lush greenery, tranquil streams, and shaded pathways, offering visitors a serene escape from the bustling city life. The park is thought to have been a favorite retreat for the Roman emperors and, according to tradition, was also a place of learning where students of the famous orator and philosopher Cicero once studied. Today, Rodini Park continues to captivate visitors with its natural beauty and historical significance, featuring a variety of trees, flowers, and wildlife, including peacocks that roam freely within its grounds.

One of the park's most notable features is its ancient tomb of the Ptolemies, which adds an element of historical intrigue to its natural charm. The park's design, with its carefully planned landscaping and use of water elements, reflects the ancient Greeks' and Romans' appreciation for harmonious, nature-centric environments. Visitors can enjoy leisurely walks along the well-maintained paths, relax by the serene ponds, or explore the ruins that hint at the park's storied past. Rodini Park not only provides a peaceful retreat but also serves as a living museum, preserving the heritage and natural beauty of Rhodes for future generations to enjoy.



Figure 18: The case study area for the ecological park

4. Conclusions

The ever-faster pace of life and limited financial capabilities of our day force the majority of tourists to take short vacations of only a few days. At the same time, however, there is an increasing demand for interesting breaks from the workaday rut providing experiences that are markedly “different.” There is widespread interest for city tours characterized by the experiential perception of the particular identity of a place instead of the mass consumption of a standardized tourist product. For a stroll around town, that offers him or her the opportunity to combine city walks with history, landscape, history and cultural memory.

In the first case, through a comprehensive analysis of the strategies implemented in Rhodes, this study aims to contribute valuable knowledge and lessons to the wider debate on sustainable tourism at UNESCO World Heritage Sites. By examining the specific case of the Medieval City of Rhodes, this research seeks to provide information on effective approaches and best practices for balancing tourism development with heritage conservation and community engagement.

The findings of the study will provide practical guidance for policy makers, site managers and stakeholders involved in the management of UNESCO World Heritage Sites worldwide. By identifying successful strategies and highlighting the challenges faced in Rhodes, the research will facilitate informed decision-making and the development of tailored solutions for other heritage sites facing similar issues.

Furthermore, by sharing lessons learned and best practices that emerged from the Rhodes case, this study aims to promote collaboration and knowledge sharing among stakeholders in the global tourism community. By promoting dialogue and collaboration, the research contributes to the promotion of sustainable tourism practices that ensure the long-term preservation and enjoyment of UNESCO World Heritage Sites for future generations.

Ultimately, the study aims to inspire and empower stakeholders to adopt sustainable tourism approaches that not only protect cultural and natural heritage but also contribute to the socio-economic development and well-being of local communities. Through the dissemination of knowledge and lessons learned, this research aims to make a substantial contribution to the conservation and promotion of UNESCO World Heritage Sites around the world.

In the second case the establishment of an ecological park in Rhodes presents a unique opportunity to engage children in environmental education and promote sustainable development initiatives. By

designing educational activities focused on water conservation, waste management, and plant and seed management, the park can empower future generations to become environmentally conscious citizens. Drawing inspiration from Greek and international case studies, Rhodes can create a dynamic educational environment that fosters a deep appreciation for nature and encourages sustainable living practices. Through collaborative efforts between government agencies, educational institutions, and civil society organizations, the ecological park in Rhodes can serve as a model for environmental education and community engagement on a global scale. The successful implementation of educational activities within the ecological park in Rhodes requires a multifaceted approach that engages stakeholders at all levels and integrates best practices from Greek and international case studies. By fostering collaboration, innovation, and community participation, the park can become a catalyst for sustainable development and environmental stewardship in Rhodes and beyond. Through continuous monitoring, evaluation, and adaptation, the park can ensure the effectiveness and long-term impact of its educational initiatives, empowering children to become active agents of positive change in their communities and the world.

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Palimpsest spatial narratives as an imprint of interactions between individual and collective memory

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Abstract

This paper explores the complex relationship between collective memory, the reuse of abandoned buildings and the redefinition of public space through educational synergies and activities involving artistic creation. Collective memory, linked to public space and shaped by present needs, was examined based on a specific methodology and through performative events, photographic, audiovisual and architectural works and actions. The workshop was implemented by the Departments of Interior Architecture and Photography and Audiovisual Arts of the University of West Attica with the participation of Professors, students, artists and residents who used public and private space as a platform to express and negotiate their collective identities, values and personal narratives through artistic and participatory processes. The research through these actions in an abandoned house in Kerameikos and the wider area, familiarized the participants with the space and turned it into a field for the recall of memories, enhancing the interactions between the participants and the space and redefining individual and collective memory. The interdisciplinary and intercultural approach aimed to explore how collective memory activates and transforms spatial relations, highlighting the role of art, identity and social dynamics in creating an open evolving archive. The dialectical relationship between the artistic expressions of the participants and the spaces enhanced the sustainable development of the specific area, strengthening the community's relationships and giving it new perspectives. The paper concludes by emphasizing the role of the educational process in understanding and activating collective memory to create new hybrid spaces through art. This dynamic phenomenon requires interdisciplinary collaboration and offers insights into how narratives of the past shape contemporary landscapes and collective identities, linking the past to the present and future of community and space with new palimpsest narratives.

Keywords: *workshops; collective memory; visual art; performance; experiential space; architecture*

1. INTRODUCTION

The aim of the paper is to investigate how collective memory is activated, constructed, transformed and also transforms spatial correlations through an interdisciplinary and inter-artistic approach to public space. It also explores the roles of art, identity and social dynamics in shaping new spatial practices and narratives. Collective memory is directly related to space and the city in general, as it is a main component of representations, through specific rituals that enable historical narrative [1].

As repositories of collective memory, public spaces embody the history and experiences of communities, bringing to the fore important events or individuals and preserving collective memories for future generations. They can also play a crucial role in shaping collective identity and sense of belonging. Some of them, such as neighbourhoods, cultural centres or places of worship, may have particular significance for communities, reinforcing shared values, traditions and narratives [2]. Moreover, the way spaces are designed, used and experienced is influenced by social, cultural and

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historical factors. Public space is not only the set of material formations that define it, "but the way in which each and every one of us, together, assigns meaning to these material formations." [3] The codes and symbols that we perceive as users or observers of public spaces - as well as the meanings - are not necessarily intrinsic and interwoven with the icon itself but are based on a cultural and historical context and norms that can vary in time and space [4]. Urban planning decisions, architectural trends and zoning regulations can reflect and perpetuate social norms, power dynamics and historical narratives. Within this context, spaces become dynamic fields of contestation and negotiation, where different social politics or other groups that coexist in the community may compete to shape collective memory and historical narratives. Conflicts over spatial changes (renaming streets, removing statues or changing the use of historic sites) highlight the complex ways in which memory and space intersect. As Harvey argues, "*the freedom to make and remake our cities and ourselves is one of our most precious yet most neglected of our human rights*" [5]. Spaces can undergo transformations or redefinitions, leading to changes in the way they are remembered by utilizing a system of sorting the narratives they embody.

Halbwachs in his theory of social memory claims that "it is in society that people acquire their memories. It is also in society that they recall recognize and locate their memories". Since societies are an evolving system it follows that collective memory is not static but dynamic, subject to interpretation, revision and forgetting over time.

2. CASE STUDY: WORKSHOP [UN]VISIBLE PLACES

The educational workshop that took place in the Kerameikos area, tried to highlight not only on a theoretical but also on a practical level, that the perception and production of visual and architectural space is not only related to what we see but also to what we hear, what we feel, or what we remember. According to Piaget the perception and intuition of space results from the observation of things, as well as from our actions in relation to them. Through different spatial and kinesthetic conditions, the way we move through space in combination with our senses, and memories of place, constitutes a living set of situations expressed through architectural and visual thinking and practice. The aim of the workshop was the birth of a new place of ephemeral habitation between the imaginary and the real through the exploration of the possibilities of the coexistence of live performance, architecture and visual art action with the already recorded image and the resulting image as an open, evolving archive.

2.1 Synergies and collective practices

The educational action was held in collaboration with the Departments of Interior Architecture and Photography and Audiovisual Arts of the School of Applied Arts and Culture of the University of West Attica. The public and private space was used as a platform for participatory design. The participants, (professors, the group "Communitism", students, artists and residents), were involved in all stages of the action, from planning to implementation. Lippard argues that art is deeply rooted in the experiences and histories of local communities and emphasizes the role of participatory art in preserving local cultures and promoting community identity [6]. Goldbard also believes that participatory art can empower communities and strengthen cultural democracy, emphasizing the importance of active community participation in the artistic process [7].

Collective art practices in the public space focus on participation, cooperation and creativity as well as the active involvement of citizens in common social, cultural and political issues. The 'right to the city' is practically expressed through participatory processes that, when carried out in public space, can play an important role in activating shared, public life [8].

Workshop participants expressed and negotiated their collective identities, values and narratives through various forms of artistic expression and participatory processes, enriching the individual and collective experience of the community. The ephemeral interventions and the transience of the

installations invited the community to experience the familiar in a new way, integrating art into everyday life.

2.2 Research context and process

The proposed spatial-art installations, since it incorporated elements of interaction with the space and with the participants and the residents, was a springboard for dialogue within the public and the wider social context, but, above all, it triggered new thoughts and reflections on the space of habitation and memory, on the immaterial and the material, on the private and the public, on individual and collective memory.

In this research framework the following questions were posed:

1. How are traces and information about individual and collective memory preserved?
2. Can the reuse of abandoned spaces be achieved through the activation of artists and communities?
3. Can archives be created of as many individual and collective, visual and ephemeral performance events that have occurred and are occurring in the city?
4. How can mixed media interventions and actions affect the sensory experience and memories of the community by creating through a montage of 'realities' - new unseen worlds and narratives?

In the short period of three days, the students worked in three groups, a group to record the experiences of personal memories of the residents, a group to create visual and architectural proposals and a group to create the final archive.

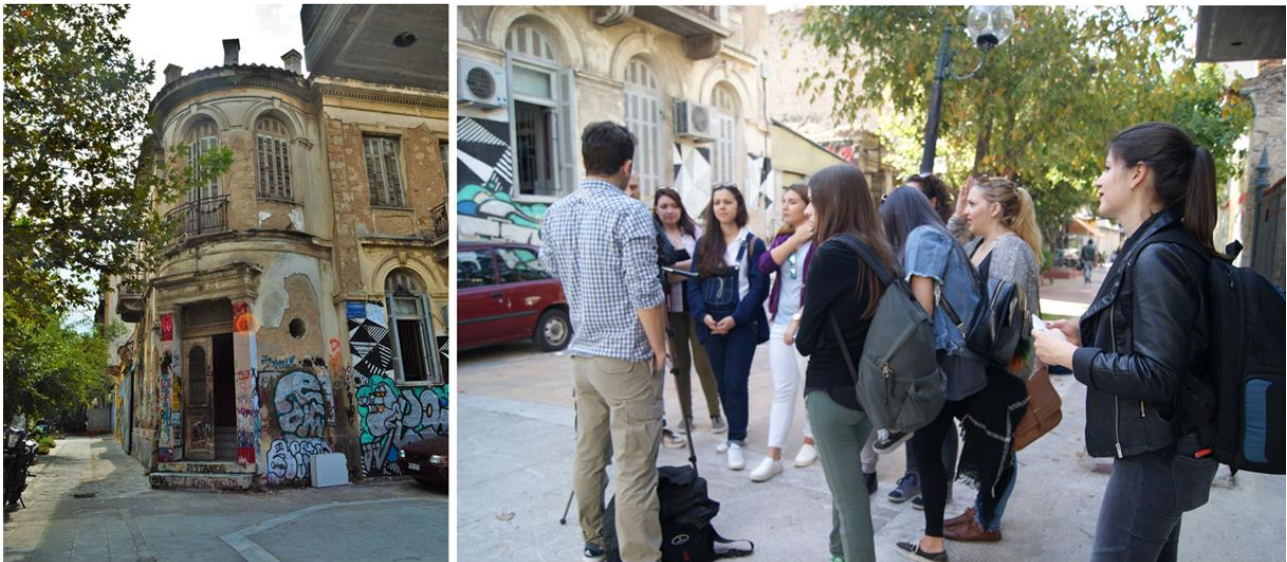


Figure 19 The building on Salaminos and Paramythias streets with students in the workshop

An abandoned neoclassical 19th century residential building, on Salaminos and Paramythia streets (Figure 19), the pedestrian street itself and the archaeological site of burial monuments "Public Signal" were chosen as the place of intervention. The venue of the workshop contributed to the formulation of the proposals that emerged through the combination of art and architecture, aura and material elements with the concept of memory as the central axis.

The source of inspiration for the workshop was the literary text *The Invention of Morel* by Adolfo Bioy Casares [9]. In the work, the central character, a narrator, records the reality of the five senses using a holographic recording and reproduction device. This recording leads to the physical death of the recorded subjects and objects and then to their "revival" as memory. Through the repetitive projection of events as idols onto the real world, its nature is altered but also mutated. The narrator is involved in the process of recording reality, first by meticulously writing a diary, and then by self-

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inscribing it as a record of holographic similes. The diary-witness is gradually corrected and completed, like a blurred memory that keeps coming back until it is elucidated, attempting to achieve the absolute accuracy and fidelity of the record of reality.

In the novel, the structures of reduplication or multiplication through the process of holographic projection in space serve as memory, which reduplicates reality by contributing to the confusion between reality and its representation. The assemblage, the montage of time and space that is attempted leads to a non-linear interpretation of time and reality, involving the past and the present, the real and the imaginary, in order to produce a disoriented space where the geographical field is not concretized. As Robert Humphrey states "the purpose of editing is to transgress or modify the arbitrary and conventional boundaries of space and time. The quality of 'stream of consciousness' requires a movement that is not strictly that of 'clockwork'. It requires, on the contrary, the freedom of switching back and forth, of mixing the past, the present and the imaginary future" [10]. The whole story can start again, the last year can be repeated over and over again and the line, the line of narrative, the line of time can become a circle. The recapture of the concept of representations in space-time uses memory as a model and constitutes the basic mechanism for recording and reproducing reality [11]. The function of memory and the archive is the nodal tissue of the novel and educational action as the basic mechanism of recording and reproducing human being and space-time. At the same time, the complex functions of memory involved in this process undermine the absolute fidelity of technological reproduction, or the identification with the original, which according to Virilio leads to the disappearance-erasure of the original [12].

This novel was used by the workshop as a methodological tool, due to the reconception of the linear perception of space-time, as it reimagines history and geography, but also due to the activation and reconstruction of individual and collective memory. Collective memory functioned here, as in the project, as a means to help fill in the gaps in individual memory and the participants' experiences in terms of shared, universal experiences - such as the experience of death or love - giving individual experience the perspective of parallelism and repetition. And as Cassares' hero wishes for the inscription of his existence in the consciousness of his beloved, who has never met it except in their holographic projection, "*My soul has not yet passed into the image" ...but to the man who, on the basis of this reference, will invent a machine capable of gathering scattered presences, I make an appeal: Search us, Faustine and me, make me enter the heaven of Faustine's consciousness. It will be an act of mercy.*" [9].

The participants identified with the role of the narrator of the project, using their individual experiences and their personal narratives in relation to the space and their personal experiences. They created artistic and architectural works that, together with the recorded experiences of the local inhabitants, were finally integrated into an open archive-diary.

A first exploratory process involved understanding the history, structure and scale of the building, which was a residence and a carpentry workshop, as well as the surrounding urban space. This process of becoming familiar and acquainted with the space took place through the use of movement and drama therapy techniques and exercises in order to activate the senses that connect the body with the space and the text. The observations on the interaction of the human body and the creation of geometric relationships with space were recorded by exploiting the digital technology and the artistic view of the students. Then, the participants created artworks, photographs and videos as well as spatial compositions with their personal objects, proposing visual and spatial interventions with staged approaches. The interaction of works and spaces in different spatial conditions served as a springboard for the creation of ephemeral artistic environments, linking the individual with the collective memory of space (housing and urban space). According to Halbwachs, each individual memory is a perspective on collective memory, that this perspective changes according to the position I occupy and that position, in turn, changes according to the relationships I maintain with other groups [13].

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Figure 20 Performative Events and Ephemeral Scenographic Environments

At the same time, simple ephemeral stage constructions were designed and implemented that contributed to the exploration of the relationship between space, body and text, spatially translating concepts that link memory and recollection, with space. The ephemeral scenographic environments acted as platforms for performative events (text reading visual experimentation with digital media and lighting), altering the everyday image of space by proposing a new image and experience (Figure 20).

According to Walter Benjamin, "to dwell is to leave a trace". The participants recorded in different ways (text, video, recordings) the experiences and memories of the inhabitants of the area and the different actions. The concept of the archive functioned as a footprint where human existence left its mark, contributing to a new reading of the city as an active, evolving field. During the compositional process, urban space and the dwelling as a unit became a rewritten site of ephemeral events, a new hybrid archival site.

The workshop concluded with the creation of a final organized archive that included the recording of the experiences and memories of the residents of the area, the recording of the actions and artworks and their display in an open exhibition and presentation at the intervention site and at the Benaki Museum.

3. METHODOLOGY

The strategies used to exploit collective memory to redefine abandoned spaces in the urban landscape are as follows:

- Inviting a set of independent artists or groups to collaborate with the participating students, setting the context the objectives and content of the action.
- Making contacts with the residents of the research area and, encouraging them to participate in the project. Discussing the possibility of engaging the community to involve residents as well as different associations in the creative process.
- Implementing a multicultural approach, encouraging the participation and expression of the members of the target community that coexist in the area by focusing on their different cultural approach to the site and the memory it carries.
- Raising awareness to the community about the importance of collective memory and the preservation of cultural and historical heritage through the lens of the creative process and art.

- Developing a fruitful dialogue between students and participants to recall monuments (personal/collective) related to the history of housing in Kerameikos and the wider area, the actions and experiences of residents to understand desires and needs of the community.
- Creation of multiple teams (text writing, site recording, performance event creation, performance, performance event recording-promotion).
- Identify the extent of logistical equipment needs for the implementation of the project. Sourcing logistical equipment from the University of West Attica, and funding resources through sponsorships, crowd funding or community fundraising efforts.
- Conducting archival research on photographic materials provided by residents, recording resident interviews, and personal observations through a tour of the residence and Kerameikos sites. Objects were also solicited that would function as springboards for the emergence of memories.
- Audiovisual recording (photographic and video) of the spaces, objects and narratives pushing for the preservation of cultural heritage and enhancing collective memory.
- Explaining the methods of creating works and constructions in the sites and in the wider area through educational activities and talks by artists, architects, theorists.
- Organization of experiential activities to strengthen the relationship of the body with space and memory through drama-therapeutic methods and processes.
- Realization of novel artistic and audiovisual artworks, constructions and interventions in situ. Due to the ephemeral nature of the works, an attempt was made to preserve the memory of the interventions through documentation with photographs, videos and written records.
- Organization of an art exhibition open to the public. Supervision of the installations and constructions by groups of students and residents for the safety of the works and participants.
- Promotion of the project and its results in social media, local media and cultural events, exhibitions with the active contribution of the participating groups, students and institutions (University of West Attica, Athens Festival, community groups, etc.) (Figure 21).
- Holding extensive discussions on the possibilities of long-term planning for the future of the abandoned buildings and urban areas and determining the temporary or permanent nature of the project or whether there are plans for possible reuse or redevelopment of the site.



Figure 21 Workshop in Athens Festival

4. ANALYSIS AND RESULTS

Cities inspire emotions, stories and initiatives through the experiences of their inhabitants, pushing for their improvement. Lefebvre describes the city as the scene in which all the complex interactions of everyday life take place [14]. The personal narratives and collective experiences were one of the main cores of the educational action, resulting in the emergence of the residents' relationship with their neighborhood and the wider urban space, the history of the area and their experiences that are inextricably linked to the community and the city. The participating students and artists, become virtual residents of the area by integrating their individual experiences and experiences into a

collective memory and with the ability to intervene, re-map the city and transform the space by making it familiar.

The use of abandoned buildings that carry their own history and memories that function as venues for hosting educational activities, exhibitions, performative events is a powerful tool for transforming them into living cultural cubes and focal points for the promotion of collective memory, contributing to the cultural upgrading of cities [15]. Many cities have come to promote culture and heritage as part of new reorientation strategies using cultural events in public space as a tool [16] [17]. The literature mentions cultural events, festivals and activities both as a means to enhance infrastructure investments and to improve the image of the city [18]. Their use refers to the enhancement of urban development processes and the broader transformations of cities in general [19]. A major area of both private and public investment tends to be local and regional infrastructure [20], which can help preserve and promote cultural heritage in cities, while introducing new functions to abandoned spaces or structures.

This training action is heading in this direction, highlighting and promoting cultural heritage by selecting and reusing abandoned buildings or structures. The incorporation in their design of new elements, both material and immaterial, maintains connectivity with the past and pushes towards a new contemporary concept of re-use of buildings through participatory processes. Activating them in this way encourages community participation, highlights the memory of the place and contributes to the overall well-being and the cultural and social upgrading of urban environments.

According to Knierbein et al. [21], cities can refer to human entities that have distinct personalities, with the result that the evaluation of a city is not exclusively subject to aesthetic terms, but is linked to the lifestyle, the memories evoked by the urban environment and the social trends associated with it. This view is supported by the research of Stanley Milgram and Denise Jodelet [22], which refers to a mental mapping of space that has nothing to do with the actual one. People living in a city map it by selectively identifying some elements of it as important, connecting them through their everyday experiences as well as through their social representations of the spaces they have, which may or may not be part of their everyday experience there. Space is understood as a function of the historical and social events, systems of production, recurring events and relationships of inhabitants that have developed in it, as a collective and personal experience. Moreover, Lefebvre points out the inseparable relationship between space and rhythm [23]. The recognition and understanding of space is realized through repetition and rhythm created either by natural factors (e.g. seasons), social (holidays), or personal (our breathing, our work) creating regular or irregular, slow or fast rhythms which become the means for understanding space and time.

The workshop sought tools to approach spatial experience, leading to new unconventional readings of space, strengthening collective identity and social bonds. As a result of the research, each proposed space was transformed as the main way of recalling memory, contributing to the formation of a system of interactions between individual and collective memory. The management of the image and the promotion of the identity of the city, reinforced sustainable development, giving it new perspectives. The spatial – visual art proposal functioned as a means of interaction between the participants and local residents with the space that functioned as a perceptual and compositional tool of participatory planning. The experiential experience of space, form, language and representation reconstituted the abandoned building, presenting it as a platform for performative artistic expression, bringing the participants and local residents in contact with constantly evolving techniques in the field of sound and image. The creation of the performance, which sometimes uses modern ways of digital representation, and its recording through the creation of an archive brought the participants in direct contact with the history of the place and the experiences of the inhabitants.

The photographic and video documentation of the proposal in all phases added a completely new perspective both in the field of promoting the event and in the "on-stage" coexistence of 3D and 2D space. An open, performative archive was proposed redefining the city and the human connection

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with its history, and culture. The new proposed city archive contributed to the preservation of information so that the ephemeral, the past and the present become the future of the city and urban space becomes the place where "everything" happens, inhabits and will inhabit.

The communication of the actions of the educational workshop through the exhibition, the lectures, the discussions at the Benaki Museum, and the promotion on social media had the effect of enriching the city cell and including a wider audience by expanding the social network.

5. CONCLUSION

This paper highlights the importance of the educational process in understanding and adopting the mechanisms of activating collective memory as a synthetic tool in the creation of new hybrid spaces as palimpsests. A complex and dynamic phenomenon that requires interdisciplinary and inter-artistic perspectives and collaborations. Collective memory and art forms share a symbiotic relationship, each influencing and shaping the other. Art has a profound capacity to capture and reflect collective memories, serving as a conduit for cultural narratives, historical events and shared experiences. Collective memory provides artistic expression with a source of inspiration and subject matter.

The visual arts and the audio-visual and scenic works created were used as a medium for preserving, interpreting and transmitting collective memories among the participants. Through text, events were recorded while through visual and spatial interventions, significant moments or symbols were symbolized that echoed community stories or specific personal memories. Sound, photographic and audiovisual recordings connected fragments of memory and narratives, creating new stories and spatial relationships.

Through the above performing acts, performances, memories and narratives were reproduced in an experiential, physical and direct way, allowing the participants to delve into these emotions on a deeper level. Drawing on shared experiences and cultural references, the works explored issues of identity, space and social consciousness, encouraging dialogue and understanding between participants.

The strategy of using collective memory to redefine abandoned spaces is an important issue linked to urban development and environmental sustainability. The re-use and re-designation, of these spaces contributes to the improvement of the quality of life of the inhabitants and the development of the city.

Through the educational process, and by using new technologies and different interventions on the site, a palimpsest of virtual spaces was created that impacted on the physical ones, playing an important role in shaping collective memory. The architectural, artistic and audiovisual interventions, as well as the promotion of the actions and spaces through social media, created new ways for communities to share, preserve and reinterpret their histories, blurring the boundaries between the physical and new spatial versions, reshaping the individual and collective identities of the sites chosen for the implementation

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Creating Livable and Inclusive Urban Voids through Sensory Mapping: Addressing new Public Realm in Cities

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Abstract

This paper explores the utilisation of sensory mapping techniques to enhance livable and inclusive urban environments, with a focus on revitalising neglected void spaces. It emphasises the importance of community engagement and renewal in these areas and highlights sensory mapping as a method to capture diverse experiences and insights. Drawing from interdisciplinary case studies, it illustrates how sensory experiences influence perceptions of urban spaces and contribute to a sense of belonging. The paper stresses the significance of inclusive design in shaping public spaces that accommodate individuals of all backgrounds and abilities, advocating for accessibility and consideration of marginalised groups. By synthesising theoretical insights with practical examples, it offers recommendations to promote collaboration, accessibility, and cultural sensitivity in sensory mapping projects, aiming to transform void spaces into vibrant, people-centred places.

Keywords: placemaking; sensory mapping; urban public spaces; urban void; inclusive design; resilience

1. INTRODUCTION

The urban fabric of modern cities is undergoing rapid transformation. A new perspective on urban architecture is required to meet the demands of contemporary communities. In the context of the built environment, urban voids represent a critical resource that must be effectively utilised.

In academic discourse, numerous disciplines explore the representation and experience of the built environment, providing varied perspectives on its design. Research on placemaking and the experiential decoding of urban environments examines how users' spatial self-awareness and participation influence the meaning and function of spaces.[1]

Charles Lardy (2006) [2] argues that urban environments overwhelm the senses, confining our sensory experiences to immediate surroundings and limiting our broader worldview. Therefore, spatial perception is crucial. Urban life encompasses various spatial and temporal activities that foster human interaction, with our understanding of place evolving through both material and intangible stimuli from these interactions. Truax (2001) [3] describes place perception as a form of tacit knowledge, highlighting the structural relationship between sensory environments and activities within them.

The senses are essential for navigating urban landscapes, enabling experiences of public spaces and the built environment through visual, olfactory, auditory, tactile, and cognitive perceptions. This underscores the importance of research into the multidimensional mapping of urban landscapes, where users' senses mediate their understanding of spatial concepts, usage patterns, and design flaws. The sense of place represents an individual's emotional bond with their surroundings, shaped by their perception of specific environments [4]. "Place" carries deeper significance and imparts a sense of identity, unlike "space," which is a mere spatial dimension. Urban areas become meaningful places through repeated visitation and user attachment, transforming them into venues for positive

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interaction and embodying the essence of "public place." This sense of place enhances personal identity and elevates the city's appeal and significance for its residents and society.

Recent studies on urban public spaces have largely focused on piazzas and nodes, often neglecting urban voids and leftover spaces, and their potential utility. Urban voids, emerge unintentionally during multiple project developments, resulting in vacant and uninhabited spaces. These voids can be repurposed and managed to enhance urban environments, particularly in developing countries, fulfilling users' needs for valuable and aesthetically pleasing spaces.

This paper reviews urban voids and their impact on cities, aiming to understand their significance in social, economic, and environmental aspects. It highlights how these voids currently affect a city's image and proposes strategies to reimagine public spaces. Sensory mapping is emphasized as key to creating inclusive and vibrant environments, challenging traditional placemaking methods. The paper advocates for integrating sensory experiences, technology, physical features, community cohesion, and public health in urban design.

2. UNDERSTANDING URBAN VOIDS AND THE SIGNIFICANCE OF REPURPOSING

Urban voids are a complex and multifaceted concept in urban planning and design, encompassing a range of spaces defined by their lack of functional, social, or aesthetic integration into the urban fabric. The term "urban void" can often be confused with similar terms such as unoccupied areas, vague land, and abandoned land, due to their overlapping characteristics related to formation, history, and development potential. In the context of this research, urban voids are understood as spaces characterized by an absence of function, human activity, and aesthetic value within the urban setting. These voids disrupt the continuity of the urban tissue, creating physical and perceptual gaps that can be either publicly or privately owned. These vacancies are often the result of neglect and abandonment.

Trancik [5] identifies urban voids as negative spaces that lack human interaction. The absence of human activity in these spaces categorises them as voids. While, Lynch [6] describes urban voids as neglected, useless, and empty areas, often referred to as waste zones. These voids are generated by permanent structures such as highways, railways, and bridges. Lynch, also argues that these spaces have potential and should be repurposed to meet the evolving needs of the city and its inhabitants.

Urban voids contribute to the fragmentation of city spaces, creating barriers between neighbourhoods and hindering pedestrian movement. Transforming these spaces into public realms can bridge these gaps, fostering greater connectivity and coherence within the urban fabric. By establishing pedestrian-friendly pathways, verdant corridors, and cultural nodes, cities can enhance mobility and facilitate social interactions, thereby cultivating a more integrated and cohesive urban environment. [7]

Reimagined urban voids can become inclusive public spaces that cater to diverse populations. Traditional public spaces often serve specific demographics or activities, potentially excluding various community members. In contrast, repurposed voids offer versatile settings that can accommodate a range of cultural expressions and recreational activities. Community gardens, outdoor art exhibitions, and temporary markets are just a few examples of how these spaces can serve diverse needs and preferences, fostering a sense of belonging and social solidarity among residents. [9]

Transforming urban voids into green spaces boosts environmental sustainability and urban resilience by integrating green infrastructure like pocket parks, rain gardens, and urban forests. This approach enhances biodiversity, mitigates urban heat island effects, improves air quality, and manages stormwater runoff through sustainable designs such as permeable surfaces and rainwater harvesting. Redeveloping these spaces helps cities adapt to climate change, attracts investment, stimulates local economies, and creates jobs. Revitalizing underutilized spaces rejuvenates neighbourhoods, attracts businesses and residents, and enhances cultural and recreational amenities, boosting the city's cultural capital and local business revenue. Successful transformation requires collaboration among city planners, architects, developers, and community stakeholders, ensuring projects align with residents'

needs through participatory design, feasibility studies, and secured funding, leading to dynamic and resilient urban environments.

3. THE NEED FOR NEW LIVABLE AND INCLUSIVE PUBLIC SPACES

Contemporary urban life pulsates with the vitality of public spaces, which serve as embodiments of societal values and collective identity. These spaces, far from being mere physical entities, are vibrant arenas where diverse interactions converge, echoing the ethos of coexistence. In today's fast-paced, interconnected world, the imperative for new, liveable, and inclusive public spaces is pressing.

Liveability in public spaces transcends mere functionality; it encapsulates the holistic well-being of individuals and communities. Human-centric design fosters a sense of belonging and facilitates diverse activities catering to various needs [10]. Inclusive design, going beyond physical accessibility, embraces diversity in cultural, socioeconomic, and generational aspects. A truly inclusive public space is where everyone feels welcome, regardless of background or ability.

The necessity for new public spaces arises from the evolving dynamics of urbanisation and technological progress. As cities expand in population and density, the demand for communal areas to counter urban sprawl's alienating effects becomes paramount. These spaces serve as connective nodes, bridging virtual interactions with tangible experiences and fostering dialogue and collective action. [10]

However, creating such spaces poses challenges, requiring a shift in urban planning priorities towards community well-being over commercial interests. Innovative design and governance approaches empowering local stakeholders are essential, along with a re-evaluation of existing norms perpetuating exclusion and inequality.

Ultimately, the call for new liveable and inclusive public spaces transcends convenience, representing a moral and existential imperative. It is about reclaiming human essence – to connect, belong, and thrive in shared environments. As society stands on the cusp of rapid urbanisation and transformation, redefining public spaces to reflect inclusivity and the richness of human experience becomes paramount.

4. SENSORY MAPPING: THE CONCEPT AND APPLICATION

Sensory mapping offers a promising approach to understanding the complex and dynamic interactions between people and the built environment. By considering the multisensory experiences of users, sensory mapping enables designers and planners to gain insights into how people perceive, navigate, and interact with urban spaces. Through the systematic collection and analysis of sensory data, sensory mapping identifies opportunities for intervention and improvement, ultimately contributing to more responsive, engaging, and inclusive public realms. Therefore, the sense of place arises from environmental design features and activities, alongside the subjective significance individuals attribute to them. [11]

The paradigm of Sensory Urbanism explores individuals' sensory perceptions and interpretations within their local environments, emphasizing the pivotal role of sensory stimuli in shaping and influencing urban experiences. Various theories and methodologies have been devised to delineate the parameters of sensory experiences and methods for their documentation. Kevin Lynch (1960) posited that individuals construct mental representations of urban elements to comprehend and navigate their surroundings. Sensory mapping augments this comprehension by integrating urban and environmental analyses with resident feedback. These mappings include visual, auditory, olfactory, and tactile dimensions, collectively enriching our understanding of urban spaces and potentially fostering enhanced practices in urban regeneration. [12]

Visual mapping delineates parameters of visual comfort, encompassing preferences for vistas, appropriate illumination levels, and minimization of glare. Sound mapping, conversely, digitally represents sonic environments, termed soundscapes, which encapsulate the auditory ambiance of

specific locales. Additionally, olfactory mapping attends to the unique olfactory signatures of urban areas, amalgamating scents from diverse sources such as street markets, eateries, vehicular emissions, and human perfumes. Texture mapping identifies the material compositions within urban landscapes, correlating with thermal comfort, visual aesthetics, and energy efficiency considerations. These maps serve as instrumental tools in the realm of comfort analysis and urban planning, potentially catalysing the emergence of sensory-oriented placemaking methodologies.

Furthermore, the evaluation of placemaking initiatives necessitates consideration of users' subjective experiences, memories, and emotional responses. Such considerations underscore the transformative impact of urban development not only on physical and economic landscapes but also on the somatic and experiential realms, profoundly influencing individuals' attachments to place. [13]. As elucidated, human sensory faculties profoundly shape perceptual experiences, rendering sensory placemaking a pivotal avenue for redefining urban evaluation paradigms. By incorporating users' multifaceted sensory encounters into placemaking endeavours, a more nuanced understanding of urban spaces can be attained, fostering inclusive and enriching environments conducive to diverse wayfinding experiences.

The diagram below captures the relationships and key points from the narrative about the importance and characteristics of new, liveable, and inclusive public spaces in the context of contemporary urban life & sensory mapping:

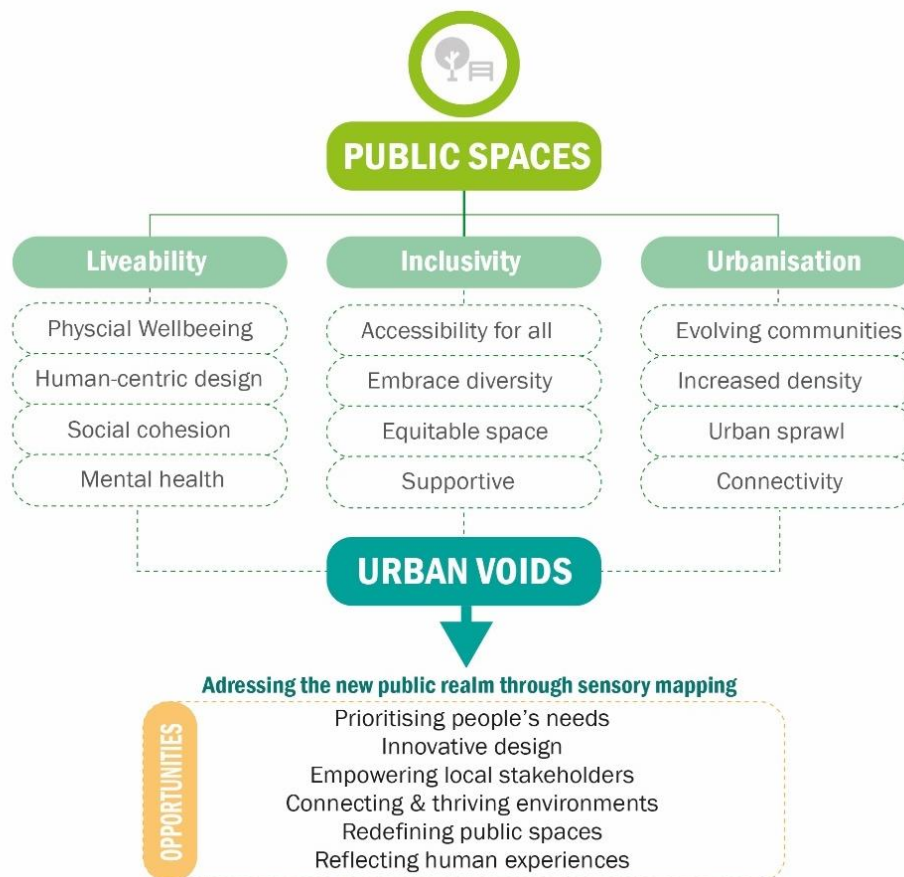


Figure 1. Inception diagram to investigate the key attributes to the new public spaces

5. CASE STUDY – TRANSFORMATIVE INTERVENTIONS IN URBAN VOIDS

Numerous examples illustrate the transformative potential of sensory-driven interventions in urban voids. To illustrate the application of sensory mapping principles in urban planning practice, this section presents one key case study that showcase successful examples of creating liveable and

inclusive public spaces in redundant urban voids, and how the principles described above has been achieved.

High Line Park, New York City:



Figure 2. Joel Steinfeld’s most iconic shot of the High Line, looking east along 30th St. A railroad artefact, May 2001 (Photo by Joel Steinfeld [Historical | The High Line](#))

Figure 3. Repurposed High Line in New York City, creating one of the most vibrant and successful public realms in the city (source: google)

The High Line Park is a renowned example of adaptive reuse, transforming a disused elevated railway into a vibrant linear park that spans the west side of Manhattan. Through careful planning and design, the park incorporates elements of nature, culture, and art to create a unique sensory experience for visitors. The integration of native plantings, public art installations, and panoramic views of the city skyline contributes to the park's appeal as a destination for leisure and recreation, while fostering social interaction and community engagement. The High has significantly enhanced inclusivity, liveability, and urban form. This elevated park, which stretches for 1.45 miles along the west side of Manhattan, was transformed from a disused railway line into a vibrant public space.

Here are the key achievements, described in Figure 1, in these areas:

Inclusivity

The High Line has succeeded in fostering inclusivity by creating a public space that is accessible to all. Its design incorporates numerous features to accommodate individuals with disabilities, including elevators, ramps, and smooth pathways. The park's programming, which includes cultural events, educational programs, and community gatherings, is designed to engage a diverse audience. By offering free access and activities, the High Line ensures that people from various socioeconomic backgrounds can enjoy its amenities. This inclusivity is further supported by the Friends of the High Line organization, which actively works to involve local communities and address their needs.

Liveability

In terms of liveability, the High Line has dramatically improved the quality of life in its surrounding neighbourhoods. It provides a green oasis in the dense urban environment of Manhattan, offering a place for relaxation, exercise, and social interaction. The park's lush plantings, scenic views, and artistic installations create a serene atmosphere that contrasts with the bustling city below. This transformation has not only enhanced the physical health of residents by promoting outdoor activities but also contributed to their mental well-being by providing a space for tranquillity and reflection. Additionally, the High Line has spurred economic development, attracting new businesses, restaurants, and housing developments, which has revitalized the area and created jobs.

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Urban Form

From an urban form perspective, the High Line represents a visionary approach to adaptive reuse and sustainable urban planning. By repurposing an obsolete railway into a dynamic public space, the project preserves historical infrastructure while giving it new life. The elevated nature of the park offers a unique vantage point to experience the city, fostering a stronger connection between people and their urban environment. The design seamlessly integrates with the surrounding architecture, encouraging pedestrian movement and connectivity within the city. The success of the High Line has inspired similar projects worldwide, demonstrating the potential for innovative urban design to transform neglected spaces into valuable community assets.

In conclusion, the High Line stands as a testament to how thoughtful urban design can promote inclusivity, enhance liveability, and reshape urban form. Its success has not only improved the lives of New Yorkers but also set a benchmark for cities globally seeking to create more inclusive and liveable urban environments.

6. CHALLENGES & OPPORTUNITIES

The concept of creating liveable and inclusive urban voids holds significant promise, yet it also presents a myriad of challenges that must be addressed to fully realize its potential. These challenges include:

- Limited resources and funding for urban redevelopment projects.
- Conflicting interests and priorities among different stakeholders.
- Regulatory barriers and bureaucratic hurdles that impede the implementation of innovative ideas.
- Socioeconomic disparities that may exacerbate inequalities in access to public spaces.
- Resistance to change from established norms and conventions in urban planning practice.

However, these challenges also present opportunities for creativity, innovation, and collaboration. By engaging with local communities, leveraging public-private partnerships, and harnessing the power of technology, cities can overcome these obstacles. Such efforts can pave the way for more inclusive and resilient urban environments.

7.1 The Significance of Sensory Mapping to repurpose the urban voids:

Human perception of the environment is inherently multisensory, involving the integration of visual, auditory, olfactory, tactile, and even gustatory stimuli. Each sensory modality contributes to our overall experience of space, influencing our emotions, behaviours, and sense of belonging. Therefore, to truly understand urban voids and their potential, it is essential to consider the full spectrum of sensory experiences that they afford.

Sensory mapping provides a holistic approach to consider the sensory experiences of people within the built environment. By mapping various sensory stimuli present in urban spaces, we can gain insights into how people interact with their surroundings and how these interactions influence their well-being and quality of life.

Sensory mapping can allow us to identify opportunities to enhance the sensory qualities of urban spaces, thereby creating more engaging and inclusive environments. By incorporating elements such as greenery, public art, lighting, and street furniture, planners can design multi-sensory experiences that stimulate the senses and foster a sense of place and belonging.

Moreover, sensory mapping can help identify areas of concern, such as noise pollution, air quality issues, or lack of accessibility, enabling planners to address these challenges and improve the overall liveability of urban environments. By prioritising sensory experiences in urban planning processes, cities can create spaces that cater to the diverse needs of their inhabitants and promote social cohesion and well-being.

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- Establishing the strategies for Creating Liveable and Inclusive Urban Voids:

As we contemplate the future, a pertinent query emerges: How can the user-centric approach continue to fulfil the expectations and demands of local communities amidst evolving urban complexities? Illustrated below is a foundational list of strategies pertaining to sensory placemaking, outlining seven core attributes that underpin and contribute to the vision of creating new public realm. These attributes encompass the physical milieu, aspects of health and well-being, community involvement, the integration of smart technologies, and the perceptible environment. The strategies below aim to establish the key drivers to transform urban voids into vibrant and inclusive public realms, we can employ a range of strategies informed by sensory mapping principles. These strategies aim to enhance the sensory qualities of urban spaces while addressing the diverse needs and preferences of urban populations and include:

- Inclusive Design Strategies

Incorporating principles of universal design ensures that public spaces are accessible and accommodating to people of all ages, abilities, and backgrounds, thus fostering inclusivity. Key strategies involve eliminating physical barriers, enhancing navigation, offering inclusive seating arrangements, and accommodating diverse sensory preferences. Prioritising these inclusive approaches can significantly enhance residents' quality of life, promote social interaction and community engagement, and cultivate a sense of belonging. This holistic approach to urban design aims to create equitable, enjoyable, and empowering spaces for all users, recognizing and addressing diverse needs to ensure dignified experiences for everyone.

- Incorporating Nature and Green Spaces

Greenery significantly enhances the sensory experience of urban environments by providing visual appeal, improving air quality, and promoting mental well-being. Integrating parks, gardens, and green spaces into urban voids can create oases of tranquillity amidst the city's hustle and bustle. These green spaces offer recreational and relaxation opportunities and serve as habitats for biodiversity, contributing to the ecological resilience of urban ecosystems. [14]

- Fostering Cultural Identity and Diversity

Urban voids offer opportunities to celebrate the cultural heritage and diversity of urban communities. Incorporating elements of local culture, history, and tradition into public space design can create inclusive environments that reflect the community's unique identity. Public art installations, cultural festivals, and heritage trails can foster a sense of pride and belonging among residents while promoting intercultural dialogue and understanding.

- Promoting Safety and Security

Safety is critical in creating inclusive urban voids, especially in areas perceived as unsafe or undesirable. Planners can address safety concerns through improved lighting, surveillance cameras, and active programming of public spaces. By fostering a sense of security, cities can encourage greater utilization of urban voids by residents and visitors, thereby activating these spaces and enhancing their vibrancy.

- Integrating Technology and Innovation

Advances in technology offer new opportunities to enhance the sensory experience of urban environments [15]. Planners can leverage digital tools such as augmented reality, interactive displays, and mobile applications to create immersive experiences that engage the senses and encourage exploration and discovery. Additionally, incorporating sustainable technologies such as green infrastructure, renewable energy, and smart lighting systems can reduce the environmental impact of urban development while enhancing inhabitants' quality of life.

- Promote health and wellbeing

Promoting health and well-being when considering new public realms in cities is crucial, and sensory mapping plays a pivotal role in this process. By understanding how different environments affect

people's moods and behaviours, planners can create more inclusive, accessible, and enjoyable spaces. This approach can reduce stress, promote physical activity, and foster social interactions, contributing to overall public health. Sensory mapping helps identify and mitigate potential negative sensory impacts, such as excessive noise or pollution, ensuring that urban environments are both pleasant and conducive to well-being.

• Creating city memories

In urban environments, lasting memories are crafted through intentional urban design, where each aspect, from architecture to public spaces, shapes experiences. A city's design should seamlessly blend aesthetics with functionality, inviting exploration, interaction, and contemplation [16]. Iconic landmarks serve as focal points, while more intimate spaces like foster social connections and personal moments. Thoughtful design also weaves in the city's story through art, history, and culture, imparting a sense of place and identity. Sustainable practices ensure these memories endure for future generations, maintaining the city's vibrancy and relevance. Ultimately, a well-designed city becomes a canvas for human experience, where every element contributes to a tapestry of enduring memories that reflect its unique character and spirit.

By implementing these strategies, we can transform underutilised spaces into dynamic, inclusive, and sensory-rich public realms that cater to diverse urban populations. The diagram below has been developed as a starting point of establishing strategies for repurposing the urban voids through sensory mapping. Each strategy contributes to the overarching goal of transforming urban voids into vibrant and inclusive public realms.



Figure 4. Inception diagram to investigate the key strategies to establish inclusive and liveable public realm

7. CONCLUSION

In the journey to reimagine urban voids, sensory mapping emerges as a pivotal tool, unlocking the potential to transform neglected or underutilised areas into vibrant, inclusive public spaces. The process of sensory mapping, which considers the multisensory experiences of urban users, provides

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a framework for designing environments that are not only functional but also responsive to the diverse needs and preferences of the users. For urban policymakers and practitioners, sensory mapping in combination with the strategies described above, could provide a robust tool to guide decision-making processes. This method can be instrumental in prioritising investments, evaluating the effectiveness of interventions, and ensuring that urban development is both equitable and inclusive. By embedding sensory considerations into urban planning policies and guidelines, cities can move towards a more holistic approach to development. The realisation of inclusive and sensory-rich cities is a collective endeavour, demanding active participation from a wide array of stakeholders, including government agencies, urban developers, designers, researchers, and community members. This collaborative approach ensures that the diverse voices and experiences of all urban users are heard and integrated into the planning and design processes. By embracing participatory methods, universal design principles, and leveraging innovative technologies, cities can fully utilise the potential of sensory mapping. Such efforts will lead to the creation of public spaces that are not only vibrant and welcoming but also universally accessible, setting the stage for urban environments that truly serve the needs of all their inhabitants. In conclusion, sensory mapping is more than just a design tool—it is a philosophy that champions the creation of urban spaces that are inclusive, equitable, and alive with the sensory experiences of their users. As cities around the world strive to become more sustainable and resilient, integrating sensory mapping into urban planning represents a significant step towards achieving these goals. By doing so, we can ensure that our urban environments are not just places to live, but places to thrive, fostering a sense of belonging and well-being for all.

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Biomaterials in architecture and the principles of biomimicry, as tools for the transition to a circular economy.

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Abstract

The purpose of this article is to explore the connection between biomaterials and technology in Architectural construction, as a process that can lead to a more effective design, regarding the reduction and response to the dramatic effects of climate change. It aims to learn from the principles of the circular economy and integrate these learnings into the development of structures to understand the importance and impact that their implementation can have in achieving the goals of the 2030 agenda, as they relate to the decarbonization of architectural constructions. The methodology followed is the investigation of the problem through analytical bibliographic research and other evidence as well as the study of four case studies, to evaluate the application of such an approach in contemporary and future Architectural design, to achieve the eleventh goal of sustainable development of U.N. that urges us to create cities that are resilient and sustainable, free from poverty and exclusion. In conclusion, proposals are formulated for current and future constructions, regarding the contribution of these strategies to climate change mitigation and adaptation to its effects.

Keywords: biomaterials, circular economy, modern manufacturing technologies, bio-mimicry, UN sustainable development goals.

1. INTRODUCTION

Around 37% of energy and process-related CO₂ emissions and more than 34% of global energy demand are attributed to the buildings sector, which includes energy used for building, heating, cooling, and lighting homes and businesses as well as the appliances and equipment installed in them, according to the United Nations.[1]

The Intergovernmental Panel on Climate Change (IPCC) claims that energy-efficient building and construction policies can help lift 2.8 billion people out of energy poverty in developing nations by reducing greenhouse gas (GHG) emissions by up to 90% in developed nations [2] and up to 80% in developing nations. Nevertheless, the industry is still not on schedule to realize its full mitigation potential because half of the structures will still need to be constructed by 2050. [3]

The lengthy lifetime of building appliances, HVAC systems, and other structures means that choices made today about purchase and design will influence energy use for many years. In the ensuing decades, buildings' influence on the climate is probably going to grow. Future construction will need to be more resilient to natural disasters and decarbonized throughout their lives. [4]

Many governments have committed to initiatives like the UN Paris Agreement and the EU's goal of becoming carbon neutral by 2050, and they have increased their efforts to lessen the impact of building construction on the environment. To achieve this, construction procedures must be approached in a circular rather than a linear manner, allowing for the reduction of carbon emissions throughout a building's life cycle.

Is it possible for a bio-based economy to meet the demands of increasing urbanization while lowering the carbon footprint of infrastructure? What is the scope of innovative manufacturing using various

technologies, and which technologies should be used? The eleventh UN target for sustainable development can be accomplished in this situation.

In this article, we recommend using the following strategies to achieve global decarbonization solutions: a. the biomimicry paradigm; b. the use of agricultural waste and recycled materials; c. the integration of nature into urban environments; and d. resource optimization, such as the use of 3D printing technologies to create concrete with low carbon emissions. Consequently, four case studies related to sub-goals 11.1, 11.7, and 11.10 of the UN's eleventh goal—among the seventeen sustainable development goals—are provided. In particular, goal 11.1 states that by 2030, everyone should have access to essential amenities, safe, affordable housing, and slum upgrading. Furthermore, sub-goal 11.10 calls for our cooperation in providing less developed nations with the financial and technical means necessary to construct sturdy, long-lasting structures out of locally available materials. Last but not least, target 11.7 exhorts us to ensure that everyone has access to secure, welcoming, and accessible green and public places by 2030.

2. CASE STUDIES

2.1 The Biomimicry paradigm

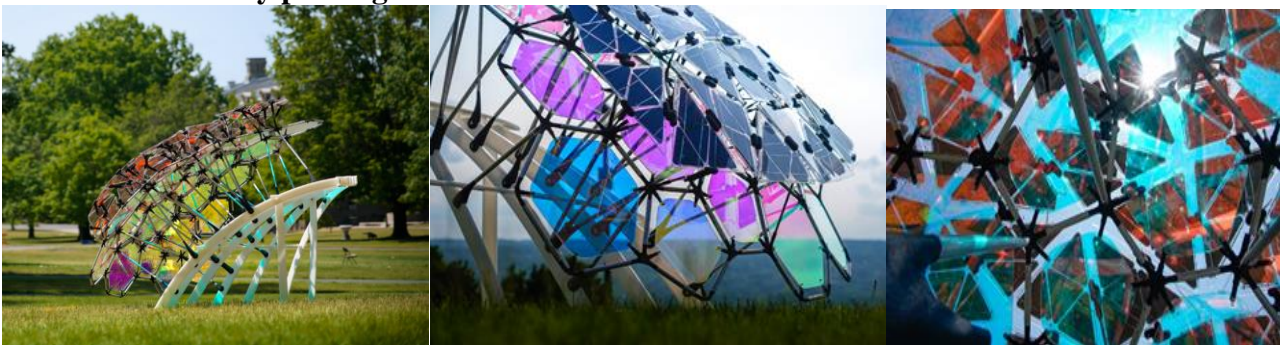


Figure 1, 2, 3 from left to right, “The Agri-voltaic Pavilion”, [RB](#) [5]

A method for conserving energy is biomimicry. Architect Pawlyn asserts that there are numerous benefits to studying the assembly of materials in biology, including low-energy production using locally accessible materials, the lack of bio-accumulative accumulative and persistent toxins, and closed-loop interconnections that allow for the reuse of everything. We then provide creative carbon sequestration structures that illustrate the dynamics of the biomimetic paradigm.

According to architect Jenny Sabin, the demand for cooperative material solutions stems from the sustainability and climate issue, which has led to the creation of a new research model. He views nature as a design metaphor and has developed a generative design process. Research does not translate what may be considered an aesthetic form; rather, it aims to understand the behaviors and processes that regulate these systems. How might buildings and their interconnected material systems behave more like creatures that react and adapt to local contexts? is one of the main issues that drives her research.

Based on the biomimetic paradigm, as depicted in Figures 1,2,3, a project was developed that innovates the design and engineering of Building Integrated Photovoltaics (BIPV) through computational design and 3D printing to create highly customized non-standard filters and panels that result in site-specific non-mechanical tracking solar collection systems. The project is a collaboration between the Sabin Lab at the College of Architecture, Art, and Design at Cornell University and the DEfECT Lab at Arizona State University. Biological adaptations, such as heliotropic mechanisms in sunflowers and light-scattering structures in Lithops plants, provide a starting point for the investigation of non-conventional panel layouts that enhance energy conversion efficiency.

Following solar path data, the suggested method eliminates 30% of copper cable and the usual 50% extra structural metal per module, resulting in a 15% reduction in carbon intensity for a southwest installation. Consequently, the Agri-voltaic Pavilion showcases the potential of sustainable design for a resilient land-use model that offers an integrated approach to food, energy, and water by demonstrating the first adaptable system with exceptionally low greenhouse gas emissions.[6]

- **Sustainable 3D printing Constructions from agricultural waste.**



Figure 4: left: coconut panel **Figure 5:** right: agricultural by-products, <https://shorturl.at/dOTZ3> [7]

In line with UN Sustainable Development Goal 11.10, which calls for financial and technical support to less developed nations so they can construct long-lasting, sustainable structures out of local resources, this article recommends as best practice the use of biomaterials made from recycled agricultural waste [8]

A case study on bio-based post-agricultural waste materials and sustainable construction techniques is offered in this context. Getting rid of agricultural waste is a big problem in many nations. The agriculture sector may find a solution to this problem by turning this waste into construction materials, which would have a beneficial environmental impact and provide a clean building material that could be fully recycled back into the ground. The example we shall present, as depicted in Figures 4 and 5, relates to the fundamental elements of floodwater retention, which are rice and coconut bark. applied to the Efua Sutherland Park bioswale project in Accra, Ghana. Additionally, we will demonstrate how to make brickwork using a treatment of moringa bark. There are often technical concerns about scalability, industrial production, standardization, fire safety, and mechanical strength when working with agricultural waste and bio-based materials. From the standpoint of developing regions in West Africa, this data was thoroughly examined by Willow Technologies, a sustainable material and building technology company founded in 2017 to promote research and development of biological, agricultural by-products in building technologies, led by Ghanaian-Filipina architect Mae-Ling Lokko.

Mae-Ling Lokko's practice has been able to explore and document the material character of various crops, their potential by-products, local transformation techniques, and the prospect and challenges of their extensibility as building materials through extensive work with coconuts, moringa, rice, and other indigenous crops. Mae-ling asserts that increasing demand for agro-based materials via

knowledge and education about them is a prerequisite for achieving the scalability of these materials. This was the basic concept driving Willow Technology's investigation into the utilization of rice, coconuts, and moringa agricultural by-products in a nation where the introduction and promotion of foreign hybrid foods was steadily decreasing the commercialization of native species.

The study topic "How to induce demand and productive use of indigenous crops and agricultural by-products in Ghana" arose from the fact that the crop could only produce enough by-products through practice to be scaled up into construction materials. Willow accelerates the research and development of low-carbon solutions across all industries by collaborating with entrepreneurs, government agencies, private foundations, and local and international partners.[9]

In Ghana and Senegal, Willow is in charge of the creation and research of the carbon life cycle of building materials for all residential building sectors. Willow collaborated with the Roads Research Institute, the Ghana Council for Scientific and Industrial Research on Buildings, Worofila, and AARBMN in Senegal for each country's case study. Together, they evaluated and contrasted the carbon footprint of conventional materials from their initial construction to their end of life with that of low-carbon alternatives. In response to a request for COP27 (the 27th United Nations Climate Change Conference (UNFCCC), that was realised in Sharm el-Sheikh, Egypt, November 6–18, 2022), Willow used rice and coconut husks as essential elements of flooding and water retention in the 'bioswale' project at 'Efua Sutherland' Park in Accra, Ghana. In collaboration with renowned African chef Selassie Atadika, Willow and the Midunu Institute procured 126 bags of rice from Africa Rice via the World Crop Trust, which were then incorporated as green infrastructure in a section of the park that is vulnerable to flooding. To slow down the water, the project entailed creating and constructing a bioswale and planting flood-resistant rice with other native species.

There may be more opportunities for by-products with broader uses due to the strong demand for regional food items. Willow Technology's investigation into by-products from "moringa," a popular tree in Ghana that is frequently used for tea, oil, herbs, and medical purposes, is proof of this. Press powder is a byproduct that is left over after moringa oil is extracted. This flour-like material aids in the accumulation and sedimentation of heavy metals and other harmful elements in wastewater, making it useful for treating toxic sewage. The moringa research and design from Willow Technologies was used by Global Mamas, a network of women-owned home-based batik dyeing businesses, to treat textile effluent. This method made their effluent less harmful than EPA standards in a proof-of-concept project, allowing it to be safely dumped into municipal sewer systems. Additionally, the process leftovers provide a sludge that can be utilized to create compacted earth masonry.

According to Willow Technologies, creating a new distributed production infrastructure for distributed biomass from the food, building, and agricultural cycles is the key to increasing the number of farming byproducts. According to Lokko, the first step in cutting production costs is to bridge the gap between the collection of agro-waste and its quality control by creating accessible production techniques. These concepts are best illustrated by the company's early use of coconut husks as a building material. Their initiatives were a reaction to Ghana's coconut boom, which resulted in traders disposing of tons of husks on the side of the road because there were no proper disposal facilities. For these projects, they gathered these husks from traders; nevertheless, their goal is to create a dispersed system of small-scale milling machines in particular areas of the city, enabling coconut vendors to process their husks and receive payment. To produce material, the husks are diced into light, fluffy, dried fibers that are easier to handle. Compared to immature coconuts from other worldwide producers, native mature coconuts from Ghana have a higher lignin concentration, which offers them a structural edge for possible usage in construction products like medium and high-density fiberboard. Using heat compression techniques and bio-based adhesives, Lokko's practice has harnessed this bark material to create low-carbon, non-toxic fiberboard. Insulation is typically the quickest application for these materials in buildings. However, no one is interested in them or is

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prepared to pay a premium price if you conceal them behind a wall, according to Mae-Ling. He continues, saying that design plays a significant influence in changing cultural perspectives. "I think there is a missed opportunity to capture their true value as strong, breathable building skins, partitions, and furniture, which has the potential to attract people to adopt them," he says. Using the form, texture, color, and surface patterns of these panels, this method was also applied to the usage of coconut husk boards in projects, enhancing the mechanical, acoustic, or thermal performance of the item showcased in projects like the Yale CEA Nairobi Ecological Pavilion and exhibitions at the Museum of the Future in Dubai [10]

The Ghanaian architect argues that not all architectural materials should be considered everlasting and that we should reevaluate each material's performance metrics and value for maintenance. By coating such bio-based materials, the likelihood that their distinct hygrothermal characteristics may impact interior comfort is greatly diminished. In hot, humid tropical regions, these material behaviors—which involve absorbing and storing moisture in the late evening and early morning and releasing it during the day—are significant passive cooling technologies. When comparing the general characteristics of bio-based products, it can be seen that these materials are crucial in utilizing the plentiful local resources and lowering carbon emissions during the construction, operation, and eventual demolition of buildings. Building relationships between players in agriculture and construction is necessary to maximize these resources and assist in the upskilling of local experts and craftspeople so they can contribute to a flourishing bio-economy. However, governments will also need to encourage and promote these collaborations, drive market demand, and take a proactive role in national and regional policy [11]

- **Solutions incorporating nature in urban environments**

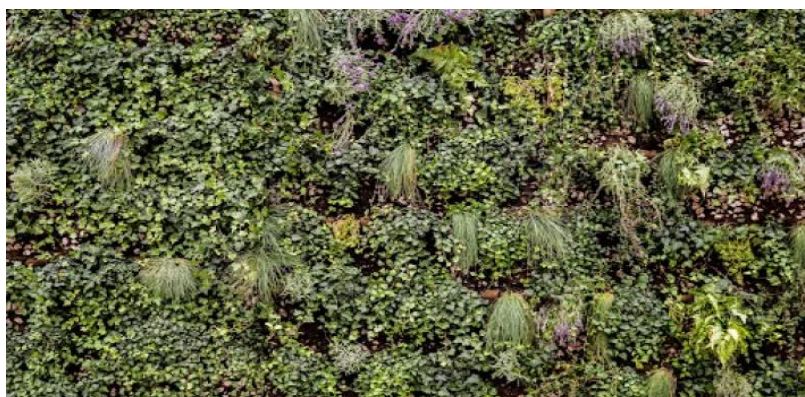


Figure 6. Bioactive green wall, <https://shorturl.at/rsuOS> [12]

Target 11.7 of the UN's Sustainable Development Goals calls for ensuring that everyone will have access to secure, inclusive, and accessible green and public places by 2030. [13]

Green wall solutions are essential to the search for more sustainable buildings made of long-lasting materials with lower environmental impact, better financial performance, and circularity. They also help to mitigate the heat island effect that occurs in large urban centers. "Bioconcrete" is a new substance that was developed in response to the rising global CO₂ emissions caused by the production of concrete. It is a type of self-healing concrete that has bio cement—an environmentally friendly main ingredient—added to it. This substance is only active when there is water present; it can lie dormant for many years. Thus, in contemporary culture, bio cement—bio concrete—produced via MICP (biomineralization/bio precipitation) may be a good substitute for ecologically friendly building materials [14]

Bio-Active Concrete from Holcim, a multipurpose material that was used during the German Design Week in the Netherlands in 2021 by the architectural firm Bouw & Infra, is an example of this self-healing building material. As shown in Figure 6, Holcim's innovative green wall consists of two surfaces: a layer of structural concrete and a porous concrete that allows plants and seeds to grow. The solution is easily expandable for both residential and infrastructure applications because it is composed of precast concrete parts. By functioning as a biofilter, it controls the building's temperature and lessens the impact of the heat island. In addition, it helps preserve rainwater, enhances biodiversity, and lessens noise pollution by absorbing sound [15]

Additionally, as shown in Figures 7, 8, and 9, the bioactive wall of eco-concrete is a construction that grows naturally, attracting lichens, moss, endolithic algae, and attached plants. It doesn't require intricate soil systems to create wet niches that support vegetation because of its high porosity and complexity. For increased green coverage, bioactive wall features with planting pockets are a great option for facades. The Bio Active wall tile's proportions can be changed to meet the needs of every project. The project's unique structural and biological requirements determine the precise concrete matrix that is used for casting.[16]

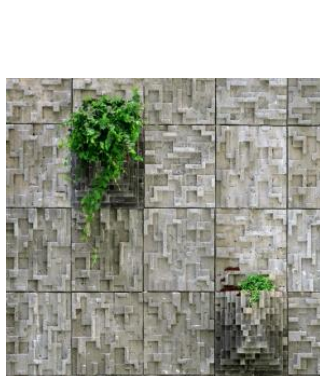


Figure 7. Bioactive wall

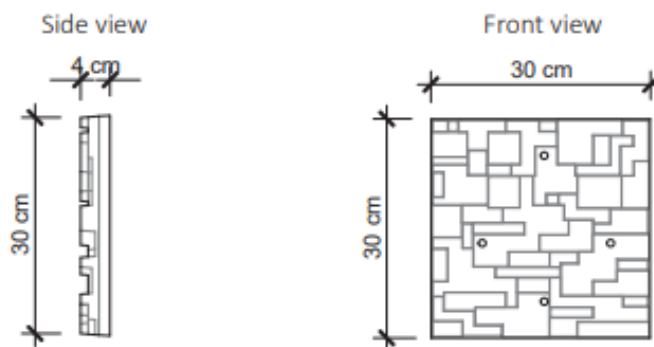


Figure 8. Standard tile

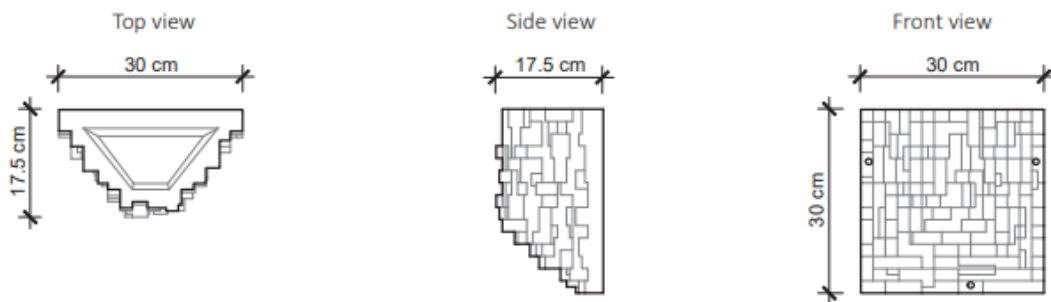


Figure 9: Pocket tile

Moreover, Chris Allison, the founder of City Forest, a group of horticulturists, designers, and engineers dedicated to creating sustainable plant systems, created the superb and cutting-edge seven-layer vertical garden system, as depicted in figures 10 and 11, known as the Bioactive Wall, which permits plant roots to spread freely. This green wall technology produces an almost natural environment by allowing plants to grow along and through the construction. Plant spores, from lichens to ferns, can organically proliferate on the wall in this way. Fundamentally innovative, the Bioactive Wall promotes sustainability by requiring less water, upkeep, space, weight, and plastic. Water conservation can be achieved by eschewing the application of conventional green wall

methods. The Bioactive Wall works to moisten the plants' surface and then take moisture from it, eliminating the need for water to drop from pot to pot and effectively wasting water.



Figure 10, left. Interior space, **Figure 11**, right. Exterior space, <https://www.cityforest.com.au/bioactive-wall> [17]

Using as much recyclable material as feasible, garden systems cool our sweltering cities while removing CO₂ from the environment. This implies that we intentionally select aluminum parts made from waste materials, such as drink containers when constructing our garden systems. Furthermore, the walls' bio felt is composed of recycled materials, preventing microplastics from entering rivers and the food chain [17]

2.4 3D-printed low-carbon concrete.

By tying in the eleventh sustainable development objective of the United Nations with the several ways to accomplish CO₂-free architecture, we selected strategies that support energy efficiency and reconstruction with new technology while also favorably impacting environmental sustainability. More specifically, the UN's sustainable development target 11.1 states that the objective is to guarantee everyone's access to appropriate, safe, affordable housing and the renovation of slums until 2030 [18]

Low-carbon concrete solutions combined with 3D printing technology offer a tremendous potential to decarbonize buildings and achieve speed and economy in construction, ensuring that everyone has access to secure and cheap housing. This kind of concrete can be used in circular construction because it is entirely recyclable and produced locally. They combine a low carbon footprint with circular benefits by incorporating recovered trash from construction and demolition projects. By using them, CO₂ emissions can be decreased from the market reference by at least 30%. They may be pumped and used like regular concrete to finish their life cycle, making them simple to use as well. Among other things, they can be used for roads, pavements, walls, beams, columns, and foundations. Concrete 3D printing, as shown in Figures 12 and 13, is a rapidly developing technology that has the potential to fill infrastructure gaps globally by enhancing performance and facilitating more effective construction. Buildings made with 3D printing are more resource-efficient, require less intricate structures, and maximize material utilization [19]



Figure 12, left. Print ten housing units in Kenya, <https://shorturl.at/sEQRZ> [20]

Figure 13, right. [Advanced Mortars for 3D Printing.](#), 30/12/2023

To expedite the building of large-scale projects, sophisticated mortars for 3D printing have also been created in the cement sector. These solutions' benefits allow for up to a 50% decrease in project materials without sacrificing project performance. Large-scale projects can be completed more quickly thanks to sophisticated mortars that optimize material usage and reduce errors on construction sites 3D printing only uses the resources required for construction. [21]

3. DISCUSSION AND CONCLUSIONS

Many building materials have an adverse influence on the environment when we take into account the human activities necessary to create our urban surroundings. To obtain raw minerals, mining is typically required. The utilization of mining minerals affects the world's natural systems. The mined materials used to produce common building materials, such as minerals, sand, gravel, crushed stone, cement, etc., are non-renewable resources because their formation is dependent on long-term natural ecological products and services, like natural sedimentary cycles. These materials are used to make steel, aluminum, concrete, glass, and other materials. According to Keena and Dyson (2017), these cycles can endure for thousands or even millions of years.[22]

The depletion of non-renewable mineral resources is the foundation for the manufacture of basic building materials. In addition to raw materials, the human race depends on the world's ecological systems for other ecosystem services including air pollution, which is frequently linked to the building and manufacturing of building materials. For instance, producing cement, one of the primary ingredients of concrete releases a lot of CO₂, therefore the environment is crucial to the making of concrete in absorbing and reducing the pollution brought on by CO₂ emissions. On the other hand, bio-renewable materials, including agricultural byproducts, can sequester CO₂ throughout their existence and have low-carbon production techniques. Therefore, many biomaterials are carbon neutral or carbon negative when looking at life cycle analysis. Renewable biological resources derived from plants, as well as waste (food) streams, are rich in several important components, including cellulose, proteins, and carbohydrates.

A novel biorefinery is being developed at Wageningen University & Research to utilize all of these components. The goal is to employ them as much as possible in food, materials, chemicals, and animal feed. Finally, we also take into account if a tiny portion can still be used to produce biofuels for heavy-duty vehicles. Opportunities are created by Wageningen University & Research to fully utilize biomass while preserving the quality of the soil. For instance, we can use the stalks of corn in addition to the cob since they contain essential components that can be used to make plastics. To establish a circular bio-based economy, Wageningen University & Research has adopted this strategy, utilizing our knowledge in biorefinery technologies, crop cultivation, bio-based product creation, and economic models.[23]

Using renewable resources from agricultural waste is a beneficial practice in current studies on sustainable construction methods, according to researcher Mae-Ling Lokko, an assistant professor at Yale University, discussing the energy and carbon life cycle of materials. Lokko 2016 [24], Lokko et al. 2016 [25], and Lokko and Rempel 2018 [26], the researcher's papers, indicate that raw materials for the building industry can be crucial in "closing" material life cycle gaps in the global economy. Throughout the building's life cycle, the application of bio binders to produce a variety of low-to high-density agro-waste-based materials has shown advantages for enhancing energy efficiency and air quality. The materials' ability to function as an inherent evaporative cooling material in humidity management systems and technologies is demonstrated by their hygienic and thermal performance. Compressed coconut fiberboard's mechanical strength can rival that of reconstituted wood material technologies on the market, which creates opportunities for applications related to indoor air quality and acoustics. One such application is as a plasterboard substitute spacer.

The same researcher used life cycle assessment (LCA) to compare three wall assemblies made of locally available bio-based materials in Montreal, Kenya, and Accra, Ghana, against a traditional construction that uses plasterboard and Rockwool insulation. The results of the comparison, published in a recent article, showed that all bio-based material alternatives had lower life cycle impacts per functional unit than traditional construction. It has also been demonstrated that DfD (design by disassembly) techniques lead to effect reductions of between 10% and 50%. The findings for the two African nations demonstrate a substantial possibility for future decarbonization, despite a strong reliance on the source of power used for building.[27]

Resurrecting bio-architecture as an alternative to other construction processes is the result of the present trend toward sustainable building construction and growing environmental awareness. Because biomaterials are renewable, their primary benefit is their little environmental impact. It can also be processed with basic tools. Biomaterials enable quick installation and prefabrication. As a result, biomaterials are now referred to as the "building materials of the twenty-first century" since they are seen as an appealing substitute for many conventional building solutions. Biomaterials mitigate emissions from other materials because they can efficiently sequester carbon. There are several opportunities that biomaterials bring to the built environment. From the perspectives of the environment, economy, society, and human health and well-being, biomaterials provide a comprehensive strategy with the ability to mitigate various effects at each stage of the building's life cycle. These kinds of solutions move us one step closer to our nature strategy and our objective of greening cities. By creating this nature-based strategy, we will contribute to creating a future that benefits both people and the environment.

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**DESIGN FOR CLIMATE ADAPTATION IN URBAN PUBLIC
SPACES: FROM ASSESSMENT TO INTEGRATED
INTERVENTION**



Changing Cities VI, Rhodes, 24 - 28 June 2024

Organized and chaired by Assoc. Prof. Thanos Pagonis

Assoc. Prof. Thanos Pagonis, National Technical University of Athens, Greece

Design for Climate Adaptation of Public Spaces in the context of Southeastern Mediterranean Urbanism

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Abstract

The paper discusses the challenges of climate adaptation of public spaces in the context of Southeastern Mediterranean Urbanism from an urban design perspective drawing on the experience of Greece. It begins by highlighting the defining characteristics of the particular tradition of urbanism that has evolved in the region. Climate adaptation of public spaces in the context of Southeastern European Urbanism is seen as having a double scope. On the one hand restoring deficiencies and enhancing urbanity in areas compromised by problematic urban structure and low-quality public realm and on the other hand introducing nature-based solutions through strategically devised urban interventions. The paper explores this potential by examining three characteristic design case studies in the metropolitan area of Athens. Analysis concludes that cities and coastal areas in the South-Eastern Mediterranean are in dire need of restoring urbanity in balance with nature and eco-systemic processes. Climate change pushes for a new orientation and design priorities such as heat relief, better use of unutilized and abandoned green infrastructures and recuperating the coastline as public space. Understanding the context of local urbanism is key to unlocking solutions for climate mitigation and adaptation of urban public spaces. Meanwhile, Research by Design provides the analytical tool for investigating and framing strategic urban interventions.

Keywords: *Mediterranean urbanism, climate adaptation, retrofitting urban interventions*

1. INTRODUCTION

Responding to the consequences of climate change is by now a widely debated topic among various policy communities, such as politicians, legislators, urban planners and environmentalists, and, not to omit, a central theme of many European policies and programs, starting with the European Green Deal and the New European Bauhaus. This paper addresses the question of climate adaptation from the angle of urban design, drawing more specifically on the concept of ‘Urbanism’ as an analytical tool and ‘Research by Design’ as a broader methodological track for dealing with urban problematics. Their value in devising urban design approaches for climate adaptation of public spaces is explored here.

Under the term *Research by Design*, we refer to the growing significance of the type of investigatory analysis of the city and urban space through drawings and visualization of data that is typically undertaken in schools of architecture and some architectural practices as a starting phase but also a methodological approach towards carrying out urban design. More recently, Research by Design has been recognized as a valid framework for conducting PhD related research in accredited academic programs of architectural and urban design, while a definition of Architectural Research which encompasses RbD is acknowledged in the Charter of the European Association of Architectural Education [1]. Going beyond official formulations, one could argue that research by design rests on the long tradition of architectural thinking about the city that has been nurtured over the years in-between theory, practice and research which involves meticulous identification of the terrain, critical inquiry, and devising of innovative synthetic solutions that go beyond the mere transposing of social and political agendas onto space. This tradition is certainly associated with the practice of urbanism.

Under the term *Urbanism* we refer to the holistic approach to planning and design of urban space which originated in the 19th century European city, also transplanted overseas, that encompasses merged planning and design preoccupations, such as land use, real estate and regulation, urban form, circulation and infrastructure along with ecological aspects into complete artefacts and can be summarized as ‘the art of building cities’ [2]. Among the products of the practice of urbanism are included some of the most iconic and resilient historical districts of European and American cities.

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Whereas urbanism has evolved since the 19th and early 20th century obviously along with the evolution of dominant ideas about city planning, so that the contemporary connotations of the term deviate from the original context of civic architecture and design, what remains as its legacy for urban research, is the emphasis on typologies, urban form and the unitary approach in linking spatial-technical with socio-ecological dimensions of the built environment. Perhaps it is not accidental that contemporary supporters of the movement of New Urbanism in the US argue that it is by definition ecological, sustainable and climate resilient contrary to the assumptions of its opponents [3]. Consequently, the argument made in the paper is that it is not possible to devise fitting design solutions for climate adaptation of public spaces without a solid understanding of the local context of urbanism. Inversely, the systematic study of local urbanism and the way that it has responded to resilience challenges in the past, can provide valuable hints on how to address contemporary problems, such as climate adaptation [4]. And, coming back to the previous point, Research by Design can provide the analytical means on how to uncover these hidden qualities and operationalize them into a design intervention scenario.

This paper builds on the experience of participation in the research network CIMATRA (City Making in Times of Transition) that was formed in 2018 among six European schools of Architecture with the aim to study via research by design the necessary design transitions in different urban environments in response to changing climatic conditions. In the rest of the paper, we present how this research scope unfolds in the case of Greece. First, we provide a brief background on the particularities of Greek Urbanism with regard to climate related challenges drawing on academic literature and recent developments. Following from there, we explore the potential of research by design to respond to these challenges in three characteristic case studies, namely design for heat relief in a densely built central district, retrofitting of a modernist university campus on the urban fringe and recuperating the urban waterfront as public space. The design research in all three cases was carried out at the School of Architecture NTUA in the period 2022-2024. In the last part of the paper, we discuss the findings and return to the main research question about how architectural thinking for the city can contribute to ongoing discussions about climate adaptation of urban public space.

2. CLIMATE CHALLENGES OF SOUTH-EASTERN MEDITERRANEAN URBANISM

The distinct path of Greek Urbanism was analyzed most characteristically by Greek Geographer Lila Leontidou in her ‘Mediterranean City thesis’ [5]. Leontidou looked into the similarities across Southern European cities and their notable differences from the industrialized North, manifested in a number of aspects, such as the spontaneous character of urban development and tolerance of informal practices, the importance of family strategies for housing provision that are associated with widespread practice of self-housing and self-employment [6] and the weak character of welfare provisions. This model of urbanism has been associated with specific typological and urbanistic traits, most notably the small scale of plots, high density of urban development with few open and green spaces, the uniformity of structures and mixity of land use inside dense urban areas [7]. Linking the socioeconomic analysis of Leontidou about Southern European cities with urbanistic and typological characteristics of spontaneous post war urban development shared among countries such as Greece, Cyprus, parts of Turkey and Albania, we arrive at a tentative definition of Southeastern Mediterranean Urbanism.

Climate resilient responses were ‘built in’ into the model of the ‘Mediterranean City’ early on through the development of areas with second homes next to the sea in vicinity to main urban centres, which enabled urban residents to escape the city during the hot summer months. This was facilitated by the relatively easy access to land and favourable conditions for home-ownership seen also as family investment, a practice that spread across a wide spectrum of social classes and incomes [8]. Typically, the model was supported by the context of extended family structure which facilitated flexible arrangements, such as grandparents and relatives keeping the children over the entire three months of the school break in the summer house while parents stayed in the city or commuted to work. The expression *paratherizo* [passing the summer], (*veranear* in Spanish) most accurately captures this widely spread social practice in South Europe. Its spatial manifestation is associated with the typical low-density sprawl that characterizes the majority of coastal development in the periphery of large metropolitan conurbations of Athens and Thessaloniki but also elsewhere.

Recent studies on the evolution of the development path of Greek cities and the relevance of the ‘Mediterranean City’ thesis [9] have shown that Southern European cities have evolved as a

consequence of social and economic change brought by globalization, the effect of tourism and real estate but also economic crisis and austerity related reforms that eroded some of their inherited resilience characteristics. In this new context climate change bears multiple new challenges. Most notably the urban overheating in the dense urban districts aggravated the living conditions in central urban areas considering also the low construction quality of *polykatoikia*, the typical` condominium housing stock, that makes them particularly vulnerable to the new conditions [10]. Meanwhile, the rising housing maintenance and transport associated costs, the abandonment of the traditional family model also due to demographic changes, as well as increased property taxes, make it now much less affordable to the vast majority to perform this dual living in the summer months. Last but not least, year-long underinvestment of public infrastructures, the so-called infrastructure gap, due to lack of value capture mechanisms [11], negligence of adoption of nature-based solutions and poor management of peri-urban forests make the urban environment and landscape more vulnerable to increased risks of wild fires and sudden floods, like the ones experienced in Greece in the summer of 2023. Also, they provide little possibilities for recreative and relief infrastructures, such urban parks, green corridors and promenades, easy access to nature and the coastline where urban residents can find refuge to.

In the following section we elaborate on three investigations for design transitions of urban public spaces in response to the shifting conditions in the context of Southeastern Mediterranean Urbanism.

3. DELVING INTO THE HADRIAN AQUEDUCT TO DESIGN FOR HEAT RELIEF IN CENTRAL ATHENS

The first investigation involves the activation of an antique Roman aqueduct as tool to generate a pole of urbanity and heat relief based on the principle of the 15min city [12] in the dense urban district of Ampelokipoi, one of the most vulnerable neighbourhoods of central Athens. It has been the topic of an urban design studio led by the author at the School of Architecture NTUA in Spring 2023 in collaboration with Athens Water Supply and Sewerage Company that assisted in providing material, expertise and offering feedback along the design process.

Eleni Myrivili, the first appointed heat officer of Athens Municipality commented in the NYC in 2022 about the dangers of rising heat waves in Athens as follows: “*Without action, the future for Athens would be bleak and airless. The capital would become more of an urban heat island with empty squares and cafes, fewer tourists and an exodus of residents who have the means and opportunities to live elsewhere*” [13].

The Hadrian Aqueduct is an underground urban infrastructure of the antiquity, one of the largest of its kind, which was built in 140 AC by Emperor Hadrian with the aim to water supply the city of Athens. It collects water along a course of 23.5km, a territory which today transcends nine municipalities that form part of the wider Athens dense urban area. The aqueduct fell out of use during the period of Ottoman rule but has been repaired and put back into use in the 19th century to water supply the newly founded capital of the modern Greek state in 1871 [14]. Despite being replaced by more modern infrastructure since the beginning of the 20th century, the aqueduct remains alive still today transporting enough cool water to meet the daily needs of a city of 10.000 inhabitants from the foothills of Mount Parnes to the centre of Athens where it is dumped into the sewer system because we are not prepared to use it differently. In 2021 an initiative to channel European funds for reconnecting the aqueduct with the city was launched by the Region of Attica in the form of an Integrated Territorial Investment (ITI) [15].

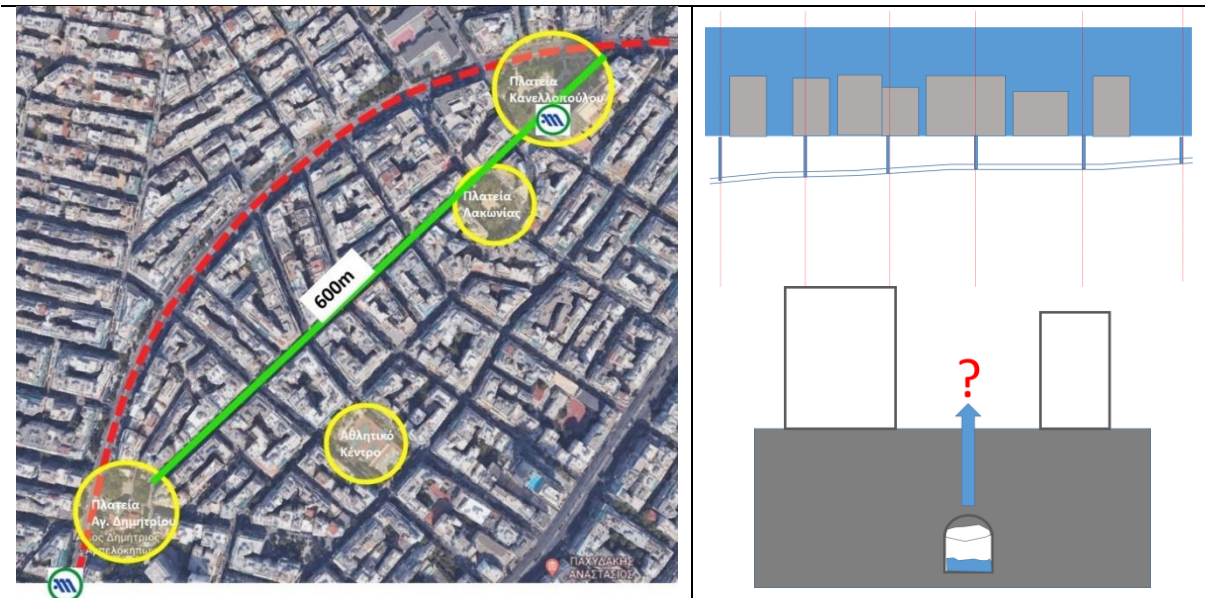


Figure 1: Exploring the resurfacing of the Hadrian Aqueduct along Louise Riancour Street in the central district of Ampelokipoi

In this context the studio aimed to investigate how this goal could be pursued by means of research by design. The studio focused on Ampelokipoi, a densely built mixed use residential district in central Athens on the grounds of it being one of the five most vulnerable neighborhoods to heat based on a combination of socioeconomic and environmental criteria [16]. Meanwhile, in Ampelokipoi, the trajectory of the aqueduct aligns over a distance of 600m with a wide local road (Louise Riancour) that has the potential to become a neighbourhood centre.

The aim of the course has been to bring into focus the presence of the Hadrian Aqueduct and redesign the axis of Louise Riancour Street as a public promenade zone and refuge for heat relief, while also addressing concerns of restituting typological order and enhancing urbanity. More specifically the questions addressed by the studio were the following:

- How can the presence of the aqueduct have an impact on the surface and give a new identity to the neighbourhood?
- How can the redesign of the street have a transformative effect promoting the principle of the 15 min city?
- How can the water of the aqueduct be used to improve climatic conditions and cooling of the area?

The study was organized in three stages. The first stage involved design investigations that focused on the element of water in the city and the design of water features with reference to the history of the Aqueduct in combination with readings of the site's urbanistic characteristics and identifying the parameters that inhibit typological coherence and unity. The second stage involved formulating a schematic design proposal for the redefinition of the axis according to a chosen theme and typological order, making note of the presence of the Aqueduct in the surface and addressing issues of accessibility, program and ecological design of public spaces. The last stage involved elaboration of specific design interventions and landscaping.

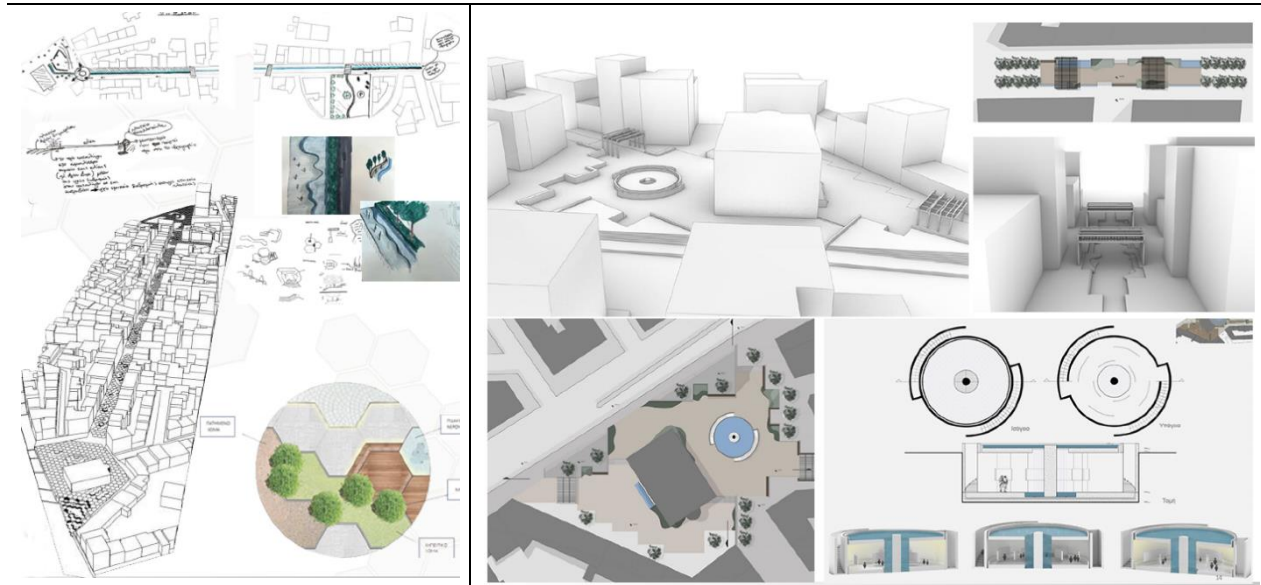


Figure 2: Final results of the urban design studio for the adaptation of Louise Riancour Street as promenade and heat relief zone (studio leader: Athanasios Pagonis)

4. RETROFITTING THE UNIVERSITY CAMPUS

The second investigation deals with the retrofitting of idle green spaces of Athens university campuses to become more climate resilient, while enhancing their transformation into valuable public spaces by removing external and internal fences, redesigning accessibility and enhancing ecological landscape design through nature-based solutions.

Alexandra den Heijer, a professor of Public Real Estate at TU Delft and expert on the planning of university campuses who advises governments on how to make optimal decisions on the use of public facilities has included in her PhD propositions the need to transform the university campus, by “doing more with less” pointing out also that “the ideal campus of the future is a city” [17].

In the era of climate change and overheating, peri-urban green spaces have become increasingly important as spaces where the urban population can find refuge in the hot days and various functions -from walking and cycling to sports and recreation- can be hosted. Often however, peri-urban green spaces fail to fulfil their expected role because they are either compromised or occupied by other uses. This is the case of the campuses of the two main universities of Athens that were constructed on greenfield sites at the foot of Hymettus Mountain in the 1960s moving out of the centre in search of available space for their expanding facilities. It was the period of decentralization supported by the ascent of the automobile as basic means of transport, so the campuses were proudly designed with modernist urban design principles and brutalist architecture and aesthetics. Fortunately, the planting of trees enhanced forestation of the sites at a time when ecological concerns were not a priority. Today the campuses along with adjacent public institutional uses represent the only remaining green corridors that connect the city with Hymettus Mountain amid a ‘sea of concrete’. The government has recognized their ecological value by designating the area a metropolitan park and drafting a masterplan [18]. However, since that time little actions have taken place to make this plan a reality. In the largest part the institutional uses remain fenced and disconnected with problematic accessibility even though there is strong evidence that a large number of people are informally using the facilities for recreation, sports and walking.



Figure 3: The NTUA Campus in the district of Zografou forms part of Goudi Metropolitan Park but only in paper. To what extent is the crisis of the Greek University Campus attributed also to urbanistic parameters and disconnection from the urban tissue besides lack of maintenance and underinvestment?

The aim of the urban design studio led by the author in the Fall of 2023 was to reverse the existing sense of abandonment and uninviting urban environment through redefining basic operating principles of the NTUA University Campus. In particular: promoting walkability, creating an attractive landscape setting through introduction of nature-based solutions and renegotiating the relationship between the campus and the city and the range of services offered. Each student team was invited to address the aspect of climate adaptation in one of the three proposed sub-areas of intervention as follows:

- How can we re-imagine the heart of the Campus as a combination of open-air and communal functions (library, restaurants, cafes) in direct contact with surrounding educational buildings?
- How would you redesign the area of the new student residences as a pleasant and sheltered environment for collective living?
- Is it possible to stitch anew the campus with the surrounding urban grid and transform the present property boundary into a lively urban interface?

Studio work was organized in three stages. The first stage involved design investigations that focused on mapping the intertwining of formal and informal ways of learning that take place across different spaces along with site recognition and study of different typologies of Campus organization. The second stage involved formulation of a spatial and programmatic intervention strategy taking into consideration climate adaptation parameters, such as walkability and landscape rehabilitation. The last stage involved elaboration of specific design proposals for the configuration of outdoor public spaces and communal building infrastructures in the envisaged new setting.



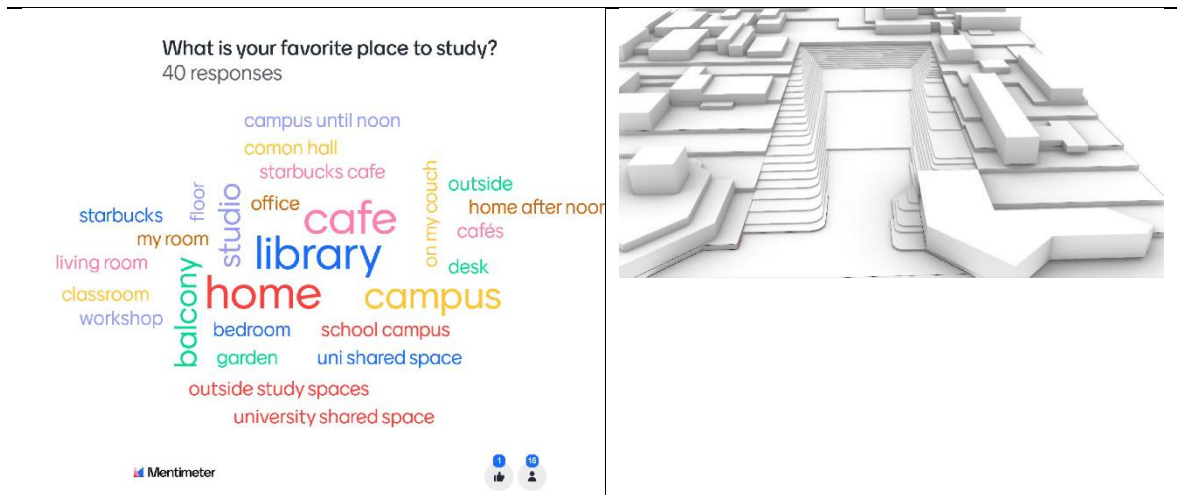


Figure 4: Interim results of the urban design studio for the retrofitting of NTUA University Campus (Studio Leader: Athanasios Pagonis)

5. RECUPERATING THE COASTLINE OF ATHENS AS PUBLIC SPACE

The third investigation deals with the redefinition of the relationship between the city and the sea in a context of shifting climatic conditions and the possibility of recuperating the coastline of Athens as public space [4]. Since the hosting of the Olympic Games of 2004 but particularly after 2015, a clear shift is noted in the dynamics of urban development of Athens towards the sea associated with public and private real estate investments, particularly the Stavros Niarchos Cultural Centre in Faleron and the development of the former airport of Ellinikon [19]. The increase of the permanent population as well as the demand for recreational services has born a significant load on the communal infrastructures and available public space in the coastal municipalities of the Athenian Riviera [20]. Combined with the shifting climatic conditions, this has pushed residents and an increasing number of daily visitors towards the seaside. In the era of the climate crisis, the beach becomes thus a new public space, a large open access urban infrastructure capable of hosting a program of activities which exceeds substantially the traditional perceptions of the Riviera: work, play, recreation, sports and exercise, improvised private and public events unfold almost on a 24hour basis and at much higher frequency. But how prepared is the Athenian coastline to accommodate these new requirements? This programmatic intensity puts a new pressure on a resource that has been up to now a residual space fragmented between various jurisdictions and subject to incremental and provisional interventions. In 2021 the Public Real Estate Fund (TAIPED) which manages the coastal land has announced its plan to create a continuous public pedestrian and cycling route, 6m wide, along the entire coastline of Athens over a distance of 22km from Faleron up to Vouliagmeni [21]. A positive initiative, but how will it play out with the existing situation in the terrain and how can we ensure that it will have a transformative effect towards the desired direction of climate adaptation?



Figure 5: Views of the study area of the beach of Glyfada with the characteristic promontories of portual facilities. The area has been divided into 9 segments with students working in parallel but coordinated investigations.

The investigation of climate adaptation interventions along the coastline and the new role of the beach as public space has been the subject of the urban design studio in the Spring of 2024 focusing on the area of Glyfada. The beach of Glyfada, a longitudinal zone of 3 km is the only outlet to the sea of a large Municipality which in recent years has emerged as the main service centre of Southern Athens. The zone is ‘sandwiched’ in-between large private real estate investments developed on former state land that has been privatized as part of the bail out agreement of Greece since 2018. The urban waterfront forms the inner ring of a system of broad axes leading to the sea interrupted by the coastal avenue (Poseidonos). This limited coastal zone is further fragmented by the presence of four small portual facilities of varying character, fishing boats, nautical vessels and private yachts that disrupt physical and perceptual continuity. Despite the fragmentation of the beach however, these interstices of unutilized land which penetrate the sea represent also opportunities for the creation of valuable green spaces due to the privileged views to the sea and the city that they offer.

The following goals were set for the design studio:

1. Reorganize the waterfront to accommodate the passing of the pedestrian-cycling corridor and to create cool and shaded rest areas.
2. Retrofit vehicular circulation and parking as well as the tramway so that they do not inhibit walkability.
3. Reinvent a new landscape identity attractive and welcoming to all types of users.
4. Restore beaches and marine facilities and renegotiate the boundary between land and sea.

The studio work was structured as follows: The study area was divided into nine segments that were allocated to different teams of students, each working on their designated site but in a collaborative way without predefined masterplan but with obligation to stitch their proposals with those of neighbouring teams. Design investigations were centered around the construction of two large physical models of the entire site in a collective way based on uniform specifications corresponding

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to two different stages of work. In the first stage the design investigations were carried out in scale 1:666 corresponding to identification of terrain and key locational and programmatic decisions, whereas in the second stage the investigations deepened into scale 1:333 corresponding to design development.



Figure 6: Interim results of first stage investigations in Glyfada urban design studio (Studio Leaders: Athanasios Pagonis & Tilemachos Andrianopoulos).

6. DISCUSSION

The paper presented three different cases of research by design investigations for climate adaptation of public spaces in the context of Southeastern Mediterranean Urbanism located in Athens. The design investigations were carried out in the context of master's level studios held at the School of Architecture NTUA. The Hadrian Aqueduct project explored the potential of climate adaptation in the case of the dense central area with a double scope, on the one hand creating a refuge for heat relief and promoting the concept of the 15min city at neighbourhood level and on the other hand restituting coherence and typological order in an urban environment with compromised built form. The studio revealed that retrofitting existing urban space for pedestrians rather than cars and introducing micro-climate improving design can bear a transformative effect. The University Campus project explored the possibility of turning idle outdoor spaces of public ownership within fenced institutional compounds into valuable green spaces offering comfortable climatic conditions to their users but also nearby residents. The project revealed that urbanistic problems deriving from isolation can be resolved by removing boundaries and enabling the dual condition of 'the city in the campus and the campus in the city' to evolve'. Also, that there is significant ground to reconstitute the urbanity of university life in a new context of a climatically resilient environment that both nourishes and benefits from restored ecological functions. The Glyfada beach project explored the potential of the coastline of Athens to become an open access public infrastructure capable to respond to the increased needs of permanent residents and daily visitors for cooling and recreation as part of their daily routines and itineraries. The project interim results already reveal an enormous potential for the coastline to

become an attractive, climate resilient but also inclusive territory of high capacity provided that it is treated in an integrated way and individual requirements are disciplined by the respect to common principles and collective interest.

Coming back to the main research question of the paper the analysis of the case studies revealed that there is a great scope of work in retrofitting the existing urban environment of the Mediterranean City towards meeting the goals of mitigation and adaptation. Design goals have always to be framed within a solid understanding of the local context of urbanism. Questioning the existing urban condition and not taking it for granted through an investigative urban design has the capacity to deliver innovative findings on how design transitions can be set forth.

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City making in Times of Transition – Sustainable, resilient, inclusive and attractive public spaces as stepping stone for a future-proof built environment.

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Abstract

The paper discusses the necessary integrated approaches and design actions aimed at fostering a future-proof built environment through the (re)design, retrofitting, and transformation of public spaces into sustainable, resilient, inclusive, and attractive areas for inhabitants and visitors. It emphasizes the importance of adapting to and mitigating the effects of climate change, as well as addressing spatial advantage and quality, social well-being, and ecological balance. Can we leverage climate adaptation and the urge for the energy and mobility transition as catalysts for spatial transformation to benefit inhabitants? Can this lead to improving attractiveness and use of public space within their neighbourhood? Can design thinking, with a focus on societal values, overcome governance's preoccupation with costs?

The City x Space design study demonstrate that an integrated design approach from different perspectives and disciplines can tackle the multitude of transitions in diverse urban settings, with public space -including its subsurface- playing a pivotal role in improvement or even transformation. Six design cases in different Dutch and Flemish cities, spanning historical, post-war reconstruction, and post-industrial contexts, showcase tailored solutions that contribute significantly to creating a more attractive and inviting future-proof built environment. The combination of a more formal set-up, a clear *Research-by-Design* approach with included assessment criteria, and the involvement of multidisciplinary design teams from practice provides both directions from a policy perspective and freedom from a design viewpoint to explore and envision plausible futures for selected locations.

The main conclusion is that policy makers, architects, urban designers, and landscape architects must deal with new and shifting conditions with a focus on societal, spatial, and ecological values. For policy makers, it is relevant to translate insights from designs produced by *Research-by-Design* into their policy processes for developing a prospect for action. Both professional practices and education need to foster innovative and interdisciplinary design strategies in a more holistic and integrative approach within their cultural-historical architectural and urban contexts. For both current and future spatial designers, the task -but above all the opportunity- is to position themselves more as integrators and agents of change contributing to a paradigm shift that can drive tangible adaptation and improvement in our living environment at the local scale.

Keywords: *built environment, public space, climate change, shifting conditions, paradigm shift, holistic and integrative approaches, research by design, design actions, multidisciplinary collaboration.*

1. INTRODUCTION

This paper presents the results of the design study *City x Space* (Stad x Ruimte) conducted in the Netherlands and Flanders in 2021 and reflects on the effectiveness of the *Research-by-Design* approach facilitated by the initiators. The design study explored the potential of multifunctional and plural use of space for existing and future purposes and functions within the built environment [1].

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This was done through an integrated design approach where public space, subsurface, and buildings were considered as a cohesive solution space by multidisciplinary design teams. The study encompassed design measures for climate adaptation, housing and social issues, and system transitions for energy, mobility, circularity, and ecology. In the Netherlands, study locations and cases were provided by the cities of Amsterdam, Maastricht, and Rotterdam, while in Flanders by Leuven, Mechelen and Oostende.

The initiative and organization for this design study were a collaboration among the Centre for Underground Construction (COB), Delft University of Technology (TU Delft), the Flemish Government (Department of Environment) and the Deltametropool Association (VDM). The urge for this study stemmed from foreseen claims on existing scarce space within dense cities due to the needs for housing, energy transition, and climate adaptation, and how this matter can be faced through a more efficient use of space. The study also encompassed the subsurface, typically regarded as terra incognita mainly seen as storage space for utilities such as sewers and cables or for transportation like metro systems and car parking. Concurrently, a Dutch governmental program for public space was initiated, aligning with the aims of the study. Cities presented issues and questions related to their locations, like the monofunctional use of space in an outdated inner-city sports park (Leuven), the potential of a heat-grid within a pre- or postwar neighborhood, also susceptible to flooding by excessive rainfall (Amsterdam, Maastricht), opportunities for circularity within a redevelopment harbor site (Oostende), the potential of a multifunctional landmark building as catalyzer for transformation of an inner-city post-industrial site (Mechelen), and the transformation potential of a large-scale traffic roundabout adjacent to a redevelopment port area and impoverished residential neighborhoods (Rotterdam). These were not presented as actual assignments for tendering or projects but as policy ideas aimed at better understanding how issues could be addressed through more efficient use of space.

For COB and the Flemish partners, the study provided an opportunity to engage with and learn from the design study and a Research-by-Design approach, which was new to them. For TU Delft, it offered an opportunity to apply and to evaluate a method for characterizing and visualizing the subsurface and to assess design proposals for locations in a more methodical manner than in previous design studies. A more formal assessment of design outcomes, resulting from various Research-by-Design approaches, should receive increased attention. As approach, a significant growth is seen in the Netherlands in spatial and urban planning and urban design over the last decade, with policymakers at various governmental levels embracing its results in policy development and programs. However, there is a lack of clear definition and documentation for these approaches, and its designs inherently involve speculation. Therefore, there is a need for a better understanding of both approach and its results to enable policy and practice to appreciate its significance and potential impact in full extent. How transparent is the process to get results? And how predictable and unambiguous are these? Especially, given the uncertainties and impacts of climate change, the multitude of system transitions, and the necessary investments to make the built environment more future proof. This understanding is also crucial for education, preparing students for their future careers and roles in the spatial domain.

1.1 Design, research, and abduction

Design has various definitions and application, encompassing a broad range of disciplines and professions involving in conceptualizing tangible objects, processes, or substances in the human-made world. In general, designers are viewed as creators, engineers as problem solvers, and researchers as discoverers. However, this distinction becomes artificial when considering the comprehensive learning cycle that embodies all these aspects. Within architecture, design and research are interrelated based on two separate determined or indefinite variables for an object and its context [2]. For instance, designing a station building at a planned location involves a determined object and context, with research informing aspects such as accessibility. This is defined as *research*

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for design. Conversely, an old, deserted factory location could present an open-ended scenario for its future purpose. In this case design can provide insight and understanding of location's potential and alternatives. This is defined as *research by design*, characterized by an indefinite object and context. The European Association for Architectural Education (EAAE) defines *research by design* as any kind of inquiry in which design is the substantial constituent of the research process. It should lead to new insights, knowledge, practices or products which is consistent with experience in practice. Its results must be original, significant and rigorous as architectural research requires [3]. The Royal Institute of British Architects (RIBA) also refers to the same criteria that define quality for scientific research in general. These criteria address both process and output, where communication and peer review are mechanisms to assess and reflect on those criteria. The involvement of practice is seen as relevant due to its practical nature and the relationship between architectural processes, products, and performance [4].

Like these definitions, Dorst explains the notion of *abduction* and the way designers in general reason, based on the equation *WHAT (thing) x HOW (working principle) leads to VALUE (aspired)* (1), in the context of problem solving and design thinking [5]. When applied to architecture, the design and construction of a house (WHAT) to provide shelter and comfort for a family (VALUE) can benefit from archetypical designs and proven construction techniques (HOW). However, if the desired value of shelter and comfort is not for a family but for vulnerable persons who needs also care, then the WHAT would be an open question. This is defined as Abduction-1, representing traditional problem solving. In case the known working principles are strictly related to design a house or hospital, then there is also an open question for the HOW, leading to Abduction-2. This introduces two unknowns that should be resolved in parallel, requiring a novel approach due to their open and (more) complex nature. For this reason, the notion of *frame creation* is introduced, facilitating the investigation of themes related to the aspired value to discover new working principles and its application in a design which could hypothetically lead to this value.

The primary focus of the design study and its collaborating partners also extends to the public domain. Design and design thinking are recognized concepts within the realm of public administration and public policy [6]. In the early stages of this field, it was also characterized as a design discipline, with policy interventions aiming at problem solving for societal issues. However, as challenges such as climate change and migration become more complex, alongside the involvement of multiple stakeholders with diverse needs and interests, questions arise about the effectiveness of traditional policy development methods for addressing these complex, wicked, and ill-structured problems. There is a growing need for novel approaches that align with core values of public administration, including accountability, legal certainty, and predictability. Design thinking, which prioritizes societal values over mere problem identification and intervention, is increasingly seen by policy experts as a solution to the current state of policy development. In general three directions are recognized: 1) Design as optimization, as a continuation of the problem solving approach by experts for well-defined issues while considering societal impact and involving stakeholders; 2) Design as exploration, searching for creative and innovative solutions for more open issues and stimulating human-centered design thinking; 3) Design as co-creation, engaging affected actors for the definition of problems and solutions in order to learn collectively and to enlarge commitment. However, contemporary design approaches, particularly those aligned with exploration and co-creation, often raise concerns regarding effectiveness and innovativeness of resulting policies and relevant conditions. Their meaning lies more in policy definition, aiming to create a better understanding rather than improving decision-making, based on a balance of analytic rigour and societal relevance.

1.2 Research-by-Design for the built environment

When reflecting on [2], [5] and [6], a closer examination of the variables for context and value is warranted. In relation to the built environment, an object is inherently connected to a multi-actor

setting beyond its physical context, with various needs and interests addressed by policies and regulations. These are undeniably linked to the desired value(s) of these actors, whether users or clients, driven by their purposes and objectives. These latter factors represent *steering*, with value as their *outcome*. When purpose is interpreted as the (working) hypothesis stemming from the analytic and inductive exercise -by the creation of a new frame on basis of the desired value and novel working principles- then a design will not yield a binary result like false or true, as with a theory. Instead, the design process is deductive, akin to justifying a hypothesis in research, yet it is qualitative and hard to justify as the sole and righteous answer. Moreover, the design process is iterative, a facet overlooked by equation (1), next to its omission of context. The extent to which the desired value would be realized through several iterations remains uncertain, further emphasizing the distinction between design and scientific research. The latter is binary in its justification, confirming predictability and facilitating the accumulation of knowledge. In case of design, we can assess and determine to what extent the value is delivered according to its purpose.

When reconsidering aforementioned reasoning within the built environment domain, it could be formulated as follows: *PURPOSE (objectives) steers WHAT (object) x CONTEXT (plural) x HOW (working principle) leads to VALUE (outcome) (2)*. Main assumption is that the purpose is hypothetical and explicitly stated, originating from many sources: via the analysis of the values and working principles, as an idea from a single thought, as a position, or as an actual issue. The purpose may be ambiguous, open, and complex. The plural context may include physical and social, governmental, economical, financial, technological, legal, cultural, historical, and ecological aspects. Concerning the variables, the degree of abduction is higher with an additional variable, making the equation more complex as it reflects reality. In any case, for equations (1) and (2) there is no guarantee that both the analysis as inductive activity, as well as the design as deductive activity, will be appropriately and transparently executed. Scientific research has its protocols and extended review systems, alongside the developed attitudes and competences of researchers through education and training. As noted before, analytic rigour is necessary to become transparent and effective. To achieve this, a sound and clear organizational and process set-up should be in place for the execution of analytic and design activities to instill confidence in the plausibility of a design and its assumed value.

1.3 Research questions and objectives

The design study City x Space is the latest instalment in a series of design studies initially co-initiated and co-organized by the Dutch Architect Association (BNA) and TU Delft. These studies focused on exploring opportunities for the use of space at various locations considering societal and technological developments, as well the potential impact of climate change and related system transitions in energy, mobility, circularity, and ecology. The locations included station areas [7], areas adjacent to urban highways [8], potential (re)development sites [9], and social housing neighborhoods [10]. COB, comprising members from engineering firms specialized in infrastructure, water, and construction domains, was particularly interested in how spatial designers perceive the subsurface from a design perspective, and how they address issues using a Research-by-Design approach. The Flemish government also expressed interest in exploring the potential of the subsurface for functions and program beyond utilities, as well as understanding how a Research-by-Design approach could be instrumental for getting more insights in spatial related issues. As outcome of discussions among the initiators, the following central question was formulated: *How could an integrated and multifunctional use of space, with a focus on public space, subsurface and buildings in a dense urban environment, create space and added value which contribute to an attractive and future proof living environment?* This main question pertains to the how, what, context and value. The purpose stems from the interests, policies, and position of the initiators and collaborators, where the integrated and multifunctional use of space serves as the key hypothetical working principle for designing an attractive and future proof living environment, representing its aspired value.

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Additional questions provide more direction and detail: 1) How could the (re)design of a strategic location contribute to spatial advantage, improving the living environment and strengthening resilience to climate change of a city?; 2) Which combinations of functions are desirable and favorable for a location considering societal needs and environmental conditions?; 3) How to integrate an object in an innovative way at system level and at a larger scale?; 4) How to create economical, societal, and ecological benefits by combinations of functions and spatial efficiency?; 5) How to incorporate different system transitions, flexibility, and resilience?; 6) How could an intervention for a location also contribute to area development or creating new conditions for this?; 7) Which future images, scenario's, design principles, innovations and approaches could be developed and useful for policy and practice? These questions also introduce a multitude of contexts and value related themes for frame development alongside the key hypothetical working principle.

2. METHODOLOGY

The accumulation of issues and variety of contexts reveal an open and complex situation for each study case, justifying an explorative Research-by-Design approach instead of a traditional design approach with defined variables. From a methodical perspective, the diversity of cases is relevant for comparing and understanding the relationship between the hypothetical working principle and associated design interventions, their value contributions, and conditional differences. This also provides insights into the potential for broader application and generic lessons. With its typological characterization of study cases and methodological intention on testing and analyzing the relationship between purpose and open variables, this study differs from the aforementioned design studies. It aims not only to produce future images but also to seek a better understanding of the conditions under which a Research-by-Design approach can yield plausible and explainable results based on a transparent process from a methodological viewpoint and within an urban planning and policy context.

2.1 Operationalization

The values derived from the main question were operationalized into the following main criteria: 1) Spatial advantage, 2) Environmental quality, and 3) Future proofing. The potential to realize these values was operationalized through the main criterion of 4) Realization.

This operationalization emerged from discussions among the organizers, the interpretations of case descriptions provided by the cities, and from relevant Dutch and Flemish national policies [11]. Each criterion has specific sub-criteria, like spatial efficiency, health, resiliency, etc. The criteria serve as the core of an assessment framework integrated into the process set-up (Figure 1). The operationalization process, occurring within the social context of various actors and criteria which entail a plural context, makes clear that an explicit attention for values and their origin is critical to find common ground and room for them. From a stakeholder perspective, this establishes a collaborative baseline and guides the design purpose, where values and derived criteria, along with the key hypothetical working principle, constitute a *starting frame* for designers. This provides organizers and cities the opportunity to evaluate the extent to which design proposals contribute to the desired values. The criteria are not quantitative performance indicators which is not problematic considering the purpose and nature of the design study, characterized by an open, ambiguous, and complex main question. Furthermore, the low-level of detail in the designs limits the opportunity to assess in full extent. As an ex-ante assessment, it implies a priori and fictitious contribution of design interventions, necessitating qualitative assessment from a multidisciplinary expert perspective.

2.2 Study set-up

The organizers of the design study issued an open call for participation via Dutch and Flemish architect, urbanism and spatial planner associations and networks. The study's intentions, cases,

method, and set-up were presented at a well attended information meeting, where attendees were encouraged to join as multidisciplinary design teams for specific cases. Selection criteria included motivation for the study, vision for the preferred case and method, the disciplinary composition and experience of the team, and willingness to contribute based on a fixed fee. The selection for a particular case was made by the respective city. In addition to the professional design teams, student teams from the architecture and urbanism departments of TU Delft were also involved within a curricular studio setting. Prior to commencing the design activities, three masterclasses were organized by the organizers, featuring topics and state of the art insights by scientists, policy advisors, technical experts, and designers. The first masterclass focused on spatial planning and transitions for climate adaptation, energy, and mobility. The second masterclass delved into design approaches and technical aspects related to the subsurface. The third masterclass addressed business cases involving the subsurface use of space and stakeholder approaches. These masterclasses aimed to establish a common knowledge base and provide updates for the design teams, with extra attention for the subsurface, which may be not the primary focus for spatial designers.

The applied framework for the Research-by-Design approach shows the relationship between the central question, which incorporates the design purpose for value creation, and the specific issues from the cities, represented by the local question for a strategic location (Figure 1). The design purpose functions as the *starting and reference frame* for the multidisciplinary design teams, focusing on the integrated and multifunctional use of space as the hypothetical key working principle, along with the generic values as operationalized for the assessment framework. The local question specifies the unique issues and values for the location within a local and, eventually, national policy and social context. Next to these the current

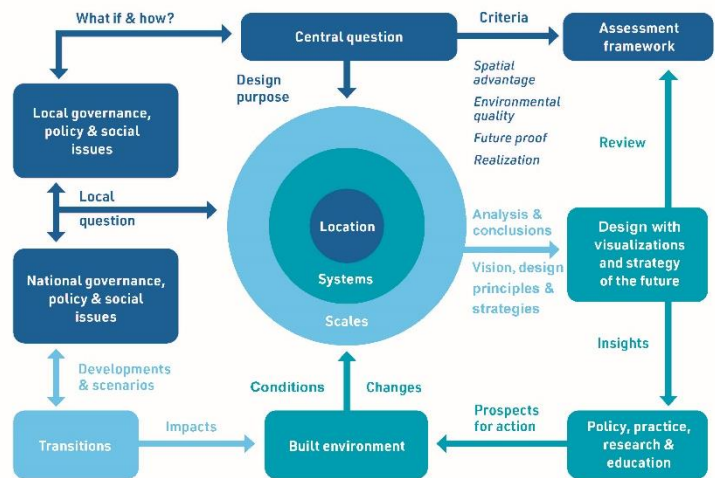


Figure 22. Framework for a set-up of a Research-by-Design approach, integrating research, design, and assessment.

conditions of a location which may already be affected by the impact of climate change and one or more transitions. The local question was discussed between city representatives and members of a design team during the first local workshop and site visit held for each location of the design study. The *what if* notion refers to the exploratory nature of the central question, its aspired values, and to the potential and uncertain impact of a multitude of transitions on the built environment and location, along with its subsequent scales and systems.

At the level of the design study, two fixed plenary meetings were scheduled for all participants. The first was dedicated to the analysis by the design teams of their case and the conclusions drawn from the inputs and location analysis. Some teams already provided a direction for further development of a vision on *what* and *how* for their location. Due to its plenary character, there was an exchange between cases and design teams, with a panel of external experts providing reflections from different perspectives. Between the first and second plenary session -for the elaborated vision and design- local workshops were planned for a more in-depth discussion involving city representatives, design teams, and in some cases, other invited actors related to the location. The second plenary meeting served as the final event where the designs and future images of the locations were presented to all involved participants. This included a strategy to connect the vision with subsequent steps or phases for interventions within a time window. Once again, city representatives and an external panel reflected

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on the designs for the locations. A dedicated final event was organized for the student work and teams due to the curricular schedule not aligning with the design study schedule. Representatives of the cities joined this event to reflect on student's visions and designs and for its takeaway.

The subsequent phase for documentation and interpretation by the organizers and invited experts marked the conclusion of the design study. In addition, to local meetings held to inform a broader audience about the design proposals and to facilitate discussions for potential collaboration, the interpretation process followed a two-tier approach. Firstly, relevant themes were defined, experts were invited to and deepen their perspectives on these themes, which also served as a reference for assessing the designs. Secondly, the designs were assessed according to the criteria derived from the central question. The chosen themes and perspectives included integration, subsurface data and representation, urban and architectural concepts and approaches, investments and finance, spatial cohesiveness, urban value, change and steering. For the assessment according to Figure 1, design teams were requested to do a self-assessment of the extent to which their designs contributed to the main criteria through an ordinal score, supported by the interventions in their designs. Conclusions from both approaches formed the basis for fourteen generic lessons (3. Results, Table 1).

The study did not include a methodological inquiry into the extent to which cities continued with the results as part of some prospect of action for actual change related to their strategic locations.

2.3 Applied techniques

Expert sessions dedicated to the subsurface were organized by TU Delft for design teams and local experts. To assess its occupation and conditions, the System Exploration Environment and Subsurface table (SEES) was introduced [12]. This table differentiates several layers such as buildings, infrastructures, public space, and subsurface, and covers topics like civil constructions, water, energy, and subsoil. Available data about sewage pipes, heat-grids, power and data cables, foundations, constructions, water reservoirs, soil composition and condition could be categorized and be classified as dynamic or static. A completed table was translated into a visual representation through a set of plan-view and cross-section drawings prepared by TU Delft. These drawings informed design teams about the present spatial condition of the subsurface at a location, aiding them in considering for their interventions. During the analysis and design activities carried out by the design teams, a wide variety of methods and techniques were employed. Examples of these are functional and system analysis, a layer approach, a circular and flow approach, a parametric approach, and a sustainability capitals approach. The framework of Figure 1 offered designers full freedom to apply methods and techniques with which they were familiar.

3. RESULTS

The results of the design study revolve around the designs for the locations. Their potential contribution to the values was assessed by the organizers, as defined by the central question, and operationalized by the criteria. Some exemplary values and aspects are illustrated by one of the many visualizations delivered by the design teams. Additionally, the designs were scrutinized from various perspectives by experts to discern and characterize defining aspects. This all has led to fourteen lessons learned, which could be valuable for cities that have ideas or facing open, complex, and ambiguous issues concerning a location, and for designers in practice, as well for architecture and urbanism students (Table 1). The effectiveness of the applied Research-by-Design approach will be addressed in the conclusion chapter.

3.1 Addressing spatial advantage, environmental quality, and futureproofing in an integrated manner

Several designs show the opportunities that the energy transition could provide for integrating measures for climate adaptation, prioritizing pedestrians, and cyclists, and creating attractive public spaces. They address: 1) spatial advantage through the combination of mobility and energy functions, and use of the subsurface; 2) environmental quality through removing parking spaces, adding green, and providing value and usability for inhabitants; 3) future proofing through the introduction of a heat-grid, and enhancement of the resiliency of public space to heat-stress and flooding by increasing water infiltration and retention. For dense neighborhoods, a heat-grid may be the preferred system from a financial perspective, but it also opens the opportunity for a redesign of public space (Amsterdam). Similarly, less dense neighborhoods like those in Maastricht, Leuven, and Oostende, could also benefit from these combined measures achieving cost reduction. Also, the need to replace old sewage systems, as seen in Amsterdam and Maastricht, could provide an opportunity for an integrated approach. The introduction of flexible structures and the combination of functions shows potential for spatial advantages and mid- and long-term business viability (Amsterdam, Mechelen and Leuven). Moreover, novel function combinations, as part of transport and flood defense infrastructure interventions, also demonstrate potential for spatial advantages and business cases related to additional real estate (Rotterdam). The designs illustrate the relationship between public space, the subsurface, and buildings, emphasizing the need for an integrated approach to all spaces.

3.2 Assessment of technical and architectural concept

Several designs introduced new concepts for interweaving ground and subsurface level, removing the hard distinction between the upper- and underworld. This was done through the use of interconnected layers of public space (Rotterdam, Leuven, Mechelen). The use of an open casco construction for subsurface or building spaces offers flexibility for present and future functions, enhancing the designs' futureproofing and cost-benefit ratio (Amsterdam, Leuven, Mechelen). Regarding spatial cohesiveness and urban value, most designs primarily impact the immediate location. However, some designs have influence to surrounding neighborhoods by introducing complementary functions and programs such as housing, jobs, and amenities (Rotterdam, Oostende), or by establishing an ecological and utility framework (Leuven).



Figure 2. Maastricht: 'Energy boulevard' as carrier for an attractive and future proof public space [13].



Figure 3. Rotterdam: *Dike Park* with integrated water retention and utility space [14].



Figure 4. Amsterdam: modular and flexible subsurface blocks and redesigned public space [15].

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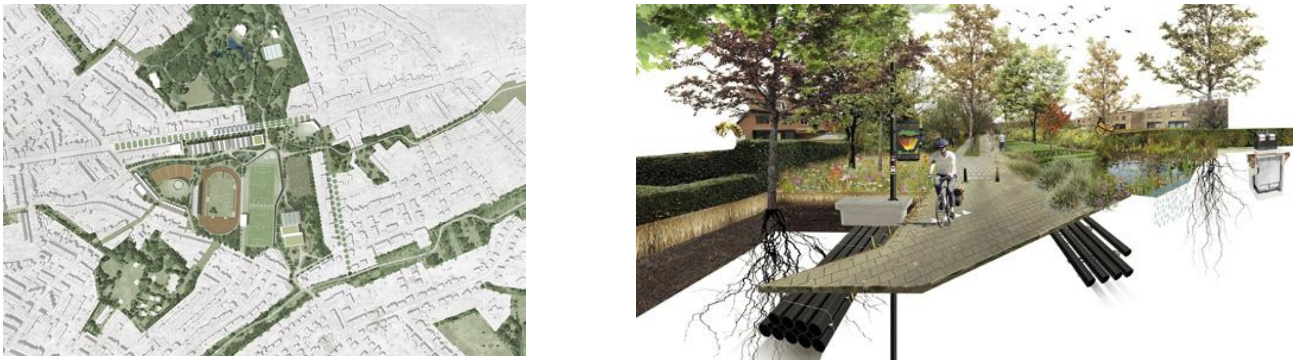


Figure 5 and 6. Leuven: *Climate joints* connect sport park and surroundings, and integrate ecosystem services, and utilities. Cross-section of a Climate joint with integrated cycle route [16].

3.3 Design clues for realization

All designs provide clues for potential financial benefits, opposite to the costs of interventions which is pertinent for developing a business case. The design for Leuven offers ecosystem services and a flexible utility structure that reduce costs for connecting neighborhoods and maintenance while the renovation of the sport park should be covered by additional space for new functions and program. Long-term benefits could be derived by exploiters from the heat and cold storage system integrated into the climate joints. The design for Mechelen presents open and transformative spaces in their park building, potentially yielding future exploitation benefits if integrated into the business case for investments. The design team for Oostende has developed action cards for stakeholders, showcasing design interventions from a catalogue of solutions related to circular flows of water, materials, biodiversity, energy, and program. These could be instrumental in forming a coalition of relevant stakeholders to tackle the redevelopment of the port area. The designs for Rotterdam focus on the addition of real estate for housing and amenities opposite to the large investments for infrastructure. Since a dike is central for flood protection, this could give a clue for investments from the Dutch national governance. For both Amsterdam as well as Maastricht, the renewal of utilities and addition of a heat-grid are large investments with long-term benefits. Existing maintenance budgets should cover the renewal and could help to reduce costs for the heat-grid concerning opening and digging in streets and its hindrance for a lengthy period. The improvement of public space by green, water infiltration and retention could be also part of maintenance budgets or financed from climate adaptation funds in case these are available from governmental bodies.

3.4 Lessons learned

From the assessment of the designs, fourteen lessons were formulated by the organizers for an integrated and multifunctional use of space in the context of climate change and related system transitions. Clustered into three steps, these lessons offer a different direction than traditional problem solving. The equation (2) contains too many uncertain variables, whereby the challenges question the present way systems are organized and perform, while realized projects are in their infancy phase before they could become best practices or even paradigms. The eventual realization of designs as presented in this study is complex and time-consuming, as urban design and area development generally are. However, the lessons show that there are answers that could serve a broader academic and professional audience than only those involved in this Dutch and Flemish study.

Table 1. Lessons learned based on the designs and their assessment.

14 lessons for integrated and multifunctional use of space
<i>Take a different perspective</i>
1. Consider the cross-section of subsurface, public space and building as a new paradigm for integrated multifunctional use of space.
2. Consider the subsurface as a valuable building block to improve the quality of the living environment above the ground.
3. Have an eye for the larger scale and systems.
4. Look beyond the traditional land and real estate development cycle.
<i>Change one's mind</i>
5. Focus and steer based on values.
6. Design for change.
7. Make use of planned interventions in the subsurface.
8. Define an integrated business case.
<i>Act differently</i>
9. Apply Research-by-Design for exploration, idea development or the definition of plural issues where the context, conditions and impact are uncertain for the mid- and long-term.
10. Use storytelling and future images for communication with stakeholders.
11. Use storytelling and future images for communication with stakeholders.
12. Research-by-Design is not without engagement.
13. Subsurface data should be available and updated.
14. Consider how investors structure and assess costs and benefits.

4. CONCLUSIONS AND DISCUSSION

The designs show the potential for multifunctional and plural use of space for both existing and future purposes and functions within the built environment, offering a broad variety of approaches and solutions for various locations. Their potential contributions to the central question reveal similarities as indicated by the main criteria of spatial advantage, environmental quality, futureproofing, and realization. Despite the difference of visions, applied design principles and strategies, and the actual designs they all have a comparable contribution to the values. The use of a clear central question and derived criteria represents a steering force that is detached from a location's character, allowing for fresh and creative approaches with tailor-made solutions. This top-down focus on values does not hinder bottom-up inspiration and innovation.

4.1 The significance of the designs and lessons

The significance of the designs is twofold: 1) providing insight for involved cities into given issues and their translation into potential value for their location by the design; and 2) serving as study cases that lay the foundation for generic lessons for a broader audience, including policy makers, design professionals from practice, architecture and urbanism students, and scientists. A broader application of the designs is limited to similar locations and conditions which in general is unlikely. As such, the designs are not templates for reproduction due to the specificity of issues, policies, actors, and other contextual conditions. They serve more as inspiration, illustrating that the integration of functional and spatial measures can lead to cohesive and insightful designs. The lessons are more generic, with the applied visions, design principles, and strategies inspiring practitioners to consider and apply them for other locations, while informing students to expand their design toolbox. The lessons emphasize the necessity to take another look on issues, systems, and space as a first step in rethinking existing practices and approaches. Internalizing these lessons could lead to new directions in practice that develop and apply approaches contributing to a future-proof built environment.

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Design studies like these are more grassroots initiatives that highlight the inadequacy of present sectoral approaches in addressing the challenges and issues we face. New intersectoral and interdisciplinary approaches and collaboration are needed to develop best practices that convince policy makers to join the effort. Actual realizations, however small can serve as references or catalysts when pioneering policy makers manage to overcome organizational hurdles. For practice, this presents an opportunity to develop new business and competences. For education of spatial designers, it offers the chance to prepare students for a new practice that requires a broad understanding of various systems and values, as well as competences in system and design thinking. When policy, practice, and academia engage themselves more effectively and collaboratively with the challenges facing the built environment, a growing community can develop and embrace novel approaches, methods, and strategies, ultimately contributing to a paradigm shift in the long run [17].

4.2 Research-by-Design as a transparent process for plausible outcomes

From a methodological perspective, the design study and its outcomes show that adopting a more procedural set-up to a Research-by-Design approach enhances transparency and credibility in both its process and results. This approach clarifies both the potential and limitations of what can be expected from this way of working. The scheme of Figure 1 represents a steering model primarily guided by key issues and policies, in which the central question and its values are the main steering mechanisms through the design purpose and assessment criteria. The resulting designs undergo review and reflection by experts and practitioners already during the process, aligning with the mechanisms of architectural research mentioned by the EAAE and RIBA. The assessment against the criteria encompasses both methodologically and qualitative aspects. The insights gained can inform feedback loops via intermediate structures and processes in policy, practice, education, and research. In the context of the procedural set-up and reformulated equation (2), the PURPOSE is filled-in by the central question, WHAT by the location's designs, CONTEXT by the policies, actors, systems, scales, and conditions, HOW by the visions, design principles and strategies, and VALUE by the potential contributions of the designs to the desired values within the central question. The inclusion of the context variable is evident for architecture and urban design considering the built environment, as De Jong discussed design and related research. It is also pertinent in product design, as Dorst, originating from this background, initially introduced equation (1). This broader perspective reveals complexities often overlooked when designers solely focus on the object as a *pure artefact* to design. The designs and approaches of the design teams show that there is no fixed content for the variables leading to a single answer. Different content yields different outcomes, which is not problematic if the objectives and results are recognized and appreciated by the problem owner. This is not only about its originality and significance as EAAE and RIBA have pointed out but also in its potential to be put on a policy agenda. This underscores the need for transparency and plausibility through rigorous analysis, as also noted by Van Buuren. The presented procedural set-up can ensure these qualities while enabling clients to provide guidance through defined values and maintain control over the process without interfering with the required creativity and imagination of designers.

4.3 Future research topics

The effectiveness of the applied Research-by-Design approach lies in providing insights into issues, solutions, and values related to climate change and inherent system transitions, particularly for cities in their specific locations. They must translate these insights in actionable prospects, using design as starting point for dialogue with relevant actors within their policy context. However, this design study cannot definitively determine the extent to which the designs have been or will be effective for policy development, planning, or actual change in near future. Conducted between 2021-2022, the study and its documentation occurred within a relatively brief period in the context of policy processes. For Oostende, the city commissioned the design team for further investigation aligned with their design.

COB has developed a toolbox for spatial and adaptive planning and design, including subsurface and flexible structures, along with a serious game for value determination of spatial ambitions [18]. The Flemish government communicates the environmental qualities for public space to a broad audience. The Dutch Minister of Housing and Spatial Planning employs Research by Design as an approach in general for exploratory research into spatial issues within the context of climate change and inherent system transitions. However, dedicated research is required to better understand the effectiveness of the different Research by Design approaches in driving actual change.

Another area for research is understanding the built environment through paradigms, recognizable architectural and urbanism manifestations, and data within the notion of shifting conditions as set by climate change. A framework that can detect change in the context of climate change and related system transitions could be valuable for identifying and classifying actual realizations as reference projects, informing further development toward a future-proof and attractive built environment [19]. Public space, including its subsurface, could serve as a tangible steppingstone, addressing challenges, leveraging opportunities, and embodying values. Categorizing widespread manifestations could yield a catalogue of novel and dedicated interventions within their cultural-historical architectural and urban context. When combined with open data and open-source parametric computational tools, it could enhance the rigour of analysis activities. Integrating data-driven and parametric methods and techniques into a formal Research-by-Design approach could improve transparency and plausibility.

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Navigating Transition: 20th-century Dutch Housing Neighborhoods and the New European Bauhaus.

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Extended abstract

This contribution examines the current challenges faced by 20th-century Dutch housing neighborhoods. Many of these neighborhoods were developed based on modern urbanistic and architectural principles, emphasizing functionality, simplicity, and the use of innovative construction materials. They were primarily established as social housing projects outside historical centers, aiming to provide residents with improved living conditions compared to existing overcrowded and substandard housing. Today, due to subsequent developments and expansions of cities, these neighborhoods often find themselves situated close to pivotal infrastructural connections and play crucial roles in urban transformation strategies. However, despite the Netherlands' reputation for innovative solutions, several Dutch cities encounter significant difficulties in integrating climate adaptation and energy transition measures with the socio-economic issues affecting residents of these urban areas.

The most prevalent challenges relate to socio-economic disparities and different cultural backgrounds of the inhabitants, leading to social exclusion, lower educational attainment, limited opportunities, unemployment, and higher levels of poverty. Additionally, the lack of affordable housing, rising property values and rents also pose gentrification risks, threatening established communities. Integration and diversity present further challenges, necessitating strategies for social cohesion and intercultural communication. Safety concerns and inadequate public spaces further impact residents' quality of life, requiring urban design approaches that strengthen social programs, affordable housing, and public services. Simultaneously, addressing these issues must align with climate adaptation and energy transition measures. Implementing heat-resilient urban design, such as green spaces and reflective surfaces, can mitigate the urban heat island effect, improve air quality, and provide recreational areas. Sustainable water management techniques, including permeable pavements and retention ponds, reduce flood risks. Infrastructure upgrades, like retrofitting existing systems to meet new climate standards, are essential. Finally, community engagement is crucial; residents must be encouraged to participate in discussions to increase awareness and willingness to adopt climate-resilient behaviors.

To comprehensively address these challenges, a holistic, design-driven research approach is necessary. Designers, local authorities, stakeholders, community organizations, and residents must collaborate to develop and implement strategies that enhance the overall quality of life in neighborhoods, fostering more equitable and sustainable communities. Following this line of thought, this contribution seeks to elaborate on the roles of design and designers by examining relevant projects, practices, and experiences in Dutch cities. The study leverages the principles of the New European Bauhaus (NEB), aiming to bring together sustainability, aesthetics, and inclusivity as fundamental pillars for promoting the green transition throughout Europe.

Keywords: *Dutch housing neighborhoods, Design-driven research, Urban transitions, Holistic approach, New European Bauhaus*

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Data-driven classification of Urban Environments for Customized Assessments and Decision-Making

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Abstract

This paper introduces a data-driven approach for assessing and monitoring urban environments, building on prior typological classifications to support decision-making in various urban contexts. These environments, each distinguished by unique characteristics, collectively experience effects of climate change and transition. However, based on their levels of vulnerability and resilience, they encounter different outcomes. Such variations require targeted analyses and strategies to develop adapted solutions for the issues at hand. Our proposal introduces a computational framework encompassing three main steps, i.e., classifying urban environments based on quantifiable characteristics, pinpointing key performance indicators (KPIs) specific to each classified typology, and suggesting tailored interventions within the context of their type/class. In this paper, we discuss the role of classifying urban areas in understanding their dynamics and developmental trends based on open data. We further summarize the main steps proposed by the data-driven computational framework.

Keywords: *urban typology, open data, decision-making, urban attributes, climate change, classification.*

1. INTRODUCTION

The characteristics of urban areas are often influenced by the prevailing design philosophy and building regulation of the time, their political and social imprint and the attributes of the specific geographical location. They reflect the ideas, topologies and technologies prevalent during their planning, evident in their authentic manifestation through housing size and typology, street width and their cross-cut morphology, extent of public green spaces, distribution, and accessibility of services etc. Bearing in mind the multiple variants of urban manifestations and contexts, it is imperative to formulate customized strategies for urban regeneration that address climate neutrality and sustainability in improving living quality.

The consequences of climate change and ongoing population growth are reflected in all levels of human society. Confronting challenges through an integrated approach on the global level is manifested in the delineation of a compendium of Sustainable Development Goals (SDGs), as outlined in the United Nations' Agenda 2030 [1]. Among the 17 enumerated SDGs, Goal 11 stands as a dedicated mandate towards prospering cities and human settlements, with the overarching objective of fostering healthy living environments, liveability, and sustainability on all levels.

The computational framework outlined in this paper upgrades our previous research [2], centering on evaluating sustainability and efficiency across multiple quality dimensions of urban areas, including mobility, energy efficiency, air quality, and perceived liveability utilising open data. Taking this further, we propose the adaptive (open) data-driven methodology, suitable for neighbourhood/district spatial scale, initiating a structured approach towards the urban typology and classification of geographical units for customized assessment and analytics.

Firstly, common urban types and classification techniques are leveraged, followed by the introduction of key performance indicators (KPIs) to discern prevalent challenges and proffer corresponding solutions. We envision setting the computational framework upon different types of

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data available for a specific location mostly relying on open data sources gathered either by public authorities, municipalities or open science and citizen science initiatives [3]. We propose a seamless conversion and integration of these datasets into a comprehensive set of relevant KPIs. Thus, we aim to perform both the classification and assessment of a specific environment while also suggesting optimizations towards its main designation. As part of this effort, the research envisions establishing a computational decision recommendation engine grounded in abovementioned assessment methodology and distinct urban categories.

The proposed computational framework relies on steps ranging from the identification and acquisition of relevant datasets, defining the typological classification of urban units, to the assessment of their functionalities and their optimization.

In this paper, we first overview the role of typological classification in understanding and improving urban areas through the perspective of previous studies. We continue by summarizing the main steps proposed by the data-driven computational framework ranging from the acquisition of relevant datasets and identifying the typology of the urban area at hand, to the assessment of its functionalities and their optimization. We conclude with some key reflections on current efforts and suggest avenues for future steps.

2. THE ROLE OF URBAN CLASSIFICATION: FROM OBJECT-BASED TYPOLOGIES TO MULTIVARIATE CLUSTERING

The typology analysis as a classification process and comparative examination has a long tradition in architecture and urban planning. The longstanding practice was primarily utilized as a fundamental tool for analysing buildings and urban areas (i.e. analytical typology) and became an approach towards designing and planning strategies (i.e. generative typology) [4–6]. With its roots deeply embedded in architectural history, classical typology stands out as the oldest method for classifying architectural objects, initially utilised for establishing fundamental divisions among building types by form, scale, and materials, and was often influenced by the geographical context, climate, topography etc. [7]. Rossi [4] introduced the concept of typology as the study of elements within a city and architecture that cannot be further deconstructed, a principle akin to a logical operation, enabling comparison by considering fundamental, irreducible components. He suggested focusing on the similarities of urban form exploring the morphological structures and their hierarchical organization within the urban fabric. This perspective, often referred to as typomorphological study, was principally focused on interpreting and classifying the spatial and morphological characteristics of buildings [8] gradually extending toward urban scale by exploring the connections between larger urban patterns and housing [9]. This includes examining the organization and connectivity of residential areas, districts, and other urban areas within the pronounced socio-geographical context. Urban morphological classification accentuated the study of the building block arrangements and the corresponding street grid, forming recognisable urban patterns. This was typically conducted by graphically analysing the cartographic types parallel to evolutionary characteristics [10]; i.e. the distinctive character of an urban fabric that stems directly or indirectly from the historical context of its formation [11].

The clear influence of evolutionary epochs on urban form and patterns led scholars to adopt the term "morphological period" [9,12] underscoring how the historical backdrop of an area significantly shapes urbanscape over time [4,11]. With the examination of the larger urban areas, the primary focus on form patterns progressively evolves towards a classification including utility and function. This trend became more apparent with the rise of new urban zoning paradigms, initially conceived as a strategic response to the disorders of the industrial city [13].

In recent years, a significant shift was made in the identification and classification of urban areas, particularly through mathematical, computer-based analyses and classification techniques that go

beyond the static function-form relations, capturing a multitude of factors revealing comprehensive urban dynamics. The concept of numerical taxonomy in biology [14] and the rise of mathematical multivariate morphometrics [15] quickly extended their influence on the domain of urban analytics and associated classification methodologies. This spread has been accelerated by the wealth of open-source data now accessible for automated analysis, facilitating the integration of multidimensional and problem-initiated aspects of spatial dynamics. Recent advances in urban analytics reveal the importance of using multicriteria classification and clustering techniques as a prerequisite for tailored analysis [16,17].

Dealing with large volumes of different data formats from various sources, such as remote sensors, satellites, surveys, and administrative statistical records, raises the necessity for systematic data organization, processing, and retrieval to uncover patterns, relationships, and trends that may not be apparent through individual datasets. Progress in high-resolution satellite imagery, coupled with advanced image processing algorithms, enabled the extraction of detailed spatial information relating to land cover, land use, and built-up areas [18]. The hyperspectral and LiDAR (Light Detection and Ranging) remote sensing have further enhanced the accuracy and granularity of spatial data and the potential for morphological classification driven by the machine learning algorithms, and geospatial information systems [19–22].

Furthermore, the morphometric analyses and classification in combination with socioeconomic indicators, allow for a more complex comparative approach. This is exemplified by Malah and Bahi [23], demonstrating the effectiveness of multivariate statistical techniques in assessing various aspects of urban sustainability based on the integration of five environmental indices retrieved from Landsat-8 imagery and coupled with eight general census socioeconomic indicators. Moreover, linking energy consumption to urban morphology and types as shown by Amando and Poggi [24], provides an opportunity to address climate change at the neighbourhood level. They tackled issues linked to solar energy production and consumption through the morphological categorization and analyses of urban fabric, building typologies, uses, and volumetry. Such efforts can assist in implementing necessary regulations and incentives for upgrading building inventories and plotting the city's trajectory towards higher energy efficiency standards, aligned with both present circumstances and future needs. Oliveira et al. [25] demonstrated the application of classification in domains of urban air pollution assessment and landscape metric analysis, highlighting its role in informed decision-making and cross-sectoral policy formulation. Grafius et al. [26] employed multivariate landscape metric analysis, by quantifying connectivity, fragmentation, and biodiversity. The resulting categories guide urban design, selectively focusing on three groups: green corridors, pocket parks, and multifunctional landscapes.

Since urban land-use information exhibits a robust connection with socio-economic properties and activities within urban areas, recent efforts have delved deeper by leveraging social sensing data. These comprise cell phone records and activity, social media check-ins including frequencies on points of interest, GPS trajectory information or floating car data to unveil the latent dimensions of social activities [27–33]. Based on the big-tech social platforms or mapping/navigation resources (e.g. Twitter, Instagram, Google Places, OpenStreetMap) these sources represent the new data ecosystem with rich attribute information and significant potential to uncover patterns of urban land use as well as serve as a powerful classification factor.

3. COMPUTATIONAL FRAMEWORK

The proposed computational framework is structured upon a set of steps, commencing the systematic identification and acquisition of relevant datasets. Subsequently, it entails delineating and classifying the geographical environment at hand, followed by a targeted assessment of its functionalities. This

assessment is followed by the optimization phase, wherein iterative refinement techniques are employed to enhance the said functionalities (Figure 1).

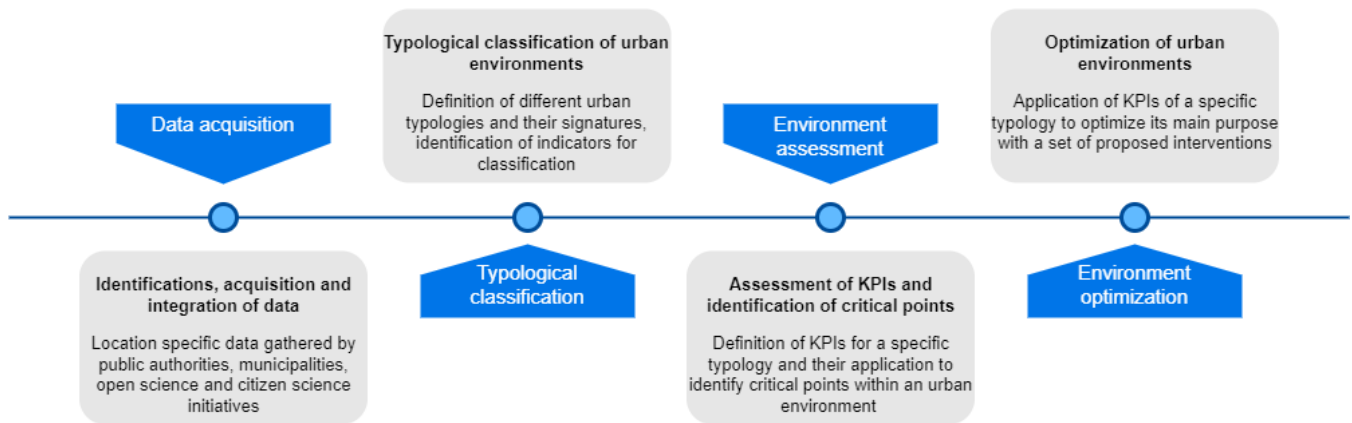


Figure 23. The proposed computational framework for classification and optimization of urban environments in the context of their typological classification. The framework consists of four steps: data acquisition, typological classification, environment classification and environment optimization.

3.1 Data Acquisition

The efficacy of computational and data-driven approaches in classifying, assessing, and optimizing specific urban environments is contingent upon the quality and spectrum of available data. A comprehensive conglomerate of datasets provides a richer understanding of the phenomena and dynamics inherent in the studied environment, enabling more accurate analysis and informed decision-making. By integrating methodically selected data sources and employing advanced analytical techniques, urban practitioners get better prospects to discern ongoing trends in urban development, identify patterns and generate tailored strategies to address complex challenges effectively. Moreover, ongoing efforts to enhance data collection methodologies and expand existing as well establish novel data repositories further augment the precision and utility of computational approaches in environmental analysis and optimization.

Data selection in this study is governed by three main criteria: a) open availability b) topic suitability and relevance, and c) spatial and temporal coverage and granularity. In the proposed computational framework two principal collections of data sources are utilized:

1. the primary (reference) datasets enable the classification of arbitrary urban areas into distinct typology classes through adaptive automated methodologies;
2. a curated array of datasets is employed for the extraction of relevant KPIs, each tailored to the specific characteristics of its corresponding urban area class.

In the first step, specific KPIs are used for the classification of the urban environment into a specific category, which is then used to select a subset of KPIs relevant only to this category.

3.2 Classification

Following the data selection criteria (open availability, topic suitability and relevance, spatial and temporal coverage, and granularity) we identified the list of datasets to implement the adaptive classification method and assessment process. Each identified class tends to represent a reference base for the semantic data layers and identification of KPIs, to support all phases of urban policy making, from designing policy frameworks and setting targets to monitoring and evaluation of trends. In our initial demonstration, we implemented the adaptive method classifying urban areas divided into 250 x 250 m and 100 x 100 m grid segments, according to their morphological and demographic

features. We approached the classification process from two main datasets: building footprints and population density. While the building footprint provides information on building tissue density, the population layer offers insight into resident density. Consequently, we were able to differentiate between low-rise and high-rise residential typologies.

a) Building footprints

Building footprints, closely resembling classical typo-morphological examination, are used to address density and build-up range, which can further inform indicators of liveability, accessibility, or land permeability [22] at the neighbourhood/district scale. In digital geometry, building footprints are typically represented by polygons, denoting the building's location, shape, dimensions, and area [34,35]. They also provide information on spatial characteristics such as distribution, floor space ratio, and the relationship between buildings and other objects (e.g., topology, orientation and proximity) [35]. The building footprints are commonly stored and displayed by vector data which allows individual features to be linked with attributes, like building height, type, use, age, occupancy etc. There are various sources for collecting building footprints from datasets such as national cadastral maps, high-resolution satellite images, and open-source projects (e.g., Open Street Map, EUBICCO [36]). For demonstration purposes we focused on Slovenia and used EUBUCCO, a scientific database of individual building footprints for 200+ million buildings across the 27 European Union countries. A 250 m x 250 m grid is initially applied to define classes based on their physical structures and contextual relationship with nearby objects. Metrics such as size, form, proximity to other buildings, and building compactness can be extracted using Momepy [37]. Momepy is an urban morphology Python library developed for OSM, enabling the creation of homogeneous categories by amalgamating neighbouring squares, thus establishing contiguous zones with analogous building compositions. Descriptive attributes such as age, height and usage are commonly additionally provided in OSM and EUBUCCO, however, these are often critically incomplete [36,38]. To address these disparities, we plan to utilize a population data source as an auxiliary tool for executing the initial classification.

b) Population density

We employed the high-resolution population density indicator to distinguish between the residential and non-residential areas and to discern the type of residential neighbourhoods accordingly (high-rise, low-rise). Several open data possibilities exist; for instance, the comprehensive open-access demographic collection WorldPop [39] covers most worldwide areas by spatial resolution of 3 arcseconds (or approx. 90 m x 65 m if demonstrated in Slovenia). In many instances, the accuracy of this population data collection can be validated (or exchanged) with comparison to national censuses at hand. Furthermore, many national authorities keep high-resolution population statistics openly available. For the demonstration purposes, we used the comparable 100 m x 100 m grid demographic data from the National Slovene Census, easily available through the geo-information portal STAGE [40], provided by the Surveying and Mapping Authority of the Republic of Slovenia and Statistical Office of the Republic of Slovenia.

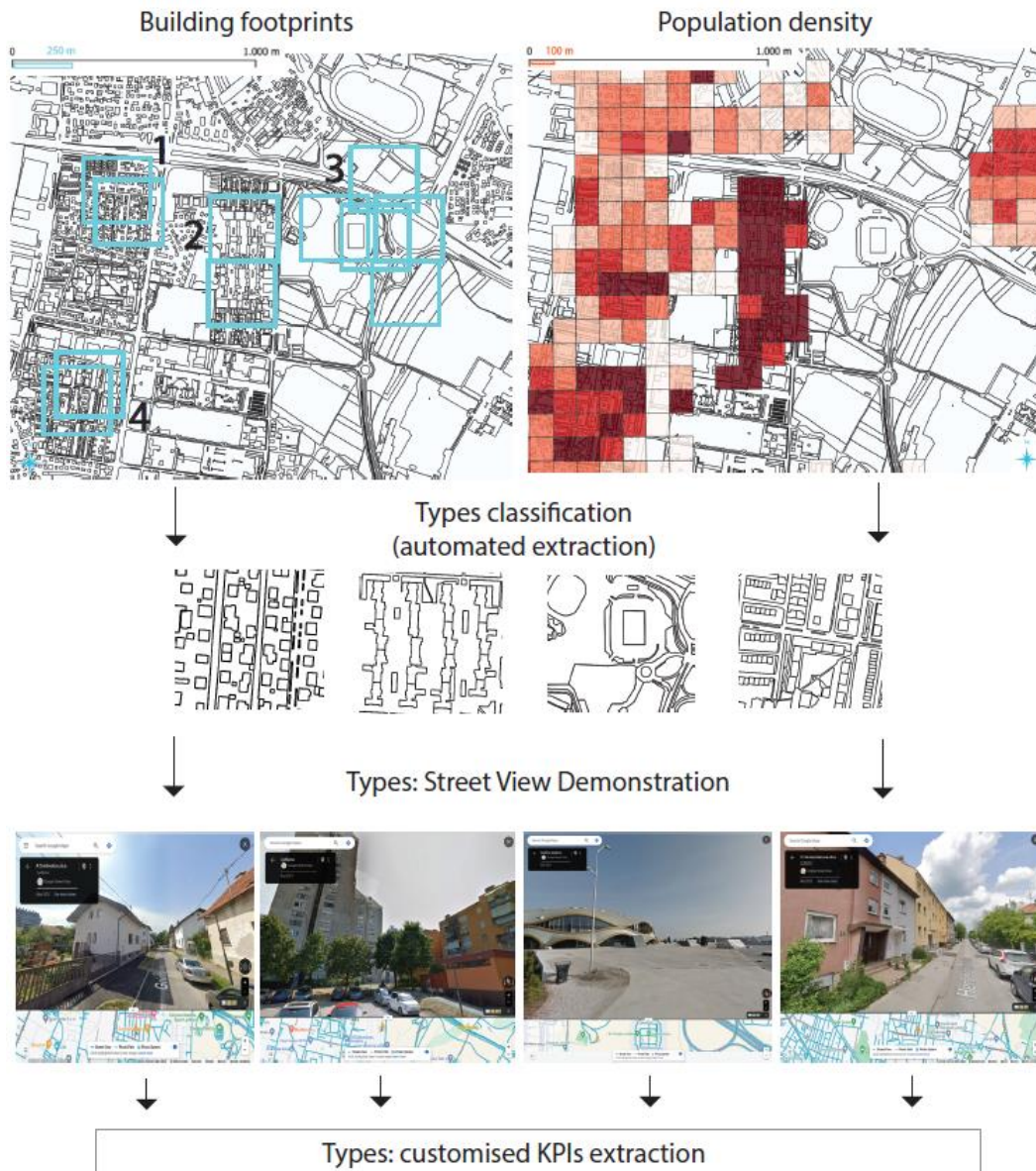


Figure 2. Proof of concept, Bežigrad, Ljubljana, Slovenia. The initial classification process is based on two data layers: building footprints and population densities (Street view demonstration by Google Street View, Google Inc., 2024).

3.3 Identification of critical points and KPIs assessment

After the main urban types (classes) have been identified, the assessment indicators can be assigned for each class. Considering the crucial characteristic of each urban type, the presumptions of potential vulnerabilities are set to extract the most relevant assessment indicators. The selected array of KPIs then allows for the identification of critical points within a particular area, comparison of akin urban types across different geographical locations, tracing trends over time periods or modelling typology-tailored predictions. Along with urban pre-classification, tailored KPI settings represent a strong decision-making mechanism. Quantitative descriptors of urban form and configuration are provided by the spatial metrics related to landscape proportions, fractal dimensions, or network density, and spatial autocorrelation measures [41]. Their practical implications address the level of urban performance, efficiency, liveability or sustainability through targeted indicators [41–43]. Also, Fleishman [44] provides a review on quantitative analysis in urban morphology that leads to

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applications of distinct research purposes, among which are measuring the performance of urban form contributing to composite measures of sustainability, resilience, accessibility, urbanity and enabling comparison among spatial cases or predict urban growth.

In the past, numerous composed measures with KPIs have been proposed to assess the specific urban environments from different sustainability and efficiency perspectives. Some examples are KPIs to assess travel time reliability among city neighbourhoods [2] energy consumption measures for neighbourhoods and communities [45,46], or multi-scale and multi-thematic performance indicators for the assessment of nature-based solutions [47,48] among many others. Based on the characteristics related to the urban type and the presumptions of the environmental vulnerabilities supported by literature, the computational framework will automatically feature a set of KPI relevant to the chosen urban type. At this point, a secondary list of open datasets will be introduced to accomplish the assessment (e.g. Copernicus portfolio with pan-European coverage for imperviousness range, high-resolution tree-canopy cover, roof greening, or European Environmental Agency data series referring to environmental functions, services, and resources, infrastructure, or economic, social, or cultural assets in places and settings that could be adversely affected by climate hazards, including flooding, wildfires and urban heat island effects).

The framework will assess the set of these KPIs and point out the critical aspects that should be addressed in the given district.

3.4 Optimization of urban environments

After identifying critical points within an urban system, a computational framework can be deployed to pinpoint various potential interventions to enhance the system's functionalities. Integrating this recommendation engine with a simulation tool that could be used as a digital twin of the system, enables the *in silico* validation of suggested interventions to assess their impact before actual implementation. This approach allows for the evaluation of each by calculating relevant KPIs for specific scenarios, providing a measurable metric to aid decision-making.

Following the successful real-world application of an intervention, both the recommendation engine and the simulation environment will be updated with the actual assessment of indicators resulting from the intervention. This update enhances the accuracy of the recommendation engine by incorporating real outcomes, allowing it to learn from actual scenarios and progressively refine its proposals. This iterative (or potentially cyclic) process ensures continuous improvement and more effective interventions over time.

4. CONCLUSION

In formulating the envisioned methodology one of the critical junctures recognised in the research process was the selection of the most applicable dataset and indicators based on predefined constraints. The choice of data layers and indicators applied in the initial classification process significantly influences the range of classes, their mutual differentiation and how a particular spatial unit is assigned a certain urban type. Additionally, the steps of data acquisition, preprocessing, and integration across diverse formats into a cohesive system demand a significant investment of resources and time. Hence, adopting a systematic and coherent approach to data inclusion and selection becomes essential. This entails evaluating the utility and added value of envisioned datasets for classification processing, ranking them according to their role within the assessment frame as well as estimating their applicability proportionate to their availability, coverage, and processing complexity. To address this challenge, we embraced a systematic modular approach, integrating a compilation of criteria to guide our selection process effectively.

Given the importance of the EU's open data policy and the strategies towards creating shared European data space, we aim to prioritize open-source datasets, available across well-represented governmental or international repositories (e.g. Copernicus [49], European Environmental Agency

[50]), as well as community-driven and citizen science initiatives that promote participatory practices. Various citizen science projects, (e.g. Telraam [51] and sensor.community [52]) have enabled citizens to contribute data in different domains over the last decade. This involvement has resulted in enhanced availability of records on traffic, weather, or pollution, among many others, across European cities and wider. By harnessing such datasets, we can construct robust inference frameworks, that can be seamlessly applied to any arbitrarily selected location that is described with similar datasets.

Moreover, one of the important considerations in the data selection process is placed on geospatial and time-based coverage. This involves giving preference to datasets that provide extensive reach and finer resolutions in both spatial and temporal aspects. It requires evaluating factors such as data spatial granularity, and temporal frequency to enhance the accuracy of feature inventory, and thus, more detailed insight into urban trends. Wide-ranging geographical data coverage emerges as an important prearrangement, offering significant potential for conducting robust cross-regional and cross-national analyses and classification. Finally, it is important to extract potential datasets based on their relevance to the most pertinent urban issues at hand and their ability to derive meaningful indicators. Specifically, we assess how well the indicators demonstrate the complex dynamics of urban climate change and show its impact over time on overall liveability. This entails considering the dataset's capacity to address existing climate-related issues as well as its potential to discover the correlation with other phenomena.

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NEB Policies' Ecosystem in the perspective of the architectural design. Postindustrial urban regeneration in the Milanese metropolitan contexts

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Abstract

The contribution illustrates, through the assembly of a coherent repertoire of research-by-design activities conducted by the authors within the academic courses at the *School of Architecture, Urban Planning and Construction Engineering* (AUIC) Master degree program, and at the PhD Program *Architecture, Urban and Interior Design* (AUID) of Politecnico di Milano, a few crucial topics engaging the regeneration projects of abandoned post-industrial areas in the Milanese metropolitan context, looking towards a climate neutral scenario. The methodological approach, believed as necessary to enhance within the education paths, explores the construction of an ongoing “open glossary” of design actions for retrofitting peripheral areas that still appears as urban leftovers, due to their difficult asset of property or stakeholder and spatial lack of ecological qualities. By cataloguing and classifying the case-by-case conditions and the different design hypothesis developed by the students, a transcultural and multi-layered dimension of the possible design actions clearly emerge as shared vocabulary. The purpose is to expose and publicly discuss the possible parameters of the architectural project to tackle the challenges emerged within the context of the Green Deal and of the New European Bauhaus policies.

Keywords: *Post-industrial areas, Urban transitions, Research by design, Transcultural approach.*

1. INTRODUCTION

The New European Bauhaus Policies' Ecosystem [1,2] and its objectives broaden the spectrum of contemporary architectural design actions to new scales and horizons, with the main scope of reorienting both the cultural common ground and the economic flows towards more sustainable and inclusive growth. Specifically, its strong impulse finds a fertile field of experimentation for the architectural project when dealing with the regeneration processes of post-industrial tissues and areas, which constitute a significant challenge for contemporary urban transitions [3]. Indeed, abandoned industrial areas are often characterized by large and open-air surfaces whose contribution to sustainable reconversion must necessarily involve the dimension of publicness, and the negotiation with often an articulated panorama of stakeholders, in defining the strategic qualities of the project. It means binding together the institutional actors and the economic parties, the spatial and environmental challenges, as well as the social expectations.

For the Milanese context, the topic of balancing the relation between different parts of a continuous ongoing urban expansion it is quite relevant, mostly concerning the urban spatial qualities and the diverse social neighbors' asset. Both the Municipality [4] and the Politecnico di Milano develop since the last decades several programs to explore the possible future scenarios, with a strong accent on ecological imprint and social justice [5,6].

Moreover, starting from a more general reflection on the urgency to reconsider climate change impacts on spatial urban dimension, such explorations based on a “research-by design” approach [7] expand on an international level thanks to research platforms such as CIMATRA Consortium,

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composed by several European Universities in the domain of Architecture and the Built Environment (Politecnico di Milano, Technische Universiteit Delft, Universiteit Antwerpen, Ethnicon Metsovion Polytechnion, Politechnika Warszawska, Univerza v Ljubljani).

The contribution, after presenting a brief research overview on the topics of urban design and spatial regeneration, articulates a case-by case open glossary, based on the results of academic design studios coordinated by the authors. It discusses four cases within the context of specific design actions such as: *Negotiating boundaries* (1), *Critical reuse* (2), *Fringes renewal* (3) *Reconnecting networks* (4). Finally, as provisional conclusions, a shared methodological approach within the different didactic experiences has been provided, based on two main parameters: the trans-scalarity of the design actions and its multi-layered relevance and impact.

2. AN OPEN GLOSSARY OF DESIGN ACTIONS

The last decades have been characterized by research and design experiments investigating the need to recalibrate the relationships between the suburbs' constellations, the urban fringe areas and the monofunctional tissues, with an increasingly polarized center. Some of those focus on the *mixité* for a new urban polycentrism [8], working on hybrid models to enhance the proximity between work and living areas [9], on urban porosity as a social and ecological value [10]. The scale of planning and policies meets the architectural one through a cross-gaze that requires a re-examination of the urban framework as a whole and of its concrete spatial quality, assuming the central role of the design of voids as an operational terrain. In this context, the contribution presents a case-by-case approach [11], using the didactic experiments to build an open glossary of design actions.

The glossary, which is delved into the three paragraphs below, combines the specific conditions of post-industrial contexts in the Milanese peripheries that show some shared features, – i.e. the fragmentation of land properties, the infrastructural load, the presence of abandoned or underused fabrics, the environmental criticalities – together with a specific design direction, aimed at recovering the ecological dimension in the urban fabric. The term glossary here refers to the Latin and medieval tradition of *glôssa*, not just in the original Greek meaning of language, but used to indicate a specific explanatory note placed next to a term that is difficult to understand. Therefore, within the vast disciplinary issue on the role of urban design for a just ecological transition, we wanted to carve out a narrow perspective in the methods of investigation. Indeed, the proposed glossary, breaking down the complexity of the research field *Design for Transition* [12,13], interprets the contemporary conditions of those areas through the lens of the architectural and urban project. The resulting actions are not replicable measures with standardized toolkits (often overlapping each other's), instead they present a specific design position. It involves, for example, the rethinking of thresholds as liminal spaces of negotiation and ecological encroachments within a condition of complex land ownership (The Bresso Airport and Breda Industries), or the selective reuse through demolitions and new transplants onto abandoned industrial fabrics (the Ex-Faema industry), or the conversion of infrastructural leftovers and margins into ecological networks within often disconnected urban fragments (Lambrate district).

2.1 NEGOTIATING BOUNDARIES (Fabrizia Berlingieri)

Thematic Design Studio, Architecture and Urban Design MsD, Politecnico di Milano, a.y. 2023-24; teaching staff: F. Berlingieri (coordinator), S. Lodrini, M. Manfredi; tutors: D. Fantoni, L. La Giusa, F. Monteleone.

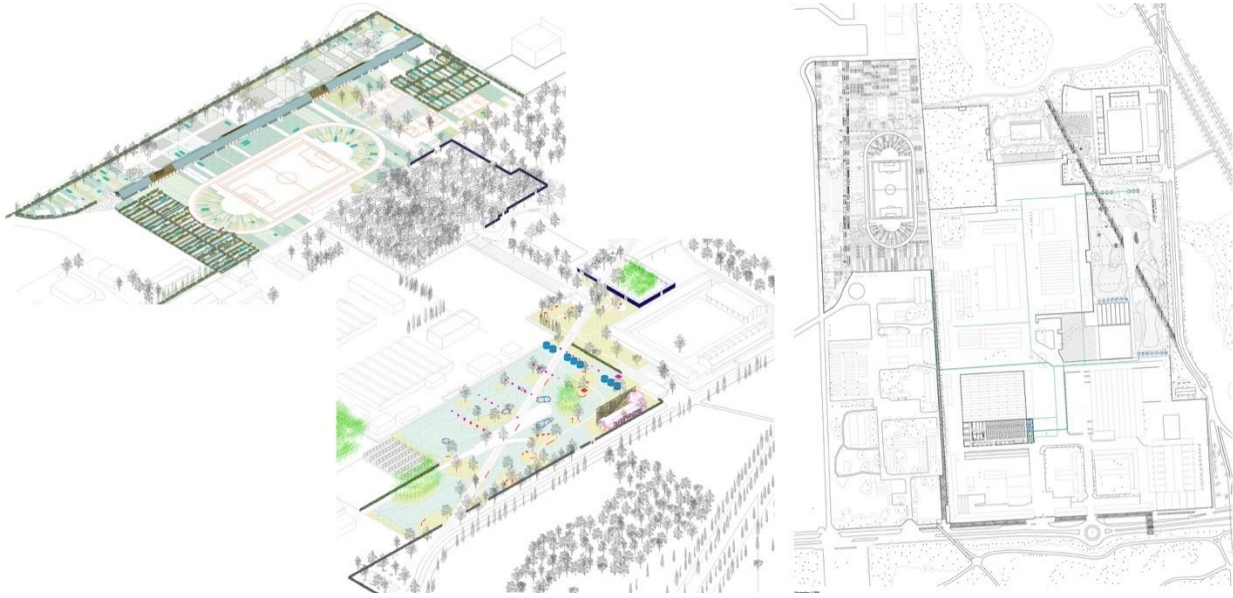


Figure 1. *Ecological Encroachment*, axonometry and masterplan of the design proposal around the borders of Breda Factory, Bresso. Drawing by students: T. Huntingford, S. Brandner, H. Jing.

The Bresso airport, with its 94 hectares, is an aircraft and heli-surface for educational, civil rescue and private amateur flights and functions. It is part of the Parco Nord Milano and represents one of the largest reserves of underdeveloped open spaces in North Milan and in the entire metropolitan area. Its appearance dates to the First World War, when the factory of the Società Italiana Ernesto Breda Mechanical Constructions expanded its production to the military aircraft sector, thus creating the need for a nearby test runway. Along the two wars, the airport was the main air defense center in the Milan area. Nowadays the Bresso airport, despite a relatively light use, represents an endowment of great environmental value of permeable areas, meadows, and wooded surfaces, albeit within the limits defined by the ENAC rules for the operation and management of airport spaces. Its central location in the metropolitan area and the great accessibility from the city center also characterize the airport as a possible new hub dedicated to innovative flight technologies, such as urban air mobilities, automated vehicles and last-mile drone logistics. The different rules that today manage this large portion of territory, derive from an iper-fragmented land ownership, involving different actors and stakeholders in the construction of future scenarios – i.e. the two Municipalities of Bresso and Cinisello Balsamo, the Metropolitan Municipality of Milano, the Parco Nord, the Croce Rossa Italiana, among others. The area then is characterized by a strong presence of borders, fences, walls that not only define a visual labyrinth, but paradoxically does not allow publicness where the different public bodies are the main agents of change. Moreover, the location itself is at the border of the Bresso urban system on the left side and part of one of the main metropolitan ecological urban systems on the other, finally surrounded by a bundle of infrastructural networks.

The Thematic Design Studio *Infrastructure and Urban Form: The Bresso airport in the Lombardy region* considers its exceptional value regarding both the urban development potential and the need for an ecological balance. Along the course, the students faced three different steps, from site and program analysis to the design proposal. The objective, before the design proposal, was the envisioning of a *Strategic Implementation Plan*, testing a composition of several programs able to enhance the prospects for urban mobility innovation, and the environmental value with a high-quality landscape and biodiversity. This was developed according to few specific design research-actions reconsidering the airport area as: a welfare and ecological infrastructure (1), a research and educational centrality (2), an innovative air logistics and mobility hub (3), a mixed-use neighbor (4). Starting from the definition of these possible scenarios, the design proposals have been oriented to

the topic of reconnecting margins in a broader spectrum: from industry to nature, from mobility to urban environment, from land properties to public realm. The common ground of the students' design actions consists of the capacity of blending innovative functional programs together with the urgency to negotiate the boundaries between the several co-existing fragments within the large area. Boundaries become the main design focus, inverting the common sense: from separations to conveyor of new urban and social values, as the proposal *Ecological Encroach* evokes (fig.1). In this experiment the properties' borders expand to visual or physical reconnections of different programs, as in-between liminal spaces questioning the possible reversal of limits. Moreover, the principles of circular construction and reuse techniques have been applied as shared keywords for projecting the postindustrial and infrastructural site towards new coexistences.

2.2 CRITICAL REUSE (Marco Bovati)

Thematic Design Studio, Architecture-Built Environment-Interiors MsD, Politecnico di Milano, a.y. 2021-22; teaching staff: M. Bovati, M. Lavagna (coordination); tutors: S. Di Mauro, L. Fraccadori, S. Giorgi, R. Magrini, V. Panella, A. Prinzo, K. Santus, L. Simoncini.



Figure 2. The retrofitting proposal, materiality and relation with open spaces.
Drawing by students: J. Leccia, B. Neri, M.Tarchini, F. Viscomi

The Lambrate district, located in the eastern area of Milan, is about 5 km from the city centre. An ancient pre-Roman settlement conquered by the Roman legions in 222 BC, it is characterised by flat terrain that has shown a clear rural vocation since ancient times: the surrounding land was made fertile by irrigation works derived from the Lambro River, from which the neighbourhood takes its name, a waterway once navigable. Lambrate's history as an industrial settlement began in the sixteenth century; a gunpowder production site is testified in this period. Starting in 1864, the creation of the urban railway ring, which runs through the district and has a station and railway yard here, has become a separating element from the city of Milan, as well as a stimulus for the creation of a strong identity and sense of belonging, but above all, together with the presence of the watercourse, an engine for the industrial development of the neighbourhood, characterised by medium-sized and small-medium

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manufacturing settlements. The autonomous municipality of Lambrate was subsequently annexed to the Municipality of Milan in 1923. The main industrial settlements have suffered from the general crisis in the manufacturing sector since the 1970s, resulting in the decommissioning of many production plants and the subsequent decommissioning of the railway yard. Among the most important are the following. Innocenti (later Innocenti-Maserati) was founded in the 1930s as a metalworking factory, later converted to producing automobiles and motorcycles (including, from 1947, the famous Lambretta) and was active until 1993. A residential neighbourhood and two parks now occupy the old production site. The Ex-Faema (Factory of Electro-Mechanical and Related Equipment), established in 1945, was requalified as Spazio Ventura, one of the pulsating centres of initiatives linked to Milano Design Week. After years of crisis, at the beginning of the 2000s, a process of urban regeneration linked to creative production (Creative Industries) was initiated, leading to the creation of the Lambrate Design District and inclusion in the Milano Design Week's *Fuorisalone* circuit. In this context, the realisation of the Spazio Ventura took place, acting as the engine of the neighbourhood's urban transformation. Positive aspects undoubtedly characterise this development, but according to some observers, it is still too tied to sporadic events that struggle to take root in the neighbourhood. The studio's work took as its theme the need to propose less sporadic and temporary occupations aimed at a stable urban and social rebirth of the neighbourhood. The project area is that of the Ex-Fonderia Tagliabue, founded in 1921 as an industry for producing cast iron, characterised by reinforced concrete buildings, mainly sheds. The area is located on the easternmost slope of the neighbourhood, between Oslavia Street and Sbodio Street, in a context characterised by a poor provision of public and collective spaces. After its decommissioning in the 1970s, the area was divided into two parts; since the 1990s, the predominant use has been as a warehouse, and since 2000 the site has been abandoned. The project brief required the construction of new volumes for residential use, partly in social housing, and a public and service building with a small exhibition space, a reception area and a cafeteria. The residential portion, in particular, was supposed to be characterised by a high degree of flexibility over time so that it could be transformed rapidly and with little expense, depending on the community's housing needs. Furthermore, the conservation and reuse of part of the existing buildings were required. They would be destined for artistic workshops, co-working spaces, and spaces for small businesses. The project request also included allocating part of the area to open green space and an underground parking facility.

The portion of Lambrate east of the railway is characterised by numerous disused or underutilised artisanal and industrial buildings, and the prospect of an extensive regeneration plan is the most desirable scenario. The projects, which should involve the creation of new spaces and the establishment of new functions, should be characterised by a critical reuse and/or selective demolition action, following an in-depth study of the architectural and constructive characteristics of the real estate heritage that marks out the buildings present in this area, to assess their historical value as a testimony to the neighbourhood's industrial past and to investigate their actual possibilities of reuse. Many projects have already been realised, and others are underway. However, most of them seem to be characterised by actions of mere building replacement, with little attention to the peculiar aspects of the pre-existing building heritage, often demolished hastily and uncritically. The functions realised also go in two divergent directions: standard residential construction on the one hand and places for temporary and transient events on the other. The work developed in the workshop, on the contrary, has attempted to formulate design experimentation capable of imagining flexible residences capable of accommodating different social classes and family compositions, multifunctional public spaces open to the community with several possible uses, and workspaces characterised by more stability over time, considering the combination of these functions as a factor capable of representing a significant and profound mutation in the social and economic structure of the neighborhood.

2.3 FRINGES RENEWAL (Emilia Corradi)

Fringes Renewal. Enhancing Urban and Peri-Urban Fragile Area International Workshop, AUID - Architecture Urban and Interior Design PhD Program, DASTU Politecnico di Milano, a.y. 2020-21; teaching staff: E. Corradi, C. Cozza, V. Dessì.



Figure 3. Morphological analysis of the Forlanini area. The ‘Figure Ground’ highlights the built fabric’s presence mainly at the borders of the case study area, close to the main infrastructures. On the opposite, as shown in ‘Green spaces’, the core of the area presents a variegated presence of green areas, representing the site's ecological strength. ‘Strengths’ and ‘Fragilities’ describe agricultural fields as key spaces, while a series of neglected green and low-quality spaces characterize the borders. Drawing by Phd candidates: C. Bulone, H. Dan, K. Santus

The Course addressed an investigation into the possible design tools aimed at achieving the objectives set by the New European Bauhaus and the EU Taxonomies policies and developed, together with the 36th cycle PhD AUID candidates, a series of strategies aimed at studying the role of abandoned industrial areas in the Milanese fabric as possible spaces of urban regeneration [13] aimed at restoring beauty, sustainability and sharing through a design investigation that aims to frame themes, analyzes

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and projects within a strategy in tune with the challenges posed by the New European Bauhaus [14] and the EU Taxonomy [15]. Through design-driven experimentation, we wanted to identify design techniques that highlight innovative design elements and spatial organizations and investigate the inhabitants' perception of the renovated spaces. The challenge posed was to contribute to the redefinition of marginal areas of the Milanese urban fabric - Lambrate, Rogoredo, Rubattino and Ortica - areas characterized by disuse and abandonment and affected by infrastructural structures. The application of these solutions opened the possibility that they have a central role in urban and peri-urban transformations to respond both to climate change and to requests for urban regeneration in the direction of building a methodological project that can be extended and replicated to urban contexts of a similar nature. Specifically, the projects have as their starting point the construction of the cognitive and descriptive framework carried out through morphological, urban, architectural, and climatic analyses relating to the abandoned or underused areas and artefacts. This work was necessary to identify themes and components on which the project could provide range of solutions through Nature-Based Solutions (NBS). The main tools of the project were identified as urban morphology and measurement, scales and perimeters, toolkits, and nature. Compared to these tools, the projects have returned both theoretical reflections and operational strategies: observation, recognition of the different ecologies and social structures, and the relationship with the marginal fabrics led the doctoral students to work precisely on the interstitial spaces of areas in mending operations between very different urban and environmental forms and structures. Within this context, morphological analysis is used as an approach to the project, which allows the identification of urban dimensions and the construction of a design vision that includes both the abandoned space and the built environment. The morphological observation of the territory reveals a design structure that allows us to identify the area's founding elements and the unexpressed potential, underlining the importance of carefully considering the shape and physicality of the territory, especially in the face of growing climatic fragility. The project is conceived as an approach that crosses different scales, including recognizing urban fabrics and their settlement value in both built and open spaces. By reviewing the equipment and operating on targeted connection systems, it is possible to identify fragments of nature and workability and recompose the connective tissues within peri-urban areas. This theme emerges in all four projects, with different perspectives, highlighting the question of the "perimeter" of the project's scope. The proposals work coherently on the limits between areas, underlining the possibility, through adaptation processes, of rethinking urban thresholds and margins in their physical and social reimagination. The complexity of these territories, in which infrastructures play a key role in defining the borders and "perimeter" of individual areas, reveals the need to reconsider them in the spatial conditions they generate. The analysis of the project experimentation carried out by the PhD students requires some reflections necessary to orient the project actions concerning the objectives in the New European Bauhaus and the EU Taxonomy.

Addressing the issue of adapting urban space or mitigating climate change requires a systematic approach that integrates European inputs, transforming them into design actions that profoundly reflect the space issue. The technical component is certainly essential, but it is not sufficient to build the project if there is no ability to combine the technical problems and data with an aptitude for the critical analysis of urban contexts and with a vision of the city outlined through the architectural project. Only through this ability to visualize, which requires adequate training attentive to grasping data and forms that often operate on very different scales based on values and an idea of space, can we rethink these marginal areas of cities, harmoniously redefining the relationship between marginal and urban spaces.

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2.4 RECONNECTING NETWORKS (Cassandra Cozza)

Fringes Renewal. Enhancing Urban and Peri-Urban Fragile Area International Workshop, AUID - Architecture Urban and Interior Design PhD Program, DASTU Politecnico di Milano, a.y. 2020-21; teaching staff: E. Corradi, C. Cozza, V. Dessì.

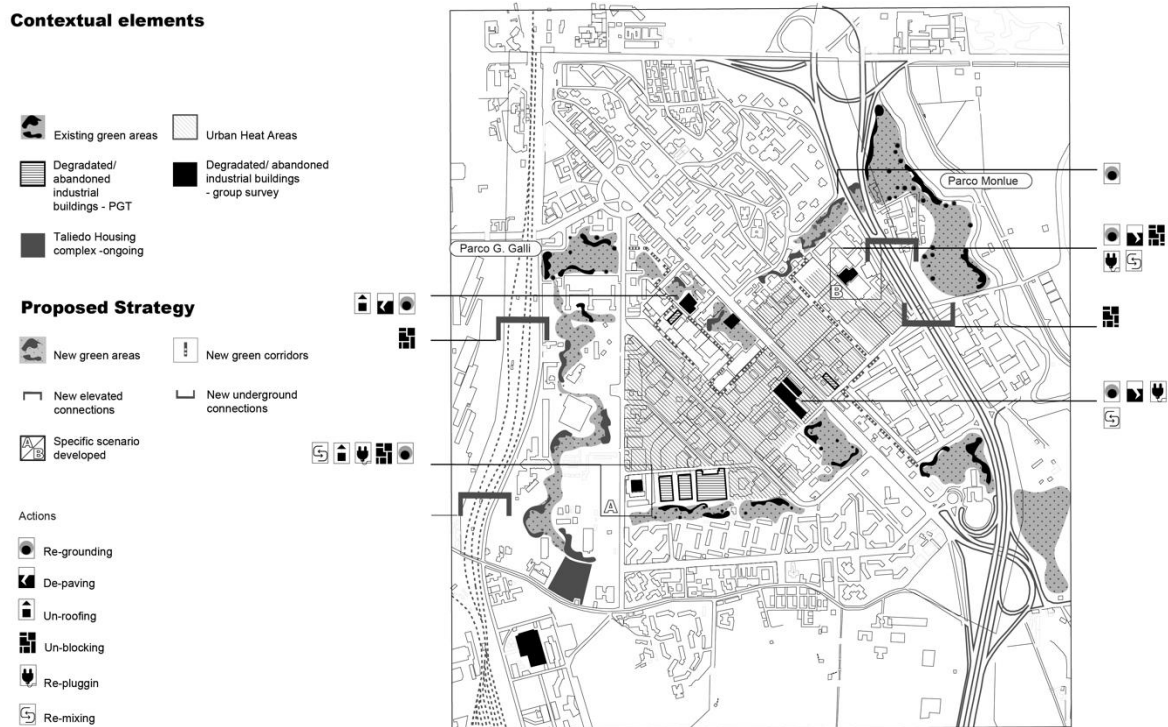


Figure 3. The masterplan shows the strategies identified to improve the porosity of the area: new open and vegetated spaces and new green and connected corridors, also made possible by the presence of aboveground and underground passages. Drawing by PhD candidates: M. Pereira, C. Cempini, P. Gamboa, V. Dall'Orto.

The Milan Eastern Fringe is a strategic resource for the spatial, ecological and social network reconnections aimed at the transition of the contemporary city toward the NEB ideals of 'beautiful, sustainable, together'. The design-driven doctoral research described in the previous section aims to establish and strengthen spatial, ecological, and social network reconnections with a multi-scale approach, from strategies to the architectural qualities of places.

The complex urban morphology of the Milan Eastern Fringe is made of urban fabrics, infrastructure, and open spaces of various typologies – part of urban, peri-urban, rural and natural domains. The developed methodology was aimed at reading and describing the common characters among the four adjacent areas of the whole fringe, reading the morphological continuities and identifying the different neighbourhoods' characters and problems to be solved. Indeed, the design actions aimed to enhance the quality of the places by spatially connecting them – both slow mobility paths and green network reconnections – and establishing new livability with climatic and social features. This fringe is characterised by various spatialities that have the potential to host significant open space enhancements in uncertain open spaces of different scales and abandoned industrial areas.

The two selected design-driven research studies described below are located in the two central adjacent areas among the four ones on the whole fringe. They are the most representative of the topics of NEB network reconnections. They are: the Southern Ortica - Forlanini Park case study, which focuses on the urban relations and reconnection both towards the city and the vast urban park; the two adjacent areas of Quartiere Forlanini – Taliedo, which proposes an urban climate and bio-climate regeneration centred on the topics of the urban climate and industrial areas abandonment.

The Southern Ortica - Forlanini Park case study investigates two main topics: spatial reconnection and green urbanism with the application of Nature-based solutions. The spatial reconnection of this area – all-around surrounded by critical infrastructures – to the adjacent neighbourhoods boosts accessibility and urban porosity. Moreover, it reestablishes the urban relationships that allow the area to be turned into the door of an important urban function, such as Parco Forlanini. Then, it operates on difficult, low-quality, neglected open spaces – mainly leftovers and passages through the limits. These are predominantly man-made environments where all future human actions should strengthen the relations between nature and architecture to trigger changes both at the local and urban scale, reimagining them in a new way combining spatial quality, environmental performance and sociality. The design actions operate directly on the ground by de-paving it, creating rain gardens, increasing the permeability of parking lots, and establishing a new relationship between the city and the environment.

The Quartiere Forlanini – Taliedo case study hosts residential and industrial fabrics; its most relevant problems are high superficial temperatures in the central industrial area and abandonment. This design experimentation works on the urban climate and bio-climate regeneration, focusing on the issue of Urban Heat Island. The proposed design actions aim at re-using and repurposing the abandoned buildings of the industrial core and the neglected open spaces and at their bioclimatic adaptation. The main design actions in the open spaces are unlocking the dense industrial area, reconnecting the network with new pedestrian and street connections, depaving and re-grounding the paving to alleviate extreme heat stress, creating new shaded public spaces, and harvesting rainwater. Moreover, the project aims to foster adaptive reuse through new mixed-use areas and services, repurposing abandoned industrial areas and buildings.

The project is a tool for urban regeneration that establishes active protection of abandoned industrial heritage, its reuse, and its renewal by managing the balance between conservation and transformation. It reactivates new life cycles for places and buildings and creates new identities by renewing the functional program and inserting innovative elements.

3. CONCLUSION

To sum up the four *lemma* of an ongoing open glossary reclaim specific design actions by:

1. Expanding borders as design potential areas, negotiating benefits and costs in periurban context of fragmented ownerships.
2. Remodeling postindustrial fabrics through critical reuse, substitutions, and graftings for energy reconversion.
3. Reconnecting architectural interstices to compose larger urban frameworks.
4. Enhancing ecological networks through NBS design for highly infrastructural areas.

On a more general level, the described didactic results show a similar approach in integrating different scales, from the geographical to the technical one of the energy building performances. This particular gaze implies a multilayer integration, where the architectural and urban design project is a systematization of environmental and cultural resources. Indeed, tackling the architectural project according to an integrated vision raises reflections on the tools to be used to operate in the historic, modern and contemporary city, in their different legacies, on the cataloguing, delimitation of spaces, elements and materials which in different roles contribute to the definition of places and their ecologies.

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Milan. A hotbed of experimentation in the transformation of post-industrial areas.

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Abstract

The paper discusses the relationship between Milan and the second life of post-industrial areas in its metropolitan region. In fact, the relocation of the industrial belt and the modification of infrastructural frameworks have been at the center of the political and scientific debate since the end of World War II, and the general plans and talk-about projects that followed. Entailing slow and sometimes contradictory transformation processes, the gradual conversion of dismissed areas has nonetheless reshaped entire urban portions and today seems still far from conclusion. The paper selects from among the plethora of post-industrial transformations a few emblematic experiences that help to frame how Milan became a hotbed of experimentation and how the perspective and the needs of the city transformation could be addressed in the future. The outcomes discuss design challenges and themes emerging from the past and ongoing architectural projects and processes of urban transformations in post-industrial sites and reflect on the strategic way contexts, architecture, citizens, and sustainable environments can find innovative and harmonious forms of coexistence.

Keywords: *Milan, Architectural design, Urban transition, Post-industrial transformation, Resilience, Climate change.*

1. Introduction

Milan and its surrounding metropolitan area represent today the most developed financial, industrial, and technological hub in Italy, due to its strategically advantageous geographical position. Located at the core of infrastructural connections, it serves as a significant crossroads for economic and financial interests and flows.

Since the post-war period, when Milan faced the challenging task of its reconstruction, the city has been shaped by a combination of industrial growth, strategic urban planning, economic reform, ambitious regeneration projects (e.g the introduction of the P.R.U. - Programma di Ristrutturazione Urbana - by the Ministry of Public Works in the 1994, to facilitate the recovery of disused areas.), and evolving social dynamics. Collectively, these factors have contributed to the emergence of Milan as a dynamic and influential global city.

In recent years, also drawing on other urban regeneration example from across Europe, policy efforts have aimed to make Milan competitive and attractive both for residents and investments, addressing the increasingly urgent issue of environmental sustainability. Although the reactions introduced so far sometimes appear driven by neoliberal rhetoric and may not fully meet the challenge [1], the National Center for Urban Policies Studies (Centro Nazionale di Studi per le Politiche Urbane Urban@ité [2]), in the fifth annual report on cities (2020), highlighted a positive narrative emerging within Milan's urban agenda. This narrative elevates the city as a "model" of urban development capable of merging competitiveness, innovation, and inclusivity, and positioning Milan as a leading foothold of the Italian economy in Europe and also in the world [3, 4].

Over the next 10 years, the objectives of the Territorial Governance Plan (Piano di Governo del Territorio - PGT) [5] will synchronously address four major themes: the megapolis of neighborhoods, sustainable development, international aptitude, and the public city. The PGT, approved by the City Council on October 14, 2019, sets the goals for Milano 2030, including demographic, economic, and

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tourism growth. This phase of growth is expected to continue, especially considering the Milan-Cortina 2026 Olympics. The plan's renewed vision for the city focuses especially on environment and climate change, outskirts and neighborhoods, the right to housing, and affordable rents.

The relation with the overall metropolitan area is fundamental, as it will shape the significant changes anticipated over the next decade. In fact, the Milano metropolitan region is characterized by extensive conurbations exerting real estate pressure on green areas, creating a fragmented mosaic of land hemmed in by suburban expansion, infrastructure lines, and a more limited network of post-industrial areas. Furthermore, large, disused sites have historically influenced the city's development trajectory and remain one of the critical challenges for its future, considering their potential environmental (climate change) and social (right to the city) roles.

In this context, Milano's recent urban history appears symbiotically linked to the past and future regeneration of its post-industrial sites. Thus, there is an urgent need to define a long-term strategy for the city's future, including the reuse of the large areas still available within the urban territory.

2. Literature

In Italy, since the early 1980s, the issue of the urban expansion crisis has been crucial to the debate, framed within a consolidated hierarchy based on urban densification. In 1984, Secchi in Casabella [6], observed a shift towards a progressive stop in urban growth and a gradual dispersion, which generates “new voids” in the structure. This phenomenon of abandonment creates fragmentation within the consolidated fabric, an expression not only physical but also economic. Within the disciplinary debate, observing the physiologies of a new dimension, a reflection on high-profile theory emerged through the pages of Casabella under the direction of Gregotti during those years. This reflection highlighted not only an inevitable transition from the “culture of expansion to the transformation”, but also the crisis of established planning tools [6]. The project undertakes a dominant role in the phenomena of abandonment, with the sentence “costruire nel costruito” (building within the built environment) as fundamental aspect of the future condition. Beyond reuse, every architectural operation increasingly becomes an action of partial transformation [7].

Moreover, for the past forty years, the debate on the city of Milan has focused on the major transformations of the abandoned areas within the city (industrial sites and railway yards). These sites have changed their purpose due to economic shifts. On this topic, the debate and research conducted within the Milanese School of the Politecnico di Milano have been fervent over the last years. There has been a consistent examination of ongoing processes and a questioning of both the possible strategies to adopt and the solutions to be implemented in the challenge of decisions due to political cycles, urban market dynamics, and territorial governance tools. Consequently, the scientific debate has been extensive through conferences and publications, as well as research funded by several agencies to the Polimi's departments, involving several colleagues, some of whose research will be mentioned in this paper.

3. Methodology and case studies

The paper selects from among the plethora of post-industrial transformations a few emblematic experiences which help to debate how Milan became a hotbed of experimentation and how the perspective and the needs of the city transformation could be judged and how nowadays, some of the projects can be measured with the time-critical distance.

The Bicocca district, one of the most famous completed transformations projects (1985-2005), is a representative “saga” of the sharp debate animating the transformation of post-industrial sites. The Bicocca project (Gregotti Associati & Studio Valle Architetti Associati) is one of the last points of encounter between urban planning and architectural design. Today, with the historical distance it offers significant elements of reflection on the social and climatic crisis, such as housing affordability and heat islands.

Moreover, the paper discusses two types of ongoing transformation processes affecting post-industrial sites. One regards projects born from public-private negotiations, such as the cases of Porta Vittoria, Porta Romana, Bovisa's Goccia, and the former Falck areas. The other considers the projects originated from international competitions, where the "Reinventing Cities" platform promoted by the C40 league, with its mandate to stimulate sustainable development and celebrate innovative solutions to environmental and urban challenges, plays the most significant role.

4. Selected approaches

4.1 The Bicocca transformation, a Milanese paradigm

Entering an abandoned factory, silent and devoid of workers, is always for me an experience where sadness and wonder mingle long before the promise of what will come next"⁸

The functional redevelopment project of the Bicocca area is situated in relation to the northern areas of Milan, characterized by a territory undergoing trans-scalar and functional transformations, and a symbolic landscape that signifies the union between "modernity" and "post-modernity."

At the time, the Bicocca project was, a milestone in the international disciplinary debate concerning the revitalization of disused industrial areas and a milestone in the urban history of Milano [9], which in the 1980s was countersigning internal fragmentation of the fabric due to obsolescence phenomena. (Among the major redevelopment interventions on disused areas - now either completely recovered or in the final stages of completion - are the ex Alfa Romeo Portello; ex Fina refinery in Quarto Oggiaro; ex Mechanical Workshops (O.M.) in the Bocconi area; ex T.I.B.B in Lodi; ex Ponteggi Dalmine and SCAC in Lorenteggio; ex Sieroterapico; ex Binda Paper Mills in the Navigli area; ex Carlo Erba pharmaceutical industry in Maciachini; and ex Motta confectionery industry[10]).

The industrial district of Pirelli's factories (at the time the second Milanese plant in addition to the one in Via Ponte Seveso, where the Pirellone is now engraved in memory) originated in 1908 in the Bicocca countryside. The first settlement, near Greco Milanese, expanded until it became an autonomous citadel of 730,000 square metres and involved the entire northern Milanese urban development. In 1983, Pirelli Industries and the municipal administration signed an allotment agreement, and in 1985, together with the Region and Province, they signed a Memorandum of Understanding to transform the site into a 'National Technology Centre'. An international competition by invitation was announced and twenty of the most important architects of the time were invited to participate: Aulenti, Aymonino, De Carlo, Gabetti, Gregotti, Piano, Rossi, Valle, Tadao Ando, Botta, Ciriani, Gehry, Meier, Solsona, Moneo, Guedes, Stirling, Hertzberger, Peichl and Ungers [11].

According to Leopoldo Pirelli's evaluation, the project was awarded in 1988 to Gregotti Associati in recognition of the expressive power of the new buildings and their ability to stitch together the surrounding urban fabric, giving it a reference point for the entire north of Milan, and contributing to a polycentric vision of Milan's metropolitan area [12, 13]. The new project aims to build a innovative "Technocity", concentrating high-tech activities, business services, research and production (headquarters of the Deutsche Bank design by architect Gino Valle, three tertiary towers and the new Siemens group headquarters), targeting the area to be a new university hub. Gregotti designed the masterplan and most of its buildings, in a mix of renovation of pre-existing buildings and new constructions [14]. Gregotti designs the district as a historical center of a diffuse periphery by now densely consolidated within an urbanized and productive countryside, also re-connecting to the memory of the old industrial settlement starting from the original grid of roads inside the factory transformed into an urban layout [15, 16]. Furthermore, it reconnects to the historical, geographical and figurative context regarding structural aspects, fully reconfiguring the stylistic aspects with buildings characterized by massive volumes [17, 18]. The layout runs parallel to the railway line over three strips and structures urban courtyard blocks with a series of public squares in sequence, connected by a central pedestrian axis. A mix of commercial functions, residences with a kindergarten and church, students' residences, an urban park (the "Cherry Hill"), CNR laboratories, the AEM, and

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the Arcimboldi Theatre to the east join in the sidestreets. The Pirelli headquarters are located to the North, including the historic Arcimboldi villa and the monumental cooling tower. To the West are sports facilities also connected by pedestrian pathways to the Parco Nord [19]. Finally, the area to the North of the district is still fragmented and under construction. Although the theoretical scope of the intervention has already been mentioned, the Bicocca project remains one of Gregotti's best-known (and most debated) works from the outset. It has been criticized for the monumental character of the solutions, which oversteps the human dimension and the scale of public space, by stretching the area to the limit and depriving the district of the comfort needed to live in it. In addition, the lack of natural greenery, which is a constant problem for the city of Milan [20], and the social problem are the most debated questions.

Recently, the studio Piuarch, also students of Gregotti at the time of the Bicocca project, was 'symbolically' entrusted with the redevelopment of a portion of the district with a project called 'BiM' ("Bicocca incontra Milano", translated as Bicocca meets Milan). By 2026, an area including two of Gregotti's buildings will be redeveloped (50,000 square metres of workspace, commerce and a new multifunctional Pavilion) with a 250 million Euro budget [21]. At the center of the project is the garden space (6,000 square meters), which is intended to become the gathering point for the quarter and be livable even after working time, as part of the community that resides or only works here.



Figure 24. The Bicocca as building site (2001, sx) and today (dx), with the changing in urban densification (©Google Earth)

4.2. Recent emblematic projects born from public-private negotiations

In recent years, Milan has reflected on the necessity of implementing profound spatial changes, revealing the city's regenerative ambition. This capacity drives through a combination of large-scale urban transformation and infrastructural interventions, affecting large disused urban areas and facilitating molecular changes in the city's settlement and functional fabric [22]. As Bozzuto [23] highlights in the atlas, outcomes of the research project "Public City as a Laboratory of Planning: The Production of Guidelines for the Sustainable Redevelopment of Urban Peripheries" (funded by the Ministry of University in 2005), these interventions are mostly heterogeneous in terms of dimension, function, and process (project forms, implementation tools, stakeholders, actors, etc.), yet they share a common denominator becoming "significant points" for bestowing new values upon the context where they are integrated into.

Nowadays, after the large industrial areas have been completed, the railway yards (Farini; Greco-Breda; Lambrate; Porta Romana; Rogoredo; Porta Genova; San Cristoforo - a total area of more than 120 ha), the EXPO 2015 site in the North-West of Milano and the abandoned barracks system (which is an open question not only for Milano, but for almost all Italian cities) have become the focus of interest. All these plots form a widespread and fragmented system of areas, fenced and impenetrable enclaves that break up the city. They represent an unquestionable potential for multi-scaled urban transformation. Moreover, both the railway yards and the barracks are public areas but owned by an

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agent (e.g. Ferrovie dello Stato) that however acts according to private logics and strategies, such as real estate valorization.

However, in 2008, Milan also faced the global financial crisis, which impacted the real estate market, not through price reductions but through increased timelines of contracts. Additionally, as Pasqui [24] highlights, Milan lacked an adequate urban strategy, and during the Albertini administration (2011), work was underway on a new Territorial Governance Plan (PGT – Piano di Governo del Territorio) to support a building growth strategy, which however no longer matched the current needs of the estate market.

Nevertheless, the first agreement between the Milano Municipality and Ferrovie dello Stato was initially formulated in July 2008 [25]. In 2017, a MoU was signed among the Municipality of Milan, the Lombardy Region, Ferrovie dello Stato Italiane S.p.A., FS Sistemi Urbani Srl, Rete Ferroviaria Italiana S.p.A., and the Fondo Olimpia. The project envisages the urban transformation of seven former railway yards (Scalo Farini, Scalo Greco-Breda, Scalo Lambrate, Scalo Rogoredo, Scalo Porta Romana, Scalo and Station Porta Genova, and the San Cristoforo railway areas, 1.2 million square meters) [26]. This is one of the most significant real estate operations in the coming years, thanks to the strategic locations of these areas in semi-central zones, and to provide an opportunity to mend the rift between the city center and the periphery. In return, Ferrovie dello Stato is expected to contribute to urbanization charges and to investment in a Circle Line, which should rapidly connect several zones in the city.

However, several doubts have arisen regarding this project, with divergent positions emerging both within the academic debate [27] and through the opposition of some associations such as Italia Nostra [28]. The social counterpart of the project is considered minimal relative to the value of the entire real estate operation and the increase in area value generated by their change in urban designation [29].

4.3. The “Reinventing Cities” initiative. A new model of contemporary urban transformations (ca 8.600 ch)

Inaugurating a pivotal discourse in urban studies and sustainable development, the C40 Reinventing Cities [30] initiative emerges as a seminal platform poised to redefine contemporary urban landscapes through a prism of innovation and ecological imperative. Envisioned as a catalytic mechanism to address the multifaceted challenges of urbanization, climate change, and social equity, this initiative embodies a concerted effort to reconceptualize urban development paradigms through scientific inquiry and interdisciplinary collaboration.

C40 is a global network of nearly 100 mayors from leading cities, united to combat the climate crisis and committed to diversity, equity, and inclusion in its operations and collaborations, aiming for a future where everyone can thrive. They aim to cut emissions by 50% by 2030 and limit global warming to 1.5°C, focusing on different scopes, among which building healthy, equitable, and resilient communities. C40 supports mayors through raising climate ambition with action plans and innovation, building equitable, thriving communities via global programs, engaging in international advocacy, sharing best practices in climate action, facilitating finance for green jobs and resilience projects [31].

Membership is based on performance, reviewed annually against C40’s Leadership Standards, which emphasize resilient, inclusive climate action, innovation, and global leadership.

Reinventing Cities is the competition promoted by C40 league that pursues effective strategies to field decarbonized and resilient urban regeneration across the globe, setting benchmarks in the global agenda [32]. Embracing a holistic approach, selected projects exhibit a synthesis of green infrastructure, renewable energy systems, and equitable urban design, emblematic of a nuanced understanding of the interplay between built environments and ecological systems.

At the time of writing, Reinventing Cities is running through the fourth batch of competitions in fifteen global cities: Almere, Bilbao, Bologna, Brussels, Glasgow, New York, Palermo, Renca, Rome,

San Antonio, San Francisco, São Paulo, Seattle, Venice, and Milano. In Milano, the call has been structured in two phases: PHASE I “Expression of interest” and PHASE II “Final proposals” and identifies neglected lands, vacant building, and uncertain urban situations that already expose potential for short and long term improvement, enacting solutions to the following 10 climate challenges: energy efficiency and low-emission energy, life cycle assessment and sustainable management of building materials, low emission mobility, resilience and climate adaptation, ecological services for the territory and green jobs, sustainable management of water resources sustainable waste management, biodiversity, urban reforestation and agriculture, inclusive actions, social benefits and community engagement, and innovative architecture and urban design.

As readable from the municipality’s webpage [33], in 2017, 2019, and 2022, the City of Milano took part in the initiative with a selection of properties partly owned by the municipality and partly stewarded by other companies. In the first edition in 2017, five sites were offered. Four, Doria, Serious, Scuderie de Montel, Gorla Market, owned by the city and one, Scalo Greco Breda, owned by Ferrovie dello Stato Italiane SpA (FS) and FS Sistemi Urbani SRL (FSSU). The competition addressed 8,4 hectares of land, received more than 40 expressions of interest, 13 of whose were admitted to the second phase, 8 selected for the final stage, and 4 were awarded: all the sites but Gorla Market.



Figure 2. The design sites of the first (sx) and second (dx) edition of Reinventing Cities in Milan (source: <https://www.c40reinventingcities.org>, graphic elaboration by G.S.)

In the second edition in 2019, seven sites were put out for tender. Five were owned by the city: Piazzale Loreto (“Loreto”); PA3 Viale Molise ex-Slaughterhouse (“Ex-Slaughterhouse”); Palazzine Liberty; ERS Area Crescenzago (“Crescenzago”); and Section A of the Monti Sabini PII (“Monti Sabini”). One, “Bovisa Node”, owned by the Municipality of Milan in partnership with Ferrovienord Spa, involving areas near the Bovisa FNM station. One, the former Lambrate railway yard (“Lambrate”), owned by Ferrovie dello Stato Italiane SpA (FS) and FS Sistemi Urbani SRL (FSSU) is part of a broader program agreement for redeveloping Milan’s railway yards, signed on June 23, 2017. The call covered 42 hectares, more than 60 manifestations of interest, 27 of which were admitted to the second phase, with 13 finalists, and 5 awarded (Ex Macello, Scalo Lambrate, Crescenzago, Nodo Bovisa, Piazzale Loreto) (Figure 2)

In the third edition in 2022, the topic got closer to housing affordability and right to the city issues, epitomized by the new slogan “Reinventing Home.” Six sites were offered. Four, “Zama Salamone,” “Martesana,” “Bovisasca,” and “Certosa 186,” are owned by the city; one, “Pitagora,” provided through a partnership with MM Spa on land co-owned with the Municipality of Milan, and one, “Abbiategrasso,” in partnership with Aler Milano, which provided an area over which it holds surface rights. The competitions addressed 4,6 hectares of land, and 9 proposals were invited for the final

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stage. While the results are still to be officialized, the third edition of Milan's Reinventing Cities appears less successful than the previous two.



Figure 3. The design sites of the third (sx) and fourth (dx) edition of Reinventing Cities in Milan (source: <https://www.c40reinventingcities.org>, graphic elaboration by G.S.)

The fourth edition was launched in 2024, when the Municipality of Milan selected the school located at via Zama 23 as the testbed or innovative design solutions. Having one sole site may suggest that the attention on the overall initiative is decreasing in the Milanese environment, posing questions on how to reboot a widespread interest from different stakeholders (Figure).

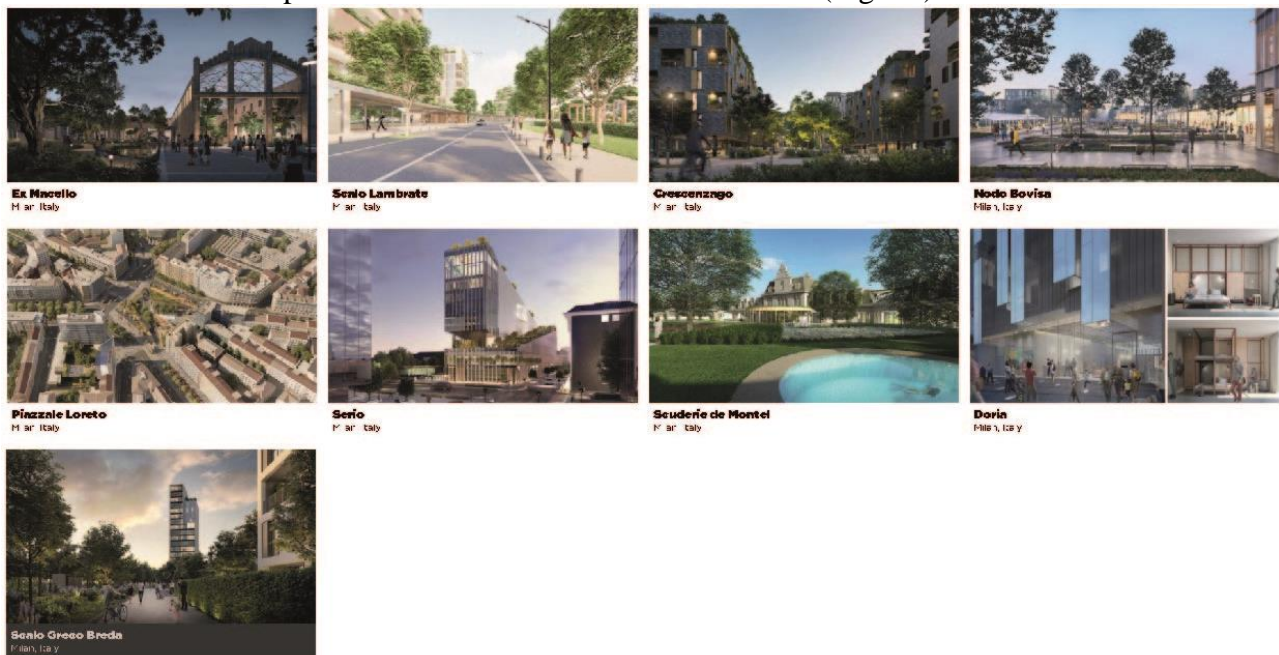


Figure 4. Iconic images of the awarded projects from the Reinventing Cities initiative (source: <https://www.c40reinventingcities.org/en/professionals/winning-projects/filter-milan/>)

Up to date, Milan can praise 9 awarded proposals (Figure 4), with projects various in size, type, functional program, contextual conditions, and design attitudes. These ventures are conversely accumulated by transdisciplinary synergic approaches, sustainable objectives, and public-private cooperation (Table 2). Witnessing the growing role played by C40 initiatives, Reinventing Cities has recently been launched also at students' level competitions. Up to now, Milan has awarded one project "Flyover Corvetto"[34] and at the time of writing no open calls appear available.

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Table 2. The 9 winner Reinventing Cities Project in Milan. (Source: C40 Reinventing Cities official website - May 2024)

Site	Plot area (sqm)	Project title	Team Representative	Architects	Environmental Experts	Others
Serio	4.900	Vitae	Covivio Development	CARLORATTIAS SOCIATI SRL	Distretto Tecnologico Trentino S.C.A R.L.	-
Scuderie de Montel	22.000	Teatro delle Terme	Architetto Giancarlo Marzorati	Architetto Giancarlo Marzorati / J+S SRL	Progettisti Associati Tecnarc srl	-
Doria	610	Co-Inventing Doria	Rete Fra Inprese "B Smart"	Ambrogio Risari - Dm Architettura, Emanuela Sara Cidri, 16bis Studio	Politecnico Di Milano, Dipartimento Di Energia - Prof. Francesco Causone	-
Scale Greco Breda	62.129	L'Innesto	Fondo Immobiliare Lombardia, managed by InvestirRE sgr and advised by Fondazione Housing Sociale	Barreca & LA Varra	ARUP Italia Srl	-
Ex Macello	148.371	ARIA	Redo Sgr Spa – società benefit	Snohetta Oslo AS, Barreca & La Varra, Cino Zucchi Architetti s.r.l., Stantec S.p.A., Chapman Taylor Architetti S.r.l.	Stantec S.p.A	-
Scalo Lambrate	64.458	Lambrate Streaming	Sant'Ilario Società Cooperativa Edilizia	Caputo Partnership International srl	Tekne spa, Pro Iter srl, Ambiente Italia Progetti srl	Studio Arch. Franco Giorgetta, Consorzio Poliedra – Politecnico di Milano, Giorgio Milani, Ernst&Young, Avv. Guido Bardelli
Crescenza go	14.900	Green Between Tessiture Urbane	Redo Sgr Spa	ARW	Stantec S.p.A.	Fondazione Housing Sociale, Cresme Ricerche spa, GET srl, Dipartimento di Energia del Politecnico di Milano, EON Business Solution srl, è nostra, MIC Mobility In Chain srl, AG&P GreenScape, Planet Idea srl, In Vento Innovation Lab Impresa Sociale srl, Consorzio SIR - Solidarietà In Rete Soc. Coop. srl, Avanzi srl, In Domus srl.
Nodo Bovisa	91.000	MoLeCoLa (Mobility, Learning, Community , Lab)	Hines	Park Associati	Habitech	ESA Engineering, Bollinger+Grohmann, Mobility in Chain, Greencure, Irs - Istituto per la ricerca sociale, Schneider Electric, A2A calore e servizi, Aparto, Woodbeton, Studio Amministrativisti Associati
Piazzale Loreto	25.800	Milano per LOC	CEETRUS Management & Development Srl with CEETRUS Italy SpA	Metrogramma Milano Srl, Andrea Caput, Mobility in chain Srl, LAND Italia Srl, Temporiuso Srl, Futureberry Srl, Squadrati Srls, Starching Srl, with Matteo Gatto and Renovatio Design	Arcadis Italia Srl	-

5. Discussion and conclusion

The paper has introduced design challenges and key issues related to a selection of transformations that have reshaped, or are still on design phases, the connotates of Milan. The results suggest that the post-industrial conversion, beyond a process not yet exhausted after several decades, is still the prominent testbed for sustainable-oriented architectural and urban projects. The examples of Bicocca

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District conversion and the coeval season of an unclear public-private partnerships urban projects unveil the gradual retreat of the public initiative in Milan's governance and transformative trajectory. Despite increasing heteronomous forces, the role of the architectural project as a design-driven agent of transformation, when supported by adequate urban governance, has already been acknowledged as pivotal in times of complex and uncertain transitions [35]. Strippoli, for instance, has emphasized how the architectural project is called time by time to reinvent its implementation tactics while keeping core strategic values of sustainability and inclusivity beyond aesthetics and functionality [36]. The C40 Reinventing Cities program was built on similar pillars: localized actions addressing global challenges.

However, evidence shows that the primary trend embodies a slow but inexorable weakening of public governance, accompanied by the so-called *de-regulation*, in favor of an increasing incisiveness of private initiative. Fostered by the privatization of basic welfare, such as transportation, social housing, or leisure, the market's dynamics have taken over the delivery of public services, triggering widespread phenomena of commodification that have also impacted architectural production. Many buildings designed for collective use have bargained their civic meaning with the flavor of fancy international styles, generating urban icons and simulacra that respond more to consumption logic than collective inhabiting. The urban transformations selected here represent this historical phenomenon well. Even the C40 Reinventing Cities initiative, inaugurated under the auspices of a new shared awareness and sensitivity towards sustainable themes, appears to have consistently shrunk over the last years, suggesting that private investments have re-oriented their focus on probably more remunerable enterprises. As the object of permanent negotiations between public and private actors, Milanese post-industrial or abandoned areas will struggle to counteract capitalistic mechanisms.

However, the high land values inevitably drive the market towards profitable logic. Considering what happened to the agricultural fields of Expo 2015, where the transition to the MIND (Milan Innovation District) aims to become a cathedral of research and innovation. The goal, in theory, is to transform the area with hundreds of enterprises and thousands of people who, using existing structures in a circular economy perspective, will begin to populate this city of the future. Yet, where one of Europe's largest linear parks was supposed to begin as a legacy, a multi-million real estate deal took place. This deal was secured by the Australian real estate giant Lendlease, which, together with Arexpo (a majority-public company), developed the project through a partnership between public entities (Galeazzi Hospital, Human Technopole Foundation, and the University of Milan) and private interests (including major pharmaceutical giants and multinational corporations allocated an area of 475,000 square meters)[37].

According to the circular logic the project for the Olympic Village in Porta Romana [38] (190,000 square meters) should be include its future transformation. The Porta Romana area, on the outskirts of Municipality 5, has long been a barrier and fracture between the North, with a consolidated residential city, and the South area, which in the recent years has experienced significant propulsion towards redevelopment thanks to the establishment of important tertiary and cultural functions such as Fondazione Prada and Symbiosis. The redevelopment of the Porta Romana rail yard, awarded to the Porta Romana Fund managed by COIMA, Covivio, Prada Holding, and the COIMA ESG City Impact Fund, has involved some of the most prominent international architectural firms for both the masterplan and the Olympic Village project. The overall objectives are intended to align with those of the EU ecological transition and the National Recovery and Resilience Plan (PNRR). Additionally, the project proposal has been reviewed through several consultations with citizens. The post-Olympics phase is also included in the initial design of the entire neighborhood, which is envisioned to have a mixed cultural/university vocation, with student housing solutions and a focus on open spaces as biodiverse meeting places for the entire city.

In this regard, the programme envisaged in the PoliMi work package of the Cimatra consortium can offer a valuable opportunity to shift the focus to post-industrial sites that are still highly valued but

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are nevertheless on the outermost fringes of the city, i.e. in the urban conurbation of the extended metropolitan area. Even in these former rural areas, first industrial decentralisation and then residential pressure has generated an increasing contraction of vacant spaces. Nowadays, where even the industrial sectors have entered a crisis and have further decentralised, it remains to be clarified which tools and design solutions can be implemented.

Especially in these areas, the lower pressure of private contracts can lead to virtuous public-private synergies that can more effectively rebalance socio-economic inequalities and, at the same time, tackle the uncertain challenges of fast-changing climate change. Local governments and development agencies' attention to suburban areas may represent an interesting opportunity to counteract urban gentrification, rebalance the provision of services, and requalify degraded peripheries [39].

The challenge for the Milanese metropolitan area is to achieve territorial cohesion, trying to design a new structure for the fragmented and widespread city, reinforcing the polycentrism of the urban region, encouraging the recognition of inter-municipal aggregations which are able to get involved in municipalities, in which to seek complementarity, integration of the service system, and identity.

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Post socialist suburban Urbanism – focus on public spaces’ transitions

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Extended abstract

The article talks about the challenges related to shaping public spaces in suburban areas of large cities, the so-called Eastern Bloc, on the Polish example. At the beginning, the article is focused on the characteristic features of the development of post-socialist cities, which are confronted with challenges in the cultural, energy, operational areas and the effects that result from the change of the political system. This is an attempt to systematize the typological phases of transformed large cities in relation to the Polish case – Warsaw. These cases show that they are distinctive, especially in relation to the development trends of the suburban sprawl. The change of political system that took place in Poland in 1989 initiated a new era of urban development. Local governments looking for effects as the first consequence of the political system uncritically accepted the conditions of new investors who invested in their cities, which brought far-reaching social and, above all, functional and spatial outcomes. The legal system in Poland was not equipped with adequate tools, which further deepened the spatial chaos. Large post-socialist cities, were subordinated to the dictates of the market, unavailable in the unplanned development of the suburbs. To this day, we are still in the process of urbanization of Polish cities, which has taken a pathological form, especially where land and former agricultural divisions have determined a new urban structure.

In all this, it concerns the chronic inhibitions of public space, towards which social expectations are growing. This aspect of culture in relation to public space is also available to the other post-socialist countries. The article presents a public space structure in the selected communes of the southern part of the Warsaw agglomeration, due to its use after 1989. The background for the research was also related to the social background for the changes occurring, and it is additionally interesting to note how the issues of public space have changed over the last post-socialist solution to urban development. In socialist times, it was treated as a domain of public, and there was no grassroots involvement in its shaping. After the political transformation, public space was perceived as nobody's property, with the expectation, being a remnant of the old system, that the authorities were responsible for it. Only recent years have shown the emerging readiness to co-decide and co-responsibility for space, but this situation mainly concerns the inhabitants of large cities. It will also be interesting to study what role a public space begins to play in places where there is no traditionally understood public space.

The conclusion of the article is a diagnosis of the condition of public spaces and their shortcomings, as well as an assessment of the possibilities of creating systemic solutions in this area, which are a response to contemporary civilization challenges, including climatic, technological and social ones.

Keywords: *public spaces, post socialist cities, urban planning, Warsaw agglomeration, suburbanization*

ECOLOGY & EKISTICS: PAST, PRESENT AND FUTURE



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Organized and chaired by Assoc. Prof. Nikolaos Patsavos

Assoc. Prof. Nikolaos Patsavos, Department of Architecture, University of Ioannina

Ecology & Ekistics: Past, Present and Future

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Extended abstract

Back in 1974, C. A. Doxiadis finalized the manuscript of his last book, “Ecology and Ekistics”, one that would be published, a short time following his death and edited by the renowned Gerald Dix. This text, although it has not, until recently, been situated at the epicenter of doxiadic studies, proposes a comprehensive reconstruction of Ekistics as the science of Human Settlement in the light of the most primary parameter in their historical evolution, that being Nature. In the light of the current international debate on sustainable cities and architecture, the paper proposes and calls for a double reading based on the following axes. a. How did the concept of nature function as a paradigm for the constitution of the Ekistics? b. In what ways did the ecological reconceptualization of architecture and planning function, itself, as a source of later institutional and scientific developments, such as UN HABITAT, contemporary methodologies and technological frameworks, like Ecological Urbanism, GIS and geo-informatics et.al.?

The rise of the discourse on Sustainable Development and the UN SDG 17 goals, could provide with appears as a necessary reference to this discussion. Could it be hypothesised that Doxiadis iterated the presuppositions for such an ecumenical and compositional, dynamic approach? By referring, himself, to the example of Patmos, and comparing it to larger scale case studies, such as the Attica Peninsula in continental Greece, he grasps the opportunity to explain his concept of the “global ecological balance goals”. His holistic study of both its monumental and natural assets could be almost straightforwardly make sense within the contemporary definitions of ‘UNESCO cultural landscapes’, their sustainable management and the “balance between preservation and change”. Doxiadis is pioneering in both his systemic approach and his coining of a series of neologisms.

This has been a characteristic of his epistemological thinking already since the Delos symposia and the schematisation of the Human-Nature-Society-Shells-Networks diagram. Ekistics are not a sheerly taxonomic and descriptive analytical science. It may be mainly understood as an adaptive theoretical body allowing for a clear view of complex phenomena far exceeding the potential of deterministic positivist approaches. Still, a closer look at the historical evolution of Ekistics may shed light on important points of rupture, regarding its main epistemic hypotheses. To give but one example, it has been often criticised for its incapacity to cater for the political aspects of spatial ecumenical governance. At the same time, Ekistics seem to be modelling space, in all its scales, in the same way and without any direct concern for what today stands out as a crucial aspect, that of the ‘in-between’. This paper invests in Ekistics’ capacity to constantly reframe its elements and the relations between them. Doxiadis’ words may serve as an epilogue to his multifaceted experience and as a prologue for future action: ‘Our task is to define the system of life expressed by human settlements so clearly that it can contain every part, aspect, expression of opinion, known or unknown, foreseen or unforeseen. Once defined, our task is then to learn to control this system wisely for the sake of mankind.’ The task of reinterpreting and reframing this rhetorical iteration today is in ‘intensive’ limbo.

Keywords: *Ekistics; Ecology; sustainable design; design science; C.A. Doxiadis*

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Planning the Human Habitat – The Foundation of Contemporary Ecological Urbanism on C.A. Doxiadis' Ekistics

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Extended abstract

This paper delves into the institutionalization of *ekistics*, the study of human settlements devised by C.A. Doxiadis, navigating the transformative journey from early urban planners to a more inclusive, diversified and “natural” approach. Against a backdrop of a century marked by population growth, widespread urbanization, and diminishing natural resources, the urban planning landscape witnessed a paradigm shift. From being predominantly, the domain of city-builders, planning now involves a multitude of contributors, including social theorists, scientific consultants, administrative committees, and the ordinary citizens affected by planning decisions. As globalization heightened the need for universally applicable planning methods, the institutionalization of principles became a defining feature by the late 20th century. City-building expanded extensively in response to the demand for larger urban environments, yet the surge in urban populations highlighted the pivotal role of those who inhabit these spaces. The act of dwelling emerged as a determinant factor in the evolution of cities, guided by the influence of habitat culture emphasizing the construction of living spaces.

The concept of *habitat*, over seven decades, has served as both a theory of habitation and an effort to formalize its manifestations, underscoring the importance of context and the link between individuals and their living spaces. Through the pioneering work of Doxiadis, this term has left an indelible mark on space planning, emphasizing the social conditions of habitation. The collective nature of human habitats, akin to living organisms in the natural environment, evolves alongside advancements in technology that enhance social links. Furthermore, the doxiadic concept of *kinetic fields* focused on the interactions between human movement and the city's organization, again drawing on the complex relationship of individuals with their urban environment and nature.

Over the past decades, various intersecting and overlapping theories have built on these foundations – from sustainable and resilient urbanism that promote social equity and provisions against climate change, to Timothy Beatley's green or *biophilic* urbanism that actively incorporates natural elements into urban design and models urban environments on regenerative ecosystems. Currently it is the city, as the most adaptive habitat, that reflects attempts to reconcile man with nature – but sustainability hinges not only on external factors but also on the forces inhabiting it. This paper links the evolution and establishment of *ekistics* through international conferences and policy shifts, with the contemporary search for a framework for implementing more ecologically sustainable cities in the face of global urbanization and environmental challenges.

Keywords: *ekistics; habitat culture; ecological urbanism; urban diversities*

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The historiography of a Biological or Ecological urbanism?

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Extended abstract

Man made structures have originally been seen throughout history as an attempt to control the physical environment in a way to express human needs. But scaling in cities through the centuries has caused an unexpected consequence, the need of a diversified approach, that of not only satisfying human needs in a hostile environment but the need of a controlled flow of natural resources, such as fresh air and water, livestock and most importantly the re-introduction of controlled nature in the city, like a domesticated landscape.

While the progressive new world strived to re-engineer society as a whole, with its most prominent tool, the institution of enlightenment science, thinkers could not but try to apply in the same spirit a new paradigm of city planning.

Through the middle of the 20th century and after a complete application of the aforementioned biological interpretations of biological processes through simplification and systematization of human processes, followed a second wave of thought, that of dynamic systems and the analysis of complex phenomena.

This paper aims to create a theoretical framework of key theoretical phases of urban planning theory and create a cartography of key movements and representatives of them, concluding to the contemporary discourse.

Architects and urban planners today are turning their interest towards sustainability, climate issues and social and economic resilience. In spite of individual intentions of academics and professionals there has not been a satisfactory update in architectural education not to mention the distancing of urban planning education from a wide ranging knowledge base such as in the architectural context.

A final statement of the paper will include the expanding scientific landscape of spatial sciences proclaiming to have the solutions of the contemporary urban condition and human settlements in general.

Keywords: *Historiography of Urbanism, Biological Urbanism, Ecological Urbanism, Ekistics*

1. INTRODUCTION: A 19TH CENTURY PREHISTORY OF URBAN PLANNING

Human settlements have always been the incubators of civilizations. Throughout the centuries, different civilizations managed to evolve and increase their capacity of maintaining human life in increasing numbers. So, cities following this progress of humanity tested in every step the basic framework of infrastructure available at the time and accordingly tested by trial-and-error new ways of handling spatial and infrastructural problems. As numbers in term of populations, densities and pollution etc. increased in exponential rate, we can witness the uprising of urban theories, as systematic efforts to establish new manners of organisation.

As we already know from history the fundamental prism in the creation of urban theories has always been political. Political organization is in the core of societal organization and urban function. From the very beginning of urban theories from the First Socialists such as Charles Fourier and Garnier have tried to theorise on a perfect societal function where the paradigm of the organic city of the past used only as the reference on mean of production, functions, and familiar spatial scales so the new experimental cities could be familiar to the new inhabitants. As a parallel phenomenon with the exploration of urban alternatives we have witnessed a silent sabotage of social change by the scope

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that urban planning works as a tool in favour of the ones in power and cannot bring by even the improvement of human life the true radical change of society.

Another story in the aesthetic universe of urban space has developed in history. That is two opposite approaches in the image of the city and going along the image of nature through the eye of the urban dweller. On the one side we have the polemic position of organisation and systemisation of society and as a reflection of that a very geometric unified and integrated urban environment. This environment must present the dominance of man-made structure versus the chaos of nature and by that means we observe the reintroduction of “green spaces” in the city as merely the quantitative amount of vegetation for fresh air or even worse the presence of nature as a domesticated object.

The other aesthetic order of city making is that of the romanticism of organic processes in city creation such as the medieval heritage of the cities that so beautifully Camilo Sitte analyzed but also translated as a synthetic tool for urban planning. Accordingly, nature is reflected similarly in this romanticist approach as a space with extravagant properties that exceed functionalism and enter to the area of connection with metaphysical schools of thought [1].

Concluding on this short introduction as we can notice, we see the influence of the two main philosophical schools of thought projecting in the urban space, Realism, and Idealism. As we will continue our research we will utilize this important observation for future connections of historical expressions in urban planning, where the aforementioned purity of intentions changes and we can see hybrid approaches in lets say modernity and organicism, as engineered naturalism and ecology of non-design.

2. PATRICK GEDDES: THE BIRTH OF BIOLOGICAL URBANISM

Beyond the above epistemological battle of implementing the principles of enlightenment or other principles of the anthropology of the western civilization, a different approach in urban thinking occurred, caused by the great impact of a new science being developed in the end of the 19th century. The thoughts of Charles Darwin’s about Evolutionary theory and the unraveling of the orders or mechanics that govern our cosmos could not dismiss Biology having a great influence in bringing solutions in the destabilization of the urban environment caused by increasing numbers and a technological shift.

Geddes being a Biologist studied the city in a very different way, which we can argue include and combine axioms from both sides of the opposing views mentioned above. Without dismissing the scientific tools to act on the city and the modernist methods to develop new strategies for urban development, Geddes argued for the city as a specialized organ for social transmission. In that way he connects the modernistic reductionist abstraction of city as an organ with a very fundamental factor of city making supported by the culturalists of the past, which is cultural heritage. This is more obvious while he describes the city as the embodiment of the cultural heritage of larger units and the transmitter of it, to societies and individuals.

Without getting too deep in the work of P. Geddes we can make a fundamental observation in the context of this paper, that the conception of Biological Urbanism by Geddes pushed forward the overall discourse of urban theory as it reached new levers of grasping the elusive and diverse phenomenon of the city, but fell in the trap of reductionism, being completely natural for the technological status of the time, by resorting to biological metaphors [2].

3. PLANNING AND NON-PLANNING. A 20TH CENTURY DISCOURSE

One of the many changes we experienced in the 20th century in the science of urban planning had as its main instigator not an urban planner but the economist Friedrich Hayek. In his book *The Road to Serfdom*, Hayek develops his liberal positions based on the basic finding that fascism was a capitalist reaction to socialism. In this book he specifically mentions that socialist or state-driven

urban planning belongs to an era of "passion for conscious control of everything". The author criticizes in his book the assumption that a democratic society must necessarily be based on pre-decided - planned principles. Hayek contrasted the planned structure of socialist states with the spontaneous expression of free economies, characterizing them as an unplanned coordination that results when individuals are allowed to pursue their own self-interest and trade more freely. This polemic aimed to emphasize a radical relationship where only a liberal society can be democratic because it does not limit individual freedoms and on the other hand any other form of central state whether right or left leads with mathematical precision to totalitarianism. In contrast to Hayek, John Maynard Keynes believed that government intervention could balance the capitalist market. These two approaches to this day remain relevant and unfortunately with the course of market deregulation we observe the "scientific" documentation of neoliberalism with the reinstatement of Hayek's work.

Accordingly, in the field of art and architecture appeared the current of New Brutalism (New Brutalists) and the Independent Group (Independent Group) part of which consisted of the Smithsons, Paolozzi, Hamilton, McHale and Reyner Banham. This generation turned away from the Bauhaus vision of the overall work of art (Gesamtkunstwerk) and turned to the unplanned every day and fragmented environment, especially the urban environment which brings together and in unplanned relationships heterogeneous elements. In 1969 the group of Banham, Barker, Hall and Price published the manifesto entitled "Non-Plan: An Experiment in Freedom" where they defined Non-plan as the liberation from regulation to promote spontaneous urban development. More specifically, they argue that the notion that the urban planner has the right to define what is right is an antiquated idea from the age of left-wing collectives and has been abandoned.

At the limits of the unplanned and free initiative of the development of the city, other recognized authors moved in a different way. Jacobs with her book *The Death and Life of Great American Cities* directs her polemic against centrally controlled urban planning and large projects in the city through the dichotomy of hierarchical and emergent planning (top-down, bottom-up). Accordingly, Venturi with his book *Learning from Las Vegas*, which is par excellence the manifesto of postmodernism, advises young architects to escape from the orthodoxy and purity of modernism and to start observing the existing heterogeneous and rich environment of the city so that they can enrich it and not to sterilize it [3].

Unfortunately, the above positions along with many others in the 70s and 80s made a terrible attack on the schools of urban planning and forced them in many cases to either close or be transferred from the Architecture schools to those of organization and administration. At the end of the century, several attempts were made to counter the neoliberal dominance of Non-planning with the aim of regaining confidence in large urban interventions. The emerging environmental movement and awareness of the planetary consequences of climate change play a catalytic role in this new venture.

4. C.A. DOXIADIS: THE FOREFATHER OF ECOLOGICAL URBANISM

As mentioned above, man throughout the evolution of civilization had an "aggressive" attitude against the wild environment in order to ensure his survival. The intensity of the human presence in space increases exponentially from the industrial revolution onwards, and consequently this data reveals the inability of the human factor to initially perceive the finiteness of resources but also the resilience of natural systems to withstand a continuous burden of their carrying capacity and their degree of feedback. On the other hand, we have a huge urbanization process at the global level with consequences such as the change of the scale of the city as well as the change of urban-rural relations. The science of Ekistics proposed by C.A. Doxiadis, is a comprehensive theory of human settlements and as such may be one of the few or even the only one with such a degree of scientific proficiency, research completeness and extent at all scales and perspectives.

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Doxiadis in his book *Ecology and Ekistics* is certain that we are in the middle of an ecological crisis and that we still have not developed the tools to deal with it, although Ecology as a foundation of the study of natural history goes back to Aristotle. He sees the two sciences as complementary, Ecology as the one that deals with the relationships of all living organisms with the environment and Housing as the science of human settlements which are the spatial structures made by man for man.

Ekistics was coined by C.A. Doxiadis and was used for the first time as a term in his lectures at NTUA in 1942. It perceives human settlements as living organisms that have their own laws, and through the study of the evolution of human settlements from the earliest phase up to the present, develops an interdisciplinary approach to solving their problems through the recording and systematization of the fundamental principles that govern them. More specifically, Doxiadis states that for the planning of future cities and more generally of the future of human habitation, we must understand the chronological evolution as well as the variety of human dwellings to date.

We need a unifying interdisciplinarity and not just a relational one, because the object of research is composed in a unit and can only be treated as such. In his book *Ekistics, an introduction to the science of human settlements*, Doxiadis describes Ekistics as the initiative to undertake an adequate conception and testing of the data, concepts and ideas related to human settlements, and the attempt to re-approach all of the principles and theories connected with Ekistics, leading to a new science. The creation of such a science, according to Doxiadis, must be carried out in a systematic way, because without objectivity and a systematic approach that defines goals, criteria and methods, it will be impossible to achieve coordination of related knowledge, much less the coordination of ideas that they can lead to the arrests that will direct growth.

In relation to Ecology, Doxiadis identifies the common goal of Ecology and Ekistics, which is the Global Ecological Balance. Considering the course of population growth steadily upward and parallel to the evolution of technology, the world population will at some point reach a size that will test the very ability of the earth's ecosystem to support it but will also endanger the quality of life of the people.

GEB is derived from predicting the maximum carrying capacity of the global ecosystem to sustain the human population as resources. The subject is then analyzed in the distribution of human activity and the protection of the delicate issues that touch the extremes. relationships between global energy flows and endangered species. Accordingly, human activity must be spatially coordinated so that valuable ecosystems survive and are not replaced by even highly profitable and intelligent human interventions.

Doxiadis states that we need four basic categories of land:

- Naturareas - Areas of nature where the main intention is to preserve the natural wealth
- Cultivareas – Areas of crops and livestock
- Anthropoareas – Areas for people where the main objective is to meet vital needs, and is not limited to the built space that is a part of human needs
- Industrareas – Industrial and mining areas

The four categories are historical stages in the evolution of our societies from prehistory to the present day and we must maintain continuity with them. A basic problem of governance is the horizontal separation of the overall unity of the lifestyles of the categories which breaks the wholes into ministries and does not deal with the problems as a whole.

These zones occupy a percentage of one hundred in the coverage of the earth's surface depending on the geomorphological peculiarities of the regions. Something that is essential in achieving Global Ecological Balance is the balanced distribution of zones and states so that societies can ensure access to and performance of their natural resources. For this reason, this conceptual scheme must be applied at all levels of the residential logarithmic scale up to the micro-level of the neighborhood. So, achieving global ecological balance depends on maintaining ecological balances at lower levels.

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In this way we will be able to evaluate conflicting interests of different levels, such as industrial or infrastructure development issues in relation to local and sensitive formations. The field in which Housing develops is that of the Anthropocosmos where it is part of the Biosphere and describes not only the areas of human activity but also the dynamic flows and functions. The Anthropocosmos is a fundamental framework for human survival on earth and the need to preserve it for future generations is imperative [4].

Doxiadis' work on Ekistics was literally a undertaking of the big, until today unanswered questions of sustainability along with development and making the connection of micro and macro matters. This leap of faith in the resolution of all problems by a new scientific field, even today after almost 70 years from its conception, brings agony and stress. If we can make a small critique to a such commendable and noble work, it is that in the need to cover that big research area Doxiadis gave a lot of support to systemization processes for model creation and finally articulation of a general theory, that lost in a big extent very easily its credibility while at the late 20th century all of the academia of the social sciences had been punished by the wrong doings of modeling society.

5. ENTERING THE 21ST CENTURY: LANDSCAPE, ECOLOGICAL & INFRASTRUCTURAL URBANISM

Since the mid-1990s, the environmental awareness of many architects and scientists in the field, who until recently may have also been involved in landscape architecture, and of course were limited to micro-scales in agricultural methods and practices with an aesthetic approach, together with the emerging field of urban ecology they formed the term of Landscape Urbanism. Landscape Urbanism is a planning theory and its actual applications in space are very few. As an evolution of the term, Ecological Urbanism was later promoted as a more interdisciplinary approach to planning beyond the Geographical and Architectural spectrum. This path of thought ends in a very interesting thread of Urban Planning as Infrastructure, where the previous ecosystem approach remains, but without the "green" envelope of Ecology. As a basic concept we can argue that it stands on a strong meta-aesthetic approach on matter through the treatment of everything as infrastructures or as factors that support systems of life, organic or artificial, in a similar manner.

Landscape urbanism is the term mainly attributed to Charles Waldheim, who as a student studied and followed the development of Landscape architecture. One of his teachers, James Corner typically mentions that the question of landscape is not of interest to us today for vegetation, relief and earthworks within Architecture and Urban planning schools but because the term also provides a deep reflection on the conceptual dimension of the landscape, for its ability to approach the various places, soils, ecosystems, networks and infrastructures and to organize large urban areas. He continues in his description by emphasizing that at an organizational level it must include the dynamic changes of ecosystems and tend to a "loose" urban planning in terms of definition and canonical orders, that can withstand the real complexity of cities in its structures. It is also important to mention that Landscape Urbanism places special emphasis on processes and this does not work in competition with the composition but as a complement to a proposal that takes into account the intense dynamics but also the invisible factors of the environment of intervention [5].

Landscape Urbanism is both an instigator and an accelerator and does not aim at the development of a formal proposal, but rather proposals on the public processes that planning and future appropriations produce. Waldheim himself considers that through the criticism of the scientific and professional commitment of traditional urbanism, Landscape Urbanism emerged and is an alternative proposal to New Urbanism movement. He considers that one of the characteristics that differentiates Landscape Urbanism from Landscape Architecture is interdisciplinarity and that Urban design has great difficulty in relating even to the other scales of planning, let alone to other sciences.

Ecological Urbanism on the other hand aims to develop theory and practices that emulate the insights of ecology and other environmental disciplines such as climatology, hydrology, geography, etc. Ecological Urbanism elaborates the future of cities and their planning and offers a framework for interventions on the problems that threaten humanity, such as climate change, rising waters, dwindling reserves of liquid fuels, increasing energy consumption, as well as meeting people's need for care, safety and justice. We can say that Ecological Urbanism is not an Architectural or Urban Planning movement, although since the 60s a multitude of "movements" have appeared such as Ecological design, Environmental art, Landscape design, Sustainable design, Green architecture and so on.

An important contribution to the development of these approaches was the study of the urban environment by ecologists and climatologists where they essentially highlighted the city's ecological status and, by extension, urban planning as a process and not as a final state. Ecological urbanism is differentiated from Landscape Urbanism by commenting that the latter, although not superficial as an approach, insists on the synthetic side of architects and the scale and articulation of urban design, staying in an approach of the urban space as a relief, while Ecological Urbanism aims at a direct effort to highlight ecologies, habitats and inductively explore catalytic factors of design strategies, not caring about the size of the intervention neither the exact tectonic articulation but about the relationships and thus it spreads on all its possible scales.

Stan Allen is one of the main, if not the only, exponents of the term Landscape as Infrastructure. It is a term that aims to transcend stylistic, morphological issues and anchorages and will provide a new model for action as well as push architecture to once again be able to define the future of the city. In the last two decades, avant-garde architecture has sought a biological transfer of its paradigm, trying to make it more fluid, adaptable and responsive to change. New computing technologies were used to sculpt biological forms through diagrammatic forces called biomimicry. According to Allen, we have passed the stage of biomorphism of the 1950s and 1960s, of imitating forms of nature, but as modeling the natural processes of morphogenesis. The result of this effort, although ambitious and exciting, is limited to ceasing to be dynamic as in simulations and to negate itself by "freezing" in a frame of this dynamism.

An opposing trend is that which does not aim at the biology of an organism, but at the collective behavior of ecological systems as models for cities, buildings and landscapes.

"Architecture is placed between the Biological and the Geological, it is much slower than living organisms but also much faster than the geological formations that surround us."

At this confluence of species and environment, the concepts of ecology and landscape offer more than an architecture or urbanism of frozen biodynamic form. The environment and organisms develop an integral vehicle of parallel development at all scales from micro to macro, and the issue for us is whether we can manage the complexity and the absence of boundaries. In the redefinition of Landscape Urbanism, which has been the catalyst in opening the dialogue of the last decades, placing the concept of infrastructure as central, offers a guide into the complexity of urban systems where planning is of particular importance. No one disputes the need for planning in urban infrastructure. What we need, according to Allen, is a new mindset that will be able to view infrastructure design not as an exercise in minimally necessary engineering standards, but as capable, catalytically, of energizing complex and unpredictable urban effects beyond its designed capacities.[6].

Urban planning as Infrastructure understands architecture as a material practice, as an activity that works within and with the multitude of systems and agents, and not necessarily with central argument or deterministic end product. It is an architecture dedicated to solid proposals and realistic implementation strategies, not detached criticism. It is a way of working on large scales and escaping the usual notions of master plan, and the Ego of an architect. Finally, urban planning as an

infrastructure marks the return to the effectiveness of architecture and not the imperative of a representation of it.

The big issue we are facing as Architects and Urban Planners today, if we suppose we share the same interests, is not the existence or not of powerful and important theories of urbanism, but the actual role as experts to consult policy makers and other to change their ways.

URBAN ECOLOGY: A 21ST CENTURY DISCOURSE

Ecology is also a humanitarian science. There are many practical applications of ecology in conservation biology, wetland management, natural resource management (agroecology, agriculture, forestry, agroforestry, fisheries), city planning (urban ecology), community health, economics, basic and applied science, and human social interaction (human ecology).

According to Sukopp & Wittig the term 'urban ecology' can be defined in two ways. Within the natural sciences, urban ecology addresses biological patterns and related environmental processes in urban areas, as a branch of biology and ecology. In this sense, urban ecology seeks to analyze the relationships between plant and animal populations and their communities, as well as their relationships with environmental factors including human influence. In this respect, research is not limited to anthropocentric assessments. However, the second, complementary, definition implies the anthropocentric approach.

Here, urban ecology is understood as an interdisciplinary approach to the improvement of living conditions for the human population in cities, referring to the ecological functions of urban habitats or ecosystems for people, and therefore includes the social and especially the planning sciences. From an even broader perspective, cities can be seen as emergent local-scale phenomena, dynamic interactions between socio-economic and biophysical forces.

These are the two complex ecological entities that have their own unique and internal rules of behavior, growth and evolution, and significant global ecological influence. Urban ecology is the study of ecosystems that include people living in cities and urban landscapes. It investigates ecosystem functions closely related to patterns of urban development [7]. Urban ecology is an interdisciplinary field that supports societies' efforts to become more sustainable. It has deep roots in many scientific disciplines including geography, sociology, urban planning, landscape architecture, engineering, economics, anthropology, climatology, public health and ecology. Because of its interdisciplinary nature and particular focus on humans and natural systems within urbanized areas, urban ecology has been variously used to describe the study of humans in the city, nature in cities, and human-nature relationships [8] In the literature, urban ecology has gone through two stages of development and now a third is proposed, with each transition being a disciplinary paradigm shift.

Ecology in the city

The initial phase is that of urban ecology within the city. Urban ecology targets terrestrial and aquatic patches within cities, suburbs and non-urban environments. In this example, ecologists specializing in biology study the habitats and ecosystems known to them that are in an urban or urbanizing environment. Urban wildlife ecology was a key contribution to the development of ecology within the city. This example reinforced the desire to develop habitats and wetlands or protect them within the urban environment and to a large extent defined urban planning directions [9] by introducing green and water lands for citizens and to a lesser extent the urging green facades and roofs.

Ecology of the city

The second paradigm, that of Ecology of the city, was recognized in the late 1990s [10] and moves beyond the proportional approach of sections within the city. This paradigm requires two approaches, firstly a thorough search for parts and habitats that are not dominated by non-human organisms, and secondly it requires a thorough understanding of how social and socially determined human activities affect even the analog environments studied by the ecologists of the first paradigm. This approach

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intersects with a variety of social sciences, such as geography, economics and urban planning for example. The field of interdisciplinary collaborations also extends to engineers, scientists specializing in complex systems, and other science and technology disciplines [11]. The distinction of the relationships of the two paradigms within the urban systems was promoted to clarify the existence and presence of bio-ecological processes and structures, visible and invisible. More specifically, the contemporary approach to city ecology maintains a perspective based on process and ecosystem ecology. Although the two examples seem opposite, the truth is that one works (within) included in the second (of).

Ecology for the city

The paradigm evolved from the first two, in the context of linking ecological science with civic processes (12). Urban ecology deals with the human quality of life, the sustainability of the urban environment, the biological diversity of cities but above all, it recognizes the legitimacy of both clean and use-driven research. The core of the ecology paradigm for the city is that it takes an active role in shaping the city “from knowledge to action”. It perceives the urban ecosystem as a social-ecological system in which scientific knowledge is integrated into decision-making and in general into all processes. Finally, ecology for the city also includes and needs the support of the two previous examples, but in contrast to them it can connect the conclusions of urban ecology with the normative goals of environmental integrity, social justice and economic sustainability through the context it provides.

As we can observe Urban Ecology is following a techno-political path into establishing an implementational role in Planning, and not just analytic. Urban ecology as we can observe, is beginning to stand out as a scientific field, creating new processes for planning in a similar manner as regional planning acted in the 20th century, maybe questioning the importance of Urban Planning as the fundamental science for shaping cities. On the contrary Urban Ecology could strengthen connection between Ecology and Urbanism (Ekistics) and as so there should be stronger initiatives for the establishment of a common knowledge.

5. CONCLUSIONS

The science of Urban planning is facing a very important epistemological challenge. First to find ways to reconnect with its historical past of urban thinking. We have witnessed internationally the schism of Architecture and Urban planning, and a fragmentation of common knowledge between disciplines that in the past used to be one. Secondly to create new unifying powers that will bring together a common body of knowledge to the broader scientific field. As we mentioned above, new sciences appear and are capable of expanding their knowledge in to fields of other sciences. This epistemological phenomenon, calls for an opposite process that that of the enlightenment, that could be described as the separation of scientific fields as clear territories of knowledge. Urban planning should, following the paradigm of ecological science, climb and pursue a leading role in the contextualization of knowledge on human settlements.

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Nature-Driven Sustainable Evolution of Settlements for Systemic Integration with the Environment

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Abstract

Design in Architecture is typically inspired by an anthropocentric character, which is projected onto the place where it is applied. The purpose of this research is to highlight a more holistic approach to urban design planning, where the interaction between individuals and their environment is carefully considered through a balanced evaluation of anthropocentric factors and those dictated by natural and ecosystemic processes. With the advent of new computational tools, it has been possible to anticipate solutions that effectively achieve this objective. By analyzing the dynamic relationships that unfold between humans and the natural element in each of its manifestations, the produced system allows to integrate human/nature's principles related to sustainability. The architect's updated toolset goes beyond mere representations and emerge as a comprehensive means by which to explore human-nature relationship in every design phase.

Keywords: *sustainable urbanism; traditional settlements; expansion; human/nature integration; topology*

1. INTRODUCTION

The research delves into a system for the development of existing settlements that is rooted in the logic of organization of the broader natural system. The approach responds to a search for optimal harmonization and coexistence of settlements with the environment, while maintaining compatibility and avoiding adverse effects such as permanent alterations and human-made disasters. Further, solutions are sought, where human-centered priorities go hand in hand with the dynamic character of the landscape and the overall place, leading to more sustainable outcomes. Therefore, a holistic system is proposed, applicable at an urban scale, taking into account all factors and configurations that influence decision-making in spatial design. The system evolves dynamically to anticipate and adapt to future needs and situations that may arise. The process benefits from the use of advanced computational technologies, particularly dynamic simulation tools, as the latter have advanced to handle complex tasks and diverse data inputs. In particular, these tools enable designers to overcome limitations associated with conventional Cartesian system, transforming the dynamics of nature into flexible man-made organizational structures.

Zagori region of Ioannina, and specifically the settlements located along the edge of the Vikos Gorge, were chosen as the case study area. The reasons these settlements were selected are due to two main factors. Firstly, the peculiarity of the landscape. The Gorge of Vikos has been characterized as the deepest canyon in the world in terms of vertical development to opening ratio. The second reason lies in the strong traditional character of the villages in this region and their well-defined boundaries. Throughout the years, the specific villages have undergone significant changes, which, can be categorized into three distinct periods spanning from 1960 to the present day. By analyzing these changes, the data files of the variables of the new system will be created, which are related to both human activity and the landscape itself. Additionally, we can distinguish extraneous variables, which

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are not completely controllable, but have the potential to influence the results of the study. Capturing these elements necessitates the use of dynamic data management software to adequately support the level of complexity required by the challenges, subject matter and objectives of this research.

The paper introduces an initial version of the system, based on the data available, in order to tailor it to different settlements that meet the specified criteria. The current method proposes a more environmentally conscious approach to planning at the urban scale, guided by the harmonious relationship between humans and nature alliance in order to define and achieve desired objectives.

2. CASE STUDY AREA ANALYSIS: THE EXAMPLE OF VIKOS'S GORGE

A residential complex undergoes constant changes driven by dynamic variables that define its characteristics. The primary objective is to thoroughly analyze and comprehend these changes, transforming them into a structural system of variables, where they will be more manageable. The key categories of these variables may be attributed to landscape and human activity. The landscape remains relatively stable over time, with minimal changes observed during the study period, while human activity emerges as a more dynamic and influential factor.

Starting with the location of the settlements, the Gorge of Vikos serves as a prominent geographical reference point. The Gorge of Vikos is located in the region of Zagori, in the northern part of the Pindos Mountain range, about thirty kilometers north of Ioannina, the nearest city. The area's highest point, Tymfi's peak of Gamila, stands at an impressive height of 2,497m. The Gorge boasts a maximum depth and opening of 1,144m, and 2,420m, respectively, resulting in a depth/aperture ratio of 0.76. The Voidomatis River traverses the Gorge, spanning a total length of 15 kilometers and covering a catchment area of 384 square kilometers. *"The terrain surrounding the area is characterized by uplifted topography, featuring numerous narrow V-shaped valleys"* (TELBISZ, et al. 2019). Nature offers a multitude of benefits for humanity that can be utilized in a variety of ways. Despite its challenging landscape, the area offers a unique environment with limited exploitation opportunities, including minimal arable land, challenging access to water sources, and steep terrain slopes. However, the distinctive features contribute to the development of a diverse ecosystem, hosting rare and endemic species, along with a wide variety of thriving herbs. The area is rich in cultural heritage, with a history that dates back centuries, leaving a lasting impact on the region. Vikos' Gorge strong cultural identity is evident in its traditions and customs, making it a significant part of Greece's historical narrative.

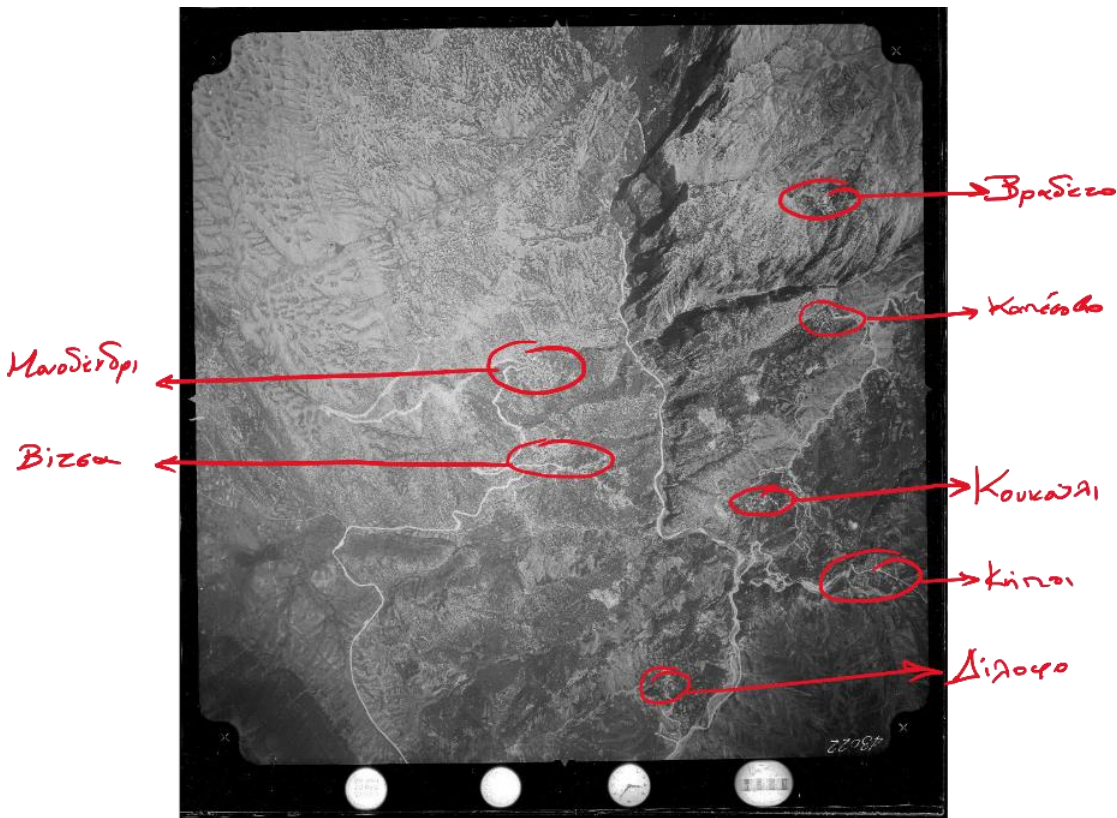


Figure 25 Aerial photo: Wider view of Vikos’s Gorge and the settlements around it

The intricate terrain has significantly shaped the features and morphology of the settlements. Zagori comprised of 46 settlements, informally categorized into Western, Central and Eastern Zagori. The focus of this research is on the settlements located in central Zagori, situated on the periphery of the Vikos’s Gorge. Specifically, the settlements of Vradeto, Kapesovo, Monodendri and Vitsa are examined (Figure 1). As time progresses, these locations also experience transformations, forming a continuous evolution that allows for the observation of distinct moments in their development.



Figure 26 Schematic section (North-South) Position of Monodendri village in relation to Vikos’s Gorge



Figure 27 Schematic section (West-East) Position of Monodendri village in relation to Vikos’s Gorge

These four settlements can be divided into two groups based on their location and their connection to Vikos's Gorge. Kapesovo and Vradeto are situated on the eastern side, while Monodendri and Vitsa are located on the western side. Access to these settlements is primarily provided by a carriage road, which is divided into two main sections with various branches. Each settlement is connected individually by paths, enhancing their accessibility and connectivity.

The relationship between human activity and the development of settlements will be examined across three distinct time periods, each influenced by the prevailing political-economic context of the era. The initial period and the starting point of the study is the 1960s, a pivotal decade following the aftermath of the World War II. During this time, agricultural and economic endeavors began to take root in the region, with the lands surrounding settlements utilized primarily for animal husbandry. "7,000 acres of land surround Kapesovo and 8,500 acres are within a few hours' walking distance... Livestock farming provides the village with a slightly better income than crop income (16% of total village income, compared to 15.2% of agriculture)". (Baud-Bovy & Papageorgiou, etc.). According to demographic data of that period, the permanent population of the wider Zagori region totals 8,977 inhabitants. When broken down by settlement, Vitsa is home to 485 individuals, Vradeto to 315, Kapesovo to 197, and Monodendri to 244, resulting in a combined population of 1,241 across the four villages.

The second period of study focuses on the 1990s, a decade marked by significant urbanization trends in the area. The gradual shift from small settlements to larger urban centers, created stark contrasts within the study area. Concurrently, there was a noticeable rise in tourist activity, which began to shape the region's dynamics. The population of the settlements, during this period, totaled 382 inhabitants in Vitsa, 129 in Vradeto, 122 in Kapesovo and 212 in Monodendri, amounting to 845 inhabitants in total, representing a 32% decrease.

Moving on to the third period of interest, in the research, the 2020s, it is observed a landscape where permanent residents are scarce, yet construction activity is on the rise as tourists comes to fill the vacancies. The total population in the area stands at 267 residents, with 82 in Vitsa, 22 in Vradeto, 30 in Kapesovo and 133 in Monodendri, reflecting a 68% decrease in population.

"The people of Zagori are generally skilled, active and engaged in commercial activities. We find rich merchants in Kapesovo and Veija who have trading houses in Vienna, Moscow, Breslau. in Leipzig and Amsterdam. Most of these big traders are getting rich in Germany." (Baud-Bovy & Papageorgiou, etc.). The occupation of the inhabitants in trade, brought about economic prosperity and subsequent development in the region. The architecture of Zagori reflects its economic standing, with elaborate houses that are product of the unique terrain. The morphology of buildings is a consequence of the specific terrain, in which they are situated, although it may not be entirely unique. The use of stone and wood in construction, coupled with the cold climate and rugged landscape, which implies both intense shading and protection from the winds, resulted in buildings characterized by simplicity, geometric shapes and limited openings. The roofs, typically square with slate coverings, are a common feature in this region and can be found in various parts of Greece and Balkans. It is worth noting that this architectural typology may be attributed to the prevalence of builders in Epirus, who often sought work in the Balkans during the winter months. This migration pattern likely influenced the architectural styles seen in both regions.

3. DEVELOPING RELATIONSHIPS AND THEIR ASSOCIATED VARIABLES: FROM ABSTRACT TO DIAGRAM TO DYNAMIC TO PARAMETRIC

“To abstract means to take away, to isolate, to remove”, (Cache, 1995)

In order to grasp the necessity of a comprehensive system, it is imperative to delve into the concept of "abstraction". This concept is prevalent across various disciplines, including Art. Generally speaking, abstraction involves isolating the fundamental characteristics of a set. By abstracting the core essence of a subject, without imparting morphological or other details, a universal framework is established that allows for diverse interpretations based on the observer and the broader context in which she/he exists. Abstraction invokes conceptual approaches related to use of diagrams. Diagrams operate on a similar principle. The act of extracting certain features and transforming them into dynamic variables makes the diagram a flexible device adaptable to various models. This flexibility increases the diagram's utility and relevance to multiple scenarios, expressed as continuous changes of the dynamic models.



Figure 28 Diagrams of dynamic movement

In the field of Architecture, the advancement of digital computing has revolutionized the production of dynamic models, enhancing the interpretation of data. "Coming from the mechanical industry, computational drafting tools have their origins in the post-war research projects of American universities, most notably the MIT. As is the case with many other appropriated technologies, their diffusion had to wait many years", (Echenagucia, May 6, 2014). Since the mid-90s, digital computing has played an increasingly significant role in Architectural design. Initially, its primary function was procedural, focused on accurately representing and describing designs through two-dimensional and three-dimensional visualization. Digital media, which originally developed for entertainment graphics, found valuable application in the field of Architecture.

The incorporation of a multi-parameter logic in the design process is crucial for accurately defining and solving problems. This logic involves describing elements through parameters and variables, where any alteration in these elements directly impacts the final outcome. The advancement of digital technologies has led to the widespread adoption of integrated parametric methods in design. The primary objective is to discover innovative organizational structures and morphologies by leveraging the experimental capabilities of digital computing tools. According to P. Schumacher, parametric design represents the culmination of a contemporary mindset, harnessing computational power to its fullest extent. Despite what is widely believed, parametric design is not an outgrowth of modern digital design media. While parameters are now expressed digitally, they are fundamentally rooted in physical elements, such as the climate, human movement and structural functionality. In smaller scale areas, like the traditional villages of Epirus, these elements are inherently integrated into the design and construction process. It is observed, however, that there is a noticeable lack of evolution in these practices despite the introduction of new technological innovations in design. The integration of parametric design principles is essential for pushing the boundaries of architectural innovation and responding effectively to the challenges of a rapidly evolving world. As it is suggested, the use of

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advanced methods and the respective computational techniques in this present case will allow to fully leverage the potential of parametric thinking in creating efficient design schemes for sustainable integration into the rich environmental and cultural context of the greater Zagori region.

Upon comparison of the different time periods being discussed concerning the Zagori region, since 1960, there has been a noticeable shift in population movement, from small settlements to larger urban centers. Prior to that period, the primary force (in other words, magnitude) keeping inhabitants in villages was security, which was directly linked to the challenging terrain of the area. Land served as a pivotal point for the development of settlements during this time. The unique topography of the region has gradually led to a decline in the population (permanent residents), while simultaneously is contributing to an increase in tourism (periodic residents). By 1990, the trend of permanent population migration towards urban centers continued, while the emergence of tourism caused to create new poles of attraction towards the settlements in the opposite direction. As of 2020, the “force” of tourism, based on the topography is on the rise, while, the development of the internet and the growing trend of remote work are contributing to this growth. It becomes evident that when services are not a primary draw for an urban center, their impact on the human flow diminishes. Additionally, the growth of tourism has spurred improvement in infrastructure, particularly in healthcare and education, fostering a sustainable return of permanent residents.

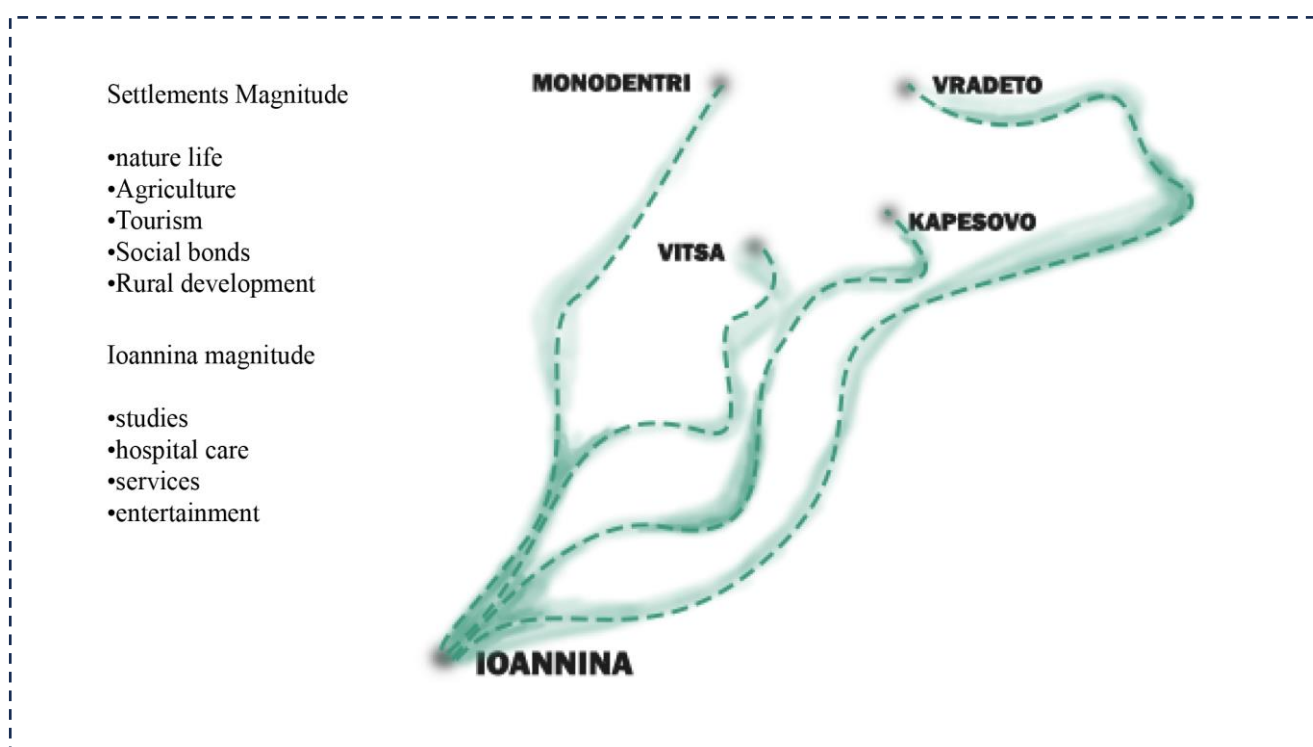


Figure 29 Diagram of population movement from the settlements to the urban center of Ioannina and reference to the factors that change its dynamics.

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The development of tourism, closely tied to the landscape, serves as a point of attraction for human activity. However, it is acknowledged nowadays that excessive and rapid population growth can have detrimental effects on the natural ecosystem and the environment. Factors such as water purity, soil quality, wildlife populations and fire risk are all susceptible to the impacts of increased human presence, particularly tourist. The intricate relationship between nature and tourism is affected both by the volume of tourists in the given area and by the duration of their stay. So, the dynamics of a variable such as the flow of people in a settlement brings about changes in a set of other factors as well as problems that may arise over time.

The development of a road network is contingent upon various factors, including the location of settlements and unique characteristics, such as geomorphology and soil composition. The main objective of a road network is to provide access to different areas, but the method of connection is heavily affected by the landscape (terrain), particularly the steep gradients that need to be integrated into the network design. Key variables that impact the final design of the network include the slope of the road, its width, the minimum distance required for travel, the stability of the ground and the presence of obstacles. These factors interact to shape both primary and secondary roads, with the importance of each variable shifting depending on the specific circumstances. In the recent years, tourism has emerged as a significant factor that affects road networks, with new routes being established or existing ones being upgraded to accommodate visitors. The length of these routes is not solely determined by speed and efficiency, but also by the experiential connection they offer to nature and the surrounding landscape. In essence, the design and development of a road network is a complex process that requires careful consideration of various factors, with the ultimate goal of providing efficient access while enhancing the overall experience for travelers. Another relationship coming to light is the correlation between the morphology of roads and rivers. The flow generated by the momentum of the waters is influenced by similar factors that shape the course of a route. The form of a road often mimics the natural curves of a river, as both are designed to navigate efficiently through the landscape. Other factors such as obstacles and ground deformation have a decisive role in the morphology of roads and alike of rivers, since the most sustainable solution would be to adjust. Another notable aspect, a consequence of the area's rich history, is the presence of a significant number of historical monuments and traditional bridges. The stone bridges, constructed during the 18th and 19th centuries, served the purpose of connecting several villages that were previously inaccessible due to the rugged terrain. However, the construction of these bridges was a complex process influenced by various factors. On the one hand there is the landscape and the human movement towards settlements, as it offers access and bypass obstacles. On the other hand, there is the residents' expertise as skilled builders, demonstrating their developed skills. Their craftsmanship and dedication to their craft are evident in the lasting legacy of these historical monuments. In the present period, these bridges and historical monuments continue to play a significant role in the development of tourism in the area. While their functional purpose may have diminished over time, the experiential value they offer to visitors leads to the present growth of tourism.

By delving deeper into the analysis of internal forces and variables while adjusting the scale, the attention can shift towards the architecture of the settlements in Zagori. These settlements create an autonomous system that is shaped by a combination of internal dynamics and external pressures. *"If we wish to define architecture as an operation on space, we must then define the nature of this space more precisely"* (Cache, 1995). Architecture is the process of designing and organizing space in a way that is functional, aesthetic and meaningful. *"On the outside the vector indicated the site as an eminence in order to determine a territorial identity; on the inside the vector is this object opposite which one must position oneself to determine a sexual identity"*, (Cache 1995). In this context, a "vector" can be identified as a force that molds the identity of a space or an individual within that space. The built is the combination of the forces exerted on it, either by the environment, or by the user. The built can initially be treated as an object, which receives forces, but at a second level it turns

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into a dynamic object, where the same forces interact with the environment. The factors that influence the interaction between two variables can be categorized as either endogenous or exogenous. Endogenous factors refer to internal changes that can be caused to a unit, such as the user property and scale. On the other hand, exogenous factors include external elements like gravity, weather conditions and terrain (Figure 5 & 6). The environment can be defined as a constant with limited changes, while the user is a variable with a broader range of values, including property, length of stay and age. So, in a system of continuous changes, one can observe how external geography impacts internal morphology. In the example of Gorge of Vikos, the forces of the location have influenced the formation of settlements with distinct characteristics. The narrow internal networks of routes contribute to high-density settlements, with arable lands surrounding them. The soil quality dictates different agricultural activities, while rocky surfaces present challenges and opportunities for development.

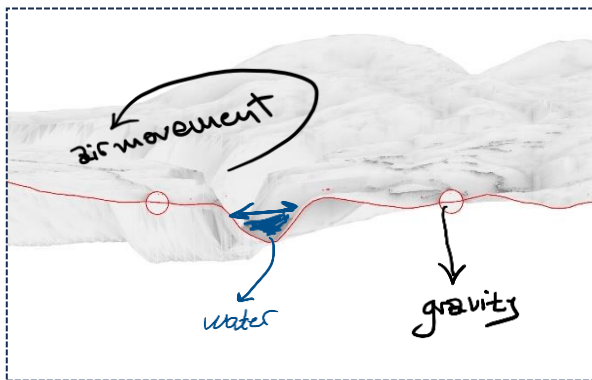


Figure 31 Diagrammatic section (West-East) of the settlements of Monodendri (Left) and Kapesovo (Right) and the external forces they receive

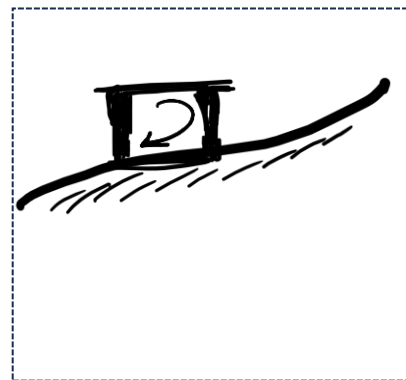


Figure 30 Diagrammatic representation of the internal changes of a unit

Regarding the building units, specifically the residences, we identify respectively internal and external forces from which the morphological and design choices derive. In terms of the environment, the way buildings are constructed is a consequence of the terrain. The materials used, such as stone, come from the Zagori area. They are carefully selected to provide protection from harsh weather conditions, especially during winter months, while also ensuring the buildings are not affected by the flows of the streams formed by the rainfall. The residents themselves can be added to the internal factors shaping the morphology of the buildings. Historically, there has been a gradual evolution in the design of residences, with three main typologies emerging based on the needs and the economic situation of the residents. However, from the 20th century onwards and especially during the last most recent period, the process of evolution of typologies has changed, reflecting changes in the qualities and needs of the residents. In appreciation of the past, there has been a strong connection between the dwelling and the inhabitant, with the building typologically adapting to the individual's qualities and needs. However, this bond progressively changes course with the inhabitant appearing to adapt more to the shell, which now tends to remain essentially unchanged especially in cases where traditional architectural style is preserved.

4. CONCLUSION

It has been noted that certain elements may initially appear to be independent of one another or the relationship between them may not be immediately apparent. However, upon closer analysis of their characteristics and a broader understanding of the overall system, deeper relationships between them can be identified. This observation allows for the linking of spatial elements and qualities as related variables within a larger system model. It is important to note that such a model, which incorporates these relationships, cannot be considered an absolute or closed one, due to the nature of the data involved being mostly negotiable. This means that due to its special nature, the data used in this approach cannot be precisely analyzed or quantified, nor can it be clearly defined. These data are referred to as “fuzzy” data (Ζαβολέας 2023). The goal, therefore, is to develop an approximate method that utilizes variables, constants and relationships derived from the analysis of the study area, to create a predictive model. This model aims to propose a holistic integration of residential complexes into their surrounding environment. The example of the Gorge of Vikos serves as an initial case study in the development and application of such a model, particularly in urban areas that display similar characteristics. This model has the potential to be adapted for use in other areas, providing valuable insights for planning decisions across various scales.

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Application of Ekistics' principles on architectural education (theoretical and compositional courses), focused on the typology of housing

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Extended abstract

K. Doxiadis believed that when integrated with nature, society, physical structures (shells), and networks, human presence could ensure the city's harmonious operation. In *Ecology and Ekistics* he called for action, based on a systematic analysis of a set of problems, the concept of nature functioning as a paradigm for the reconstitution of *Ekistics*. In the same way nature could recompose the theory of *Ekistics*, in the light of the current international debate –political, social, technical, economical- on sustainability, architectural education is challenged and reconfigured under this prism. The *science of human settlements* has an inherent connection with the question of housing. The orientation towards approaches tackling ecology via adaptability, resilience, inclusivity a.o., redefine both the frameworks and methodologies of housing typology and its spatial characteristics. Even if parameters related to ecology are part of the guiding directions but also of the briefs used in the architectural education at a theoretical and synthetic level, they could be re-read under this prism, shedding light to a potential application of Doxiadis principles to today's architectural teaching methods and tools. This article proposes to explore the possibilities of these principles informing the typology of housing within architectural education, both in design studio and theoretical courses, in order to serve as conceptual, organizational and methodological tool that promote experiential learning. In other words, the article seeks to understand how a possible integration of Doxiadis principles as derived from the *Ecology and Ekistics*, in the educational process of architectural design and theory, could affect the compositional and interpretative approach to housing typologies, participating on students' spatial thinking as well. To approach this question, the five principles of *Ekistics* and the categories of human settlements are applied in current briefs on housing typology. With an insight on ecology, the codification of Doxiadis theory into concepts, terms and parameters is related to the key concepts and topics of the corpus chosen. The correlations and analogies derived serve as a material for systematization. By redefining and reorganizing the briefs based on the relational structures governing *Ekistics*, we intend to propose a re-evaluation of the compositional and theoretical approach of architectural education towards the integration of a thorough conceptual, functional, technical and sociocultural approach of nature and ecology. The aim of the analysis and interpretation proposed is to study the formation and evolvement of the housing design process carried out, through a pedagogical point of view, within the framework of the ecological reconceptualization of architecture. Moreover, the ways the experience can be transformed into spatial perception, through critical and inquisitive spirit, are investigated.

Keywords: architectural education; design process; housing typology; sustainable architecture; ecology

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1. INTRODUCTION

In recent years, there have been significant discussions and debates on the need to transform and rethink architectural education. Several key themes and proposals have emerged in response to the evolving needs of society, advancements in technology, and shifts in architectural practice, all through the lens of ecology and the environmental crisis. Within these discussions, critical pedagogy and experiential learning have been introduced as important methodologies, as they are regarded to be vital in architectural education, particularly in the exploration of housing typology. What is the role of students' cognitive experience of habitation and domestic spaces in the process of architectural design and in what ways does this experience define the development of their own architectural identity?

Doxiadis' theories present human settlements as living organisms that can evolve: anthropos can employ the ideas derived from his theories to direct this development and ensure a better living environment [1]. This paper aims to explore the role of experiential learning in architectural design studio, particularly on the theme of residential design projects, with the introduction of Doxiadis' theories on human settlements as a methodological tool to analyse the transformative process that takes place in architectural education on the exploration on this specific typology. How can one use Doxiadis' theories and concepts to comprehend housing typology strategies? In what ways could ecology be involved in this process?

2. DOXIADIS' EKISTICS & ECOLOGY: APPLICATIONS ON CONTEMPORARY BUILT ENVIRONMENT

Human settlements are the territorial arrangements made by Anthropos for his own benefit and welfare. They are the results of human action and their goal is human survival, an easier and better life; happiness and safety (as Aristotle demanded); and opportunities for human development. [2]

How can we, as designers, achieve urban environments that respect human dimensions and our communities? The theory of *Ekistics* (1970) by Constantinos Doxiadis focused on the analysis of human settlements, aiming at a balance between man and his (artificial) surroundings. The five pillars of human existence — nature, humans, society, shells (buildings), and networks — served as the foundation of his study and formed a methodological tool to analyse habitation. As key elements of human existence and behaviour, these components are subject to examination from the perspectives of politics, society, technology, culture, and economy, offering multiple layers of interpretation.

One basic component of human life is the need of people to maximize their possible contacts. Doxiadis' theory's first principle addresses the necessity for people to interact more with their environment and with other people. This can be seen as a realistic interpretation of each person's right to personal freedom and the reason why humans want to control their surroundings. The second principle relates to the fact that people want to use as little energy, time, and money as possible to achieve their present and future objectives. For instance, people usually choose the simplest path when faced with a physical obstacle, such as a mountain. Maximizing the protective area in which people live, whether permanently or temporarily, at any time and place, is the focus of the third principle: humans need a shelter from heat, noise, and other distractions, a shelter that can make their life comfortable. The fourth principle deals with how human connection with the environment is organized and optimized. This includes interactions with other people (society), buildings of all kinds, networks (such as telecommunications and roadways), and the natural world. This type of structure, which encompasses both organic, daily functions and aesthetics, is essential to preserving order in human existence. According to the fifth principle, man organises his settlements to achieve the best possible synthesis of the preceding four principles; nevertheless, this synthesis is dependent on a number of variables, including time and space, the actual world, and man's capacity for synthesis. "Successful human settlements" can be defined as such when this is achieved through a planning that maximizes the number of possible contacts (first principle), minimizes the energy used (second

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principle), permits separation from others (third principle), and creates the desired relationship with the environment (fourth principle). [3]

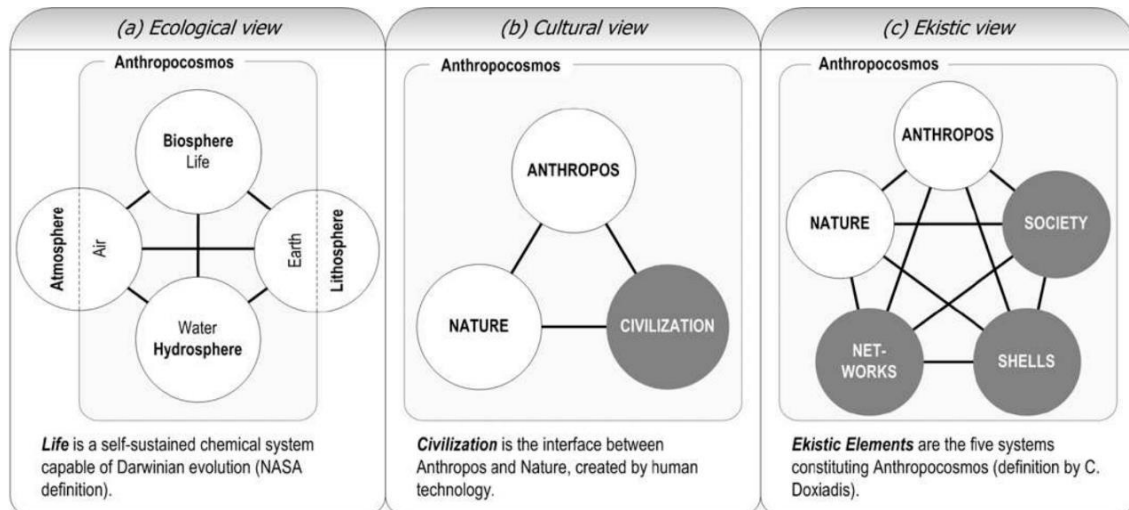


Figure 32. Ecological, cultural and ekistic view of Anthropocosmos. (source: Pertsemliadis, 2007)

Ecology: Branch of biology dealing with the mutual relations of living organisms and their surroundings; their habits, modes of life, populations, etc: human ecology, study of interaction of persons with their environment, their spatial distribution in relation to material and social cases and effects. [4]

In the study of *Ecology & Ekistics* in 1977, the ideas analysed in *Ekistics* are approached through the lens of ecology as interpreted by Doxiadis. He discusses the achievement of a global ecological balance that will support the optimal development of humanity and analyses the ecological system focusing on its five ekistic elements: nature, Anthropos (humankind that is), society, shells and networks. This book, although not central in Doxiadis studies until recently, offers a thorough reimagining of *Ekistics*, emphasizing Nature as a fundamental factor in their historical development. *There is only one way to get out of the confusion and achieve the balance we need: we must clarify our intentions by defining and establishing types of spatial areas necessary for the survival of humans and their ecology.* [5]

Ecology and Ekistics calls for action grounded in a systematic analysis of specific problems. For issues arising from the growing degradation and pollution of the natural environment, it advocates for the international adoption of a universal classification code, along with a code of conduct for each zone. [6]

Specifically, Doxiadis proposed four basic types of areas, or ‘ecological types of space’, differentiated by use: the naturareas, the cultivareas, the anthropareas and the industrareas, each of them subdivided into defined zones with different characteristics. [7]

Of the many disciplines related to nature, ecology is to Doxiadis the closest to current needs, making it the chosen field for connection to *ekistics*. This effort attempts to integrate and relate disciplines, technologies, and sciences with all aspects of human settlements to better understand the world of humans. [8]

With current global discussions on sustainable cities and architecture Doxiadis' concluding thoughts highlight the importance of understanding and managing the system of human settlements for humanity's benefit. A consideration that arises concern the possible applications of this research on the contemporary built environment and the ongoing research on this direction.

On a worldwide level, while interconnecting local and global environmental issues, the United Nations Human Settlements Programme (UN-Habitat) aims to integrate environmental considerations into urban policymaking, addressing housing as well. At the same time, an essential

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feature of ecological urbanism is acknowledging of the wide-ranging impact of ecology, which expands beyond the urban area. *The city, for all its importance, can no longer be thought of only as a physical artifact; instead, we must be aware of the dynamic relationships, both visible and invisible, that exist among the various domains of a larger terrain of urban as well as rural ecologies.* [9]

3. THE HOME AS ARCHITECTURAL TYPOLOGY: EXPERIENCE, SPACE, EVOLUTION

Shells: All types of structures used by anthropos for living in or for the accommodation of animals, machinery, produce, manufacturing, etc.; the structures within which and by which mankind lives and carries out his different functions; the structures that cover ekistic functions: one of the five ekistic elements.

House, housegroup: These terms, replacing the terms 'dwelling', and 'dwelling group' formerly used, correspond to ekistic Unites 3 and 4, with a population of 5 and 35 people respectively. Housegroup corresponds to community class 1.

Room: Ekistic Unit 2, with a population of 2 [10] [11]

From the early days of human civilization, as Stoneham and Smith [12] state, any form of built, enclosed space, provided a sense of security and protection for its users. Residential areas acquired specific spatial qualities as mankind evolved and arranged itself into permanent communities according to location. These characteristics varied depending on several aspects, including religion, climate, socioeconomic factors etc.

The space that one calls "home" reflects and shapes one's identity, serving as an extension of the self and a canvas for self-expression.-At the same time, the experience of being at "home" fosters a sense of belonging and rootedness within a community or social group. It is a place where individuals feel accepted, understood, and connected to others, forming bonds with family members, neighbours, and broader social networks.

David Benjamin described "home" as: *(The home is) that spatially localized, temporally defined, significant and autonomous physical frame and conceptual system for the ordering, transformation and interpretation of the physical and abstract aspects of domestic daily life at several simultaneous spatio-temporal scales, normally activated by the connection to a person or community such as a nuclear family.* [13]

While the psychological definition of home emphasizes the emotional, social, and symbolic dimensions of residential spaces, their architectural characteristics focus on the physical and spatial attributes that shape the built environment and provide shelter and accommodation for individuals or families.

Over human history, there has been a direct correlation between the spatial characteristics of "home" and the development of society. The relationship between social factors and residential space organisation is very strong, and the changes in the latter clearly reflect shifts in society institutions, cultural norms, and technology developments, as well as the rising role of sustainability.

An interesting example can be found on the transition from the typical Athenian house (Athens, Greece) to the architectural archetype of polykatoikia.

Until the early 20th century, each household in the area of Athens occupied its own space, but were organized in groups around a courtyard, which served as a strong gathering place for informal interactions between the residents for daily activities by offering opportunities for socialising, recreation, and household activities. Although the common areas were shared by all members of the households, they also provided some privacy and isolation from the public realm. Such a spatial organization promoted social interactions and close-knit family ties. The houses were organized in one or two-storeys, with the upper floor to be equipped with a glass facade element [14]. This arrangement of Athenian houses was reminiscent of the ancient typology of residential areas and the idea of atrium and peristylion. According to Theocharopoulou, A. Konstantinidis, a prominent name

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of greek 20th century architecture, who studied in detail these houses, stated that there is a direct link and sequence between ancient domestic architecture and “old” (referring to pre-revolutionary period) athenian houses’ typology. [15]

In contrast, the polykatoikia represents a significant architectural and social shift. Polykatoikia, which emerged in the 1930s, expanded swiftly during the 1960s and 1970s, and currently has a prominent position in the city's urban identity. This architectural model was closely linked to the rapid urbanization of Athens metropolitan area. The term “polykatoikia” stands for the small-scale, multi-storey apartment building, and ultimately refers to a method for constructing and disposing multiple housing units and apartments within a single plot of land. [16]

Polykatoikia apartments was originally planned to enhance a sense of connectivity among residents, as multiple households shared common areas such as stairwells, lobbies, and courtyards, and this organization ideally would encourage social interaction and neighbourly relationships, albeit within the confines of a more structured and organized environment compared to the informal interactions of typical Athenian houses. But, as this housing model expanded within Athens, it turned out that it did not aspire the sense of collectivity as originally planned. [17]

The Blue polikatoikia in Exarcheia area is a characteristic example of the previous statement. In its original design and first period of habitation, on the top level, there was a large space for social interaction of the building’s residents, which promoted the sense of neighbourhood, the ‘enteftkirion’. This space offered to its users a chance for rest, peace, tranquillity, unobscured city views and an opportunity to socialize with the rest of the polykatoikia’s inhabitants. Unfortunately, enteftkirion did not last for long – this and other spaces designed for communal use, were transformed into small apartments.[18]

The polykatoikia enhanced the sense of individuality within residents and the need for privacy, as it featured a vertical layout, with multiple floors housing separate apartments. Each apartment had its own self-contained living spaces, including bedrooms, bathrooms, and kitchens, providing a greater degree of spatial separation and privacy between individual households, when compared to the typical Athenian house. [19] Polykatoikia contributed, along other social factors to the increasing privatization of domestic space.[20]

Overall, both housing types served as reflections of their respective societal contexts: the typical (pre-revolutionary) Athenian house represented a more traditional and informally communal form of domesticity and the polykatoikia symbolized a shift towards modernization, urbanization and increased population density with less communal, vertically integrated forms of urban living. The architectural transition from the typical Athenian house to the polykatoikia apartment reflects a complex interplay of social, economic, and cultural factors shaping urban life in Greece over time.

4. HOUSING TYPOLOGY IN ARCHITECTURAL EDUCATION: EXPERIENTIAL LEARNING AND THE TRANSFORMATIVE PROCESS

The introduction of housing design projects in the architectural design studio has a distinctive difference in comparison to all other categories of projects: each student is, by default, carrying specific ideas and spatial experience from their own domestic environments. [21] It can be regarded as a dichotomous issue, as, according to Czafik, Puškár, Vráblová & Bacová “it reflects individualism and, at the same time, manifests contemporary architectural shaping”. [22]

Given the above-mentioned statement, residential design projects in architectural studio form an ideal case for the application of experiential learning theory. ELT, as widely known, was analyzed by Kolb and other scholars (John Dewey, Kurt Lewin, Jean Piaget, William James, Carl Jung, Paulo Freire, Carl Rogers and others) who gave experience a central role in their theories of human learning and development—notably—to develop a holistic model of the experiential learning process and a multilinear model of adult development. [23]

According to ELT, learning is defined as “the process whereby knowledge is created through the transformation of experience. Knowledge results from the combination of grasping and transforming experience” (Kolb, 1984: 41) [24]. The ELT model portrays two dialectically related modes of grasping experience— Concrete Experience (CE) and Abstract Conceptualization (AC)—and two dialectically related modes of transforming experience—Reflective Observation (RO) and Active Experimentation (AE). Experiential learning is a process of constructing knowledge that involves a creative tension among the four learning modes that is responsive to contextual demands. This process is portrayed as an idealized learning cycle or spiral where the learner “touches all the bases”— experiencing, reflecting, thinking, and acting—in a recursive process that is responsive to the learning situation and what is being learned. [25]

Through experiential learning, the students undergo a transformative process, by using their concrete experience of own residential spaces as a basis to observe and experiment on their educational projects in the architectural design studio, by integrating spatial principles on functionality, layout and user experience.

According to Mezirow, transformative learning is “the social process of construing and appropriating a new or revised interpretation of the meaning of one’s experience as a guide to action.” [26]

The architectural studios and the way they operate can be classified in both the areas of pedagogy and andragogy. [27] Pedagogy, as Winter at al, describe it, is a content model of teaching, where the transmission of information and skills, predetermined by the teacher, is focused on filling perceived deficits in students’ knowledge and comprehension.[28]

Andragogy, on the other hand, describes the process of learning as a transaction between the teacher and the learner, in which the needs of the learners are addressed as teachers facilitate the process of content acquisition by providing leads to other content resources. [29]

This is achieved by the teacher facilitating experiences through which the topic, or what is being learnt, can be directly related to learners' own life experiences. [30]

Taking into account the distinctive characteristics of architectural design studio and its interactive, dialectic nature between the tutor and the student, the educational process can also be classified under the term of “critical pedagogy”, which, according to A. Salama: *aims at reconfiguring the traditional student/ teacher relationship, where the teacher is the active agent—the knowledge provider—and the students are the passive recipients of the teacher's knowledge. Grounded on the experiences of both students and teachers, new knowledge is produced through the dialogical process of learning.*

[31] This new knowledge, derived from the students’ and tutors’ experience from their own domestic spatial cognition, combined with tutors’ knowledge of compositional principles as per bibliography, empirical professional experience and curricula, is the main hypothesis of this article. How can this process of learning be mapped and facilitated, using *Ekistics*’ principles on human settlements as a methodological tool?

5. DOXIADIS’ EKISTICS AND ECOLOGY AS A METHODOLOGICAL TOOL IN THE HOUSING DESIGN STUDIO

In order to approach the issues raised, an empirical process will concentrate on a series of workshops conducted within the architectural design studio, aimed at exploring the connections between design process, housing typology, the theory of *Ekistics* as well as *Ecology and Ekistics*.

A first workshop tool place with the participation of Year 1 and Year 2 students of BArch (Hons) Architecture program (Metropolitan College in collaboration with Oxford Brookes University). This workshop introduced Doxiadis' theories to the students and highlighted key concepts of architectural composition by relating through keywords the principles of *human settlements* to the idea of habitation. The objective was to document each student's understanding of the habitation experience by linking it to specific phrases that encompass the essence of feeling at home. Simultaneously, students used these keywords to describe the spatial qualities related to housing typology in their

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current architectural design project. Diagrams and word clouds served as tools to record and convey the findings of the experiment.

More specifically, the questionnaire [Appendix 1] aimed to highlight correlations concerning the development and exploration of housing typology, as studied in the studio course of Architectural Design, between the theoretical principles of *Ekistics* by C. Doxiadis and the design process elaborated. In this questionnaire, students were asked to associate spaces with keywords deriving from the interpretation of each of the five principles of *Ekistics* regarding the relationship between humans and the organization of space.

The students of the 2nd and 3rd year were asked to reflect on the spaces that have impressed them, identifying them experientially as strongly connected with the meaning of ‘home’, today or in the past (a). They were also asked to consider the residence(s) they have designed in their current proposal for the architectural design course (b). During this process, they were provided five keywords for each principle, to align with the relative spaces in (a) and (b) case.

<i>Doxiadis principles</i>								
	<i>keywords</i>							
1 st principle	contact	interaction	socialization	transition	threshold			
2 nd principle	distance	functionality	sustainability	economy	access	circulation	movement	
3 rd principle	safety	shell	familiar	protection	privacy	comfort		
4 th principle	system	network	connection	society	nature	community	order	organisation
5 th principle	sustainability	development	Harmony	Balance	symbiosis			

Table 3 Attribution of keywords to each Doxiadis principle, deriving from the interpretation of its notions and concepts

The collection of the results was interpreted and classified as follows, demonstrating the keywords most used for the description of the students’ own perception of the habitation experience, thus linked to the idea of *home* (a – circle at left), the keywords mostly associated with the students’ proposed perception of the habitation experience, thus linked to the design project (b – circle at right) and the ones intersecting both categories, thus representing the common ground.

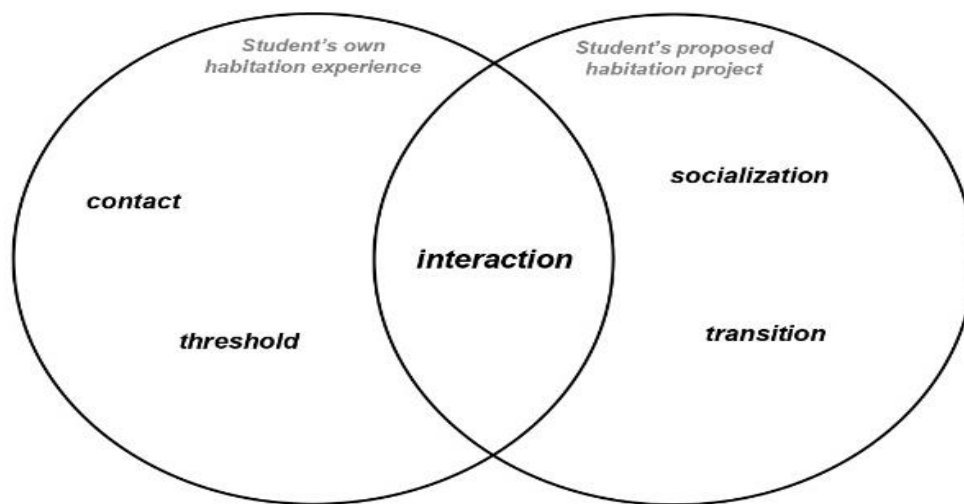


Figure 33. First principle: maximization of man’s potential contacts with the elements of nature, with other people, and with the works of man. Proposed keywords: contact, interaction, socialization, transition, threshold. (source: authors)

The keywords *contact*, *interaction*, *socialization*, *transition*, *threshold* interpreted Doxiadis first principle. According to the students the common ground that relates the perception of the habitation experience of their personal notion of home and the one of the proposed housing design project is the keyword *interaction*. For the second principle, among the keywords *distance*, *functionality*, *sustainability*, *economy*, *access*, *circulation*, *movement*; according to the students the common ground that relates the perception of the habitation experience of their personal notion of home and the one of the proposed housing design project is the keywords *circulation* and *distance*.

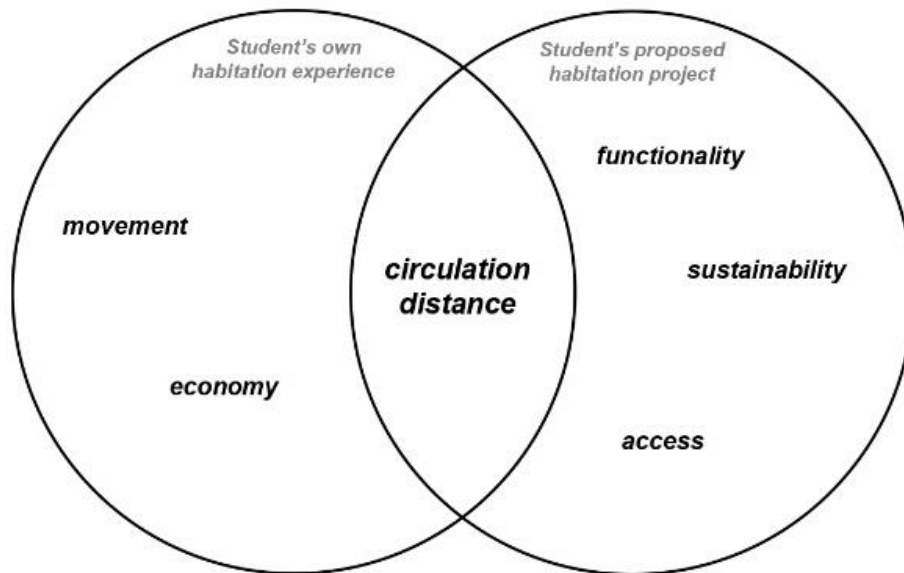


Figure 34. Second principle: minimization of the effort required for the achievement of man's actual and potential contacts. Proposed keywords: distance, functionality, sustainability, economy, access, circulation, movement (source: authors)

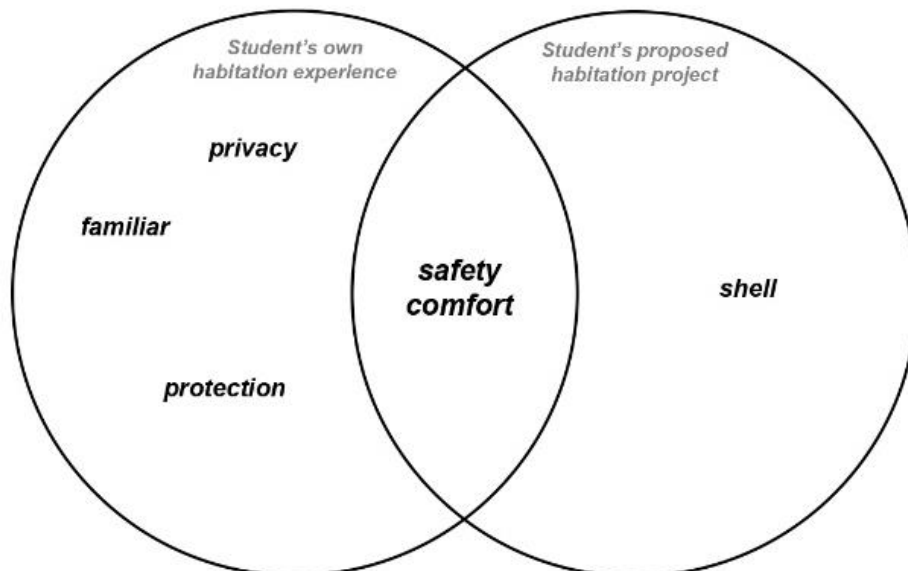


Figure 35. Third principle: optimization of man's protective space. Proposed keywords: safety, shell, familiar, protection, privacy, comfort. (source: authors)

The keywords *safety, shell, familiar, protection, privacy, confort* interpreted Doxiadis third principle. According to the students the common ground that relates the perception of the habitation experience of their personal notion of home and the one of the proposed housing design project is the keywords *safety* and *confort*. For the fourth principle, among the keywords *system, network, connection, society, nature, community, order, organisation*; according to the students the common ground that relates the perception of the habitation experience of their personal notion of home and the one of the proposed housing design project is the keywords *nature, community* and *organisation*.

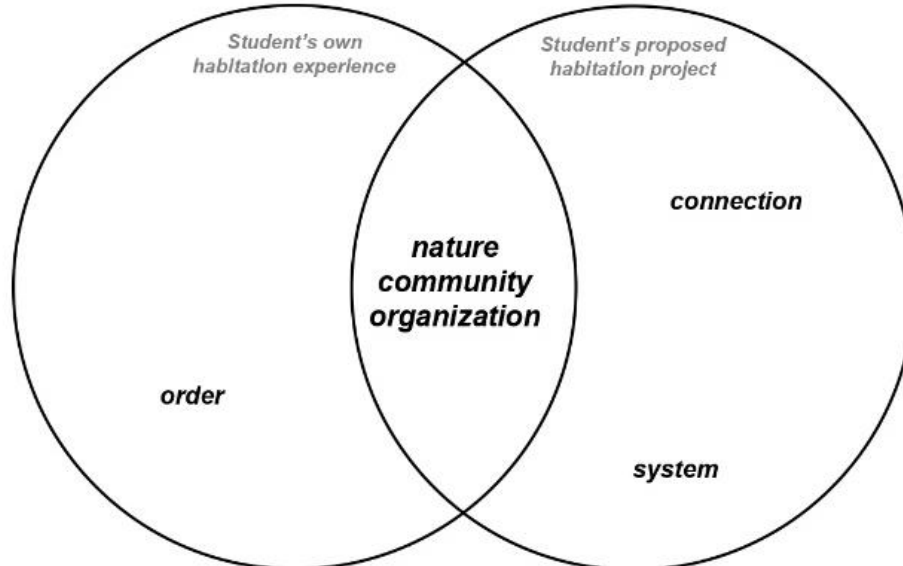


Figure 36. Fourth principle: optimization of the quality of man's relationship with his environment, which consists of nature, society, shells and networks. Proposed keywords: system, network, connection, society, nature, community, order, organisation. (source: authors)

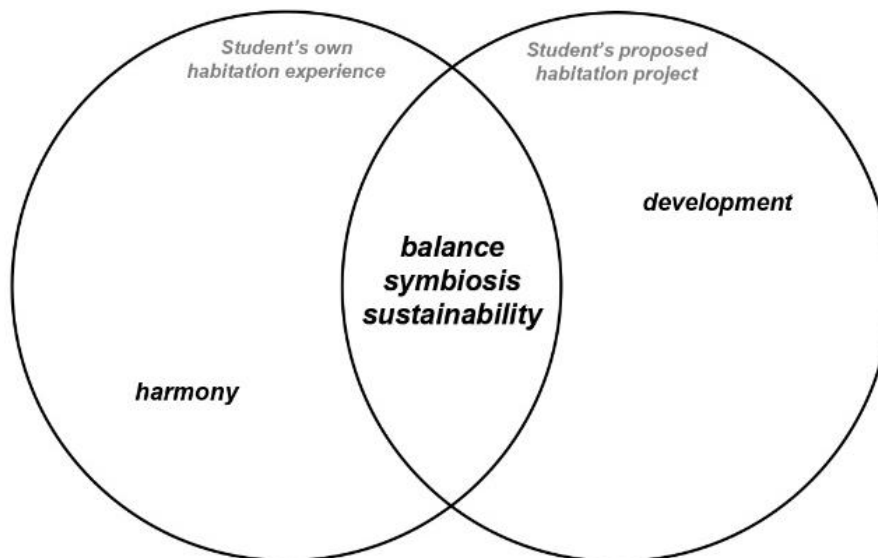


Figure 37. Fifth principle: man organizes his settlements in an attempt to achieve an optimum synthesis of the other four principles. Proposed keywords: sustainability, development, harmony, balance, symbiosis. (source: authors)

Finally, as far as the fifth principle is concerned, interpreted with the keywords *sustainability, development, harmony, balance, symbiosis*, the students chose as common ground between their proper perception of the notion of home, and the experience of housing as designed in their project, the keywords *balance, symbiosis, sustainability*.

The aforementioned paradigm demonstrate elements to be considered when integrating ecological issues, initially linked to *Ecology and Ekistics*, as a methodological tool in housing design studios: combining scientific knowledge with empirical analysis, including experimental processes; applying theoretical concepts in practical design scenarios and vice versa, interrogating housing on different scales and considering the micro and macro impacts it conveys, encouraging an interdisciplinary approach while acknowledging the complexity of the relations between the natural and artificial systems. Integrating the study of ecology into educational programs could enrich the design process activity. In link with Doxiadis diagrams overlapping layers and fields of concepts and disciplines in a broader system including ecology and *ekistics*, it is intended to extend this first step of the inquiry within workshops that will be followed. Using as keywords concepts chosen meticulously from the glossary of *Ecology and Ekistics* it is aimed to figure the ways those notions refer to spaces within the home, and, further, to identify which are those spaces.

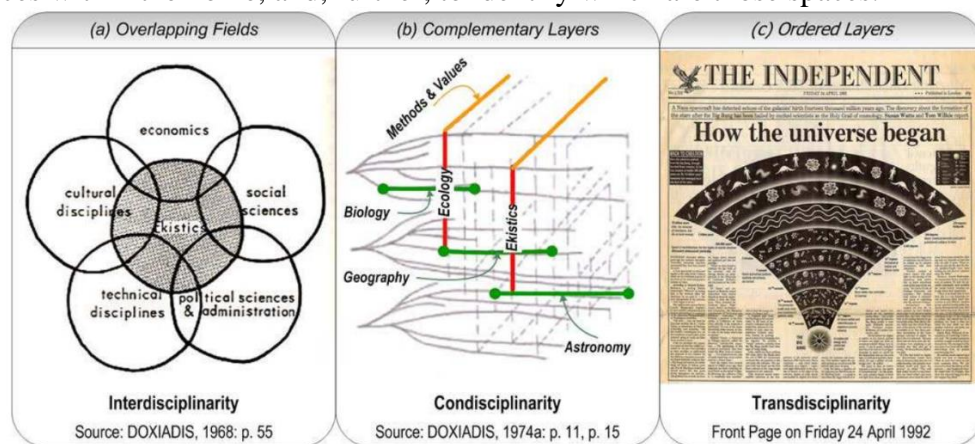


Figure 38. Overlapping fields and layers of knowledge in Doxiadis research. (source: Pertsemlidis, C. 2007)

All those who are studying architecture, planning, economics and other subjects concerned with humans and their settlements should also be required to study basic ecology. Similarly, those studying ecology, geography, and related disciplines should be required to learn about the elements of ekistics. In this way we will help to establish firm connections between disciplines and attract to this area of activity those few young minds interested in inter-disciplinary innovation. [32]

6. CONCLUSION

Critical pedagogy and experiential learning are essential components of architectural education, particularly in the exploration of housing typology. By promoting critical thinking, social justice, and hands-on experience, they prepare students to address the complex challenges of housing design with creativity, empathy, and a commitment to positive social change.

The main hypothesis of the research analysed above, is the integration of *Ecology and Ekistics* theory within architectural education, particularly on the theme of housing, to promote experiential learning in architectural design studio and explore new practices within the education of aspiring architects. In the steps to follow, this research will be expanded with additional workshops, using the terms used in the glossary included in *Ecology and Ekistics* as keywords connected with domestic spaces and experience. In this way, the ways in which these notions and concepts relate to different spaces within

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the home will be explored, leading to a further identification of those spaces. The main aim of the research is to propose a new methodology for architectural design studio, particularly on the typology of housing, for the investigation of spatial qualities and correlations that includes the theoretical principles of *Ekistics* in general and *Ecology and Ekistics* where applied.

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APPENDIX 1

Ekistics, the Science of Human Settlements, C.A.Doxiadis, 1970

Five principles of Constantinos Doxiadis on the relationship between man and the organization of space

1. The first principle is **maximization of man's potential contacts with the elements of nature** (such as water and trees), with other people, and with the works of man (such as buildings and roads).

Key words: contact, interaction, socialization, transition, threshold

2. The second principle is **minimization of the effort required for the achievement of man's actual and potential contacts**. He always gives his structures the shape, or selects the route, that requires the minimum effort, no matter whether he is dealing with the floor of a room, which he tends to make horizontal, or with the creation of a highway.

Key words: distance, functionality, sustainability, economy, access, circulation, movement

3. The third principle is **optimization of man's protective space**, which means the selection of such a distance from other persons, animals, or objects that he can keep his contacts with them (first principle) without any kind of sensory or psychological discomfort.

Key words: safety, shell, familiar, protection, privacy, comfort

4. The fourth principle is **optimization of the quality of man's relationship with his environment**, which consists of nature, society, shells (buildings and houses of all sorts), and networks (ranging from roads to telecommunications). This is the principle that leads to order, physiological and aesthetic, and that influences architecture and, in many respects, art.

Key words: system, network, connection, society, nature, community, order, organization

5. In the fifth principle, man organizes his settlements in an **attempt to achieve an optimum synthesis of the other four principles**, and this optimization is dependent on time and space, on actual conditions, and on man's ability to create a synthesis.

Key words: sustainability, development, harmony, balance, symbiosis

Questionnaire in the context of scientific research entitled as:

The application of the principles of Ekistics (C.Doxiadis, 1970) in architectural education, focusing on the typology of housing

Date: April 2024

Year of study: 1st/2nd

The present research seeks to highlight correlations between the theoretical principles of Doxiadis' Ekistics and the process of architectural design. These correlations concern specifically the development and exploration of housing typology as studied in architectural education, especially in the Architectural Design studio

In this questionnaire, you need to associate the **spaces** with **keywords**.

With which spaces:

(a) **your house** as you have experienced it (the space mostly associated to the meaning of home, now or in the past)

(b) **in the housing areas in your current Arch. Design proposal**

would the following keywords correspond to each of C. Doxiadis' five principles concerning the relationship between man and the organization of space?

Principle 1: maximization of man's potential contacts with the elements of nature

Key words: *contact, interaction, socialisation, transition, threshold*

(a)

(b)

Principle 2: minimization of the effort required for the achievement of man's actual and potential contacts

Key words: *distance, functionality, sustainability, economy, access, circulation, movement*

(a)

(b)

Principle 3: optimization of man's protective space

Key words: *safety, shell, familiar, protection, privacy, comfort*

(a)

(b)

Principle 4: optimization of the quality of man's relationship with his environment

Key words: *system, network, connection, society, nature, community, order, organization*

(a)

(b)

Principle 5: attempt to achieve an optimum synthesis of the other four principles

Key words: *sustainability, development, harmony, balance, symbiosis*

(a)

(b)

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Doxiadis' Ekistics as a legacy on Arab urbanism and beyond; The Softscapes and Hardscapes of Modernity

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Extended abstract

It was in 2017, at the aftermath of The United Nations Habitat III Conference on housing and sustainable urban development in Quito Ecuador and the New Urban Agenda, when Saskia Sassen, Ricky Burdett and Richard Sennett manifested a new, open-ended, inclusive urbanism, while cynically launching a polemic against the role of the modernist urban planning approaches on shaping today's urban condition. Whilst a great volume of literature has repeatedly elaborated on the issue ever since and various architectural theories have evolved as a response to modernism's most radical teachings, one could argue that modernism is not the sole culprit and that other schools and forces that followed have contributed equally or more so. Furthermore, such an accusation should apply to modernism's full width and breadth of expressers, sub-currents, variations, tools and contexts.

The theoretical and applied work of Konstantinos Doxiadis, an arguably dominant figure of that era, could serve as a vantage point of such an examination. Ekistics, his scientific approach on human settlements, is deterministic enough to express both the modernist "machine" and its global configuration. However, the roles and position of Anthropos and the society are interestingly contrasting the more rigid Charter of Athens. Similarly, his geography of projects spans across most continents, but it is in the Middle East and the Gulf region in particular that the spatial manifestation of his ideas shows the clearest, due to the "tabula rasa" urbanism that thrived under the petroleum concessions of the mid-century. However, even though Doxiadis was offered the means, power and space to implement his Laplacian modernism, he displayed a remarkable resistance and respect to the human scale, the local context and the right to the city.

The aforementioned controversies are indicative of the overall debate on modernism's impact on the contemporary urban condition. They consist the already familiar "hardscape" – the more rigid, purist and harshly criticised expression of modernism, but also a more elusive and context-sensitive "softscape". This paper attempts to showcase Doxiadis' approaches and methods on several key projects in the Gulf region, thus arguing in favour of partially lifting responsibility off towards other theoretical and implementation approaches that followed ever since. His human-centered advocacy has left its stamp towards a more socially cohesive urban planning that have in-formed numerous sustainability manuals and rating systems, such as Abu Dhabi's "Estidama".

Keywords: *Doxiadis; Ekistics; Abu Dhabi; Gulf urbanism; modernism*

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Units, Elements and Doxiadis' Ekistics Disciplines through G.I.S. data and analysis

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Extended abstract

In this day and age, as well as the societies we have created, have begun to swell to a suffocating degree regarding the quality of life in cities. Today, more than ever, it is imperative to integrate urban ecology into the management of cities, in order to change the quality of life of people living in small and large societies. The imperatives for improving the quality of life can be found in a total analysis of city structures where, among others, Doxiadis has also spoken and developed the science of Ekistics. This paper has to do with the science of Ekistics which was created by Doxiadis through his study of human behaviors in human settlements, small and large communities and their creation through parameters such as geography, human psychology, the ecology of cities and culture. In order to understand the Units, Elements and Ekistics Disciplines, an analysis must be done in a Geographical Information Systems environment, because we are referring to geographic data. The units that Doxiadis integrates the science of Residential science into the field of sciences, start from the unit of man (anthropos), mediated by an average human community and end in Doxiadis' vision of a single community of people called Ecumenopolis. For the above units the geographic data in a G.I.S environment. they give the raw data for analysis through the information contained in it. The important thing about these geographical data is found in the detail of the analysis (L.O.D.). When we talk about a small city community or a neighborhood there is a diametric difference compared to a Metropolis. The information embedded in geographic data may vary from unit to unit. In addition to the primary data for the analysis, the elements that embedded human communities such as nature, society, transport networks etc. are also integrated, but also the parameters that influence the analysis such as social, technological, economic, cultural etc. parameters. Through these 3 different groups of data and parameters Doxiadis in his analysis tried to integrate them into a holistic methodology for predicting human societies in transition for a single city "Ecumenopolis". For all of the above in this text, an attempt will be made to integrate them into the science of Geoinformatics, where the individual units, elements and disciplines will be developed with examples from the scientific community and procedures and further analysis of them will be made. Geographical Information Systems, Remote Sensing or Photogrammetry will join the discussion on the analysis of the various data, in a branch of universal management of modern cities, but also of the predictions of the Doxiadis' vision for the Ecumenopolis.

Keywords: *ekistics, spatial analysis, geoinformatics, urban ecology, Ecumenopolis*

1. INTRODUCTION

Doxiadis' work in the fields of urban transformation and architecture is vast and continues to be studied for years after his death. On his way, Doxiadis for the interpretation of the city and the elements that define and make it up, created the science of Ekistics where he systematically studies human settlements. '*Ekistics begins with the premise that human settlements are susceptible to systematic research*' he says characteristically and continues in his texts on the study of human settlements and how to create a system / city that respects human, history and dimensions in order to be sustainable. For this study of the settlements where people live, the study of a wider spectrum of

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the human environment is also needed, such as nature, society, man, buildings and networks, which can be studied in many ways, such as, economic, social, political, technological and cultural [1]. Now the planet is saturated and according to the predictions it continues at the same and greater pace, the need to manage this saturation through sustainable solutions for cities and people. Human needs are increased, as a result of which changes are evident and the tendency to concentrate people in large urban centers creates predictions which are not so utopian, these predictions are the Ecomenopolis of Doxiadis [2]. Following Doxiadis's study on Ekistics, he studied the dynamics of a hypothesis - theory of a city that would gather the people of the earth, the so-called Ecumenopolis. This city refers to the planetary level and is a single and continuous city which was the evolution of megacities and the trend of human settlements towards urbanization. In the study of Settlement we must move from a small scale to a larger one in order to study the whole spectrum of human settlements. As a smaller scale of study we consider human and end up with the single city of Doxiadis' Ekoumenopolis [3]. However, these elements by themselves do not have any coherence if we do not also study the influencing factors according to the conditions they choose each time. For this particular study, they could not but play a special role in G.I.S., through which the spatial data (units) will interact with the analysis of the elements (elements and disciplines), with various methods of spatial analysis of human settlements. For the study of this scale of Doxiadis (from human to Ecumenopolis) categories are mediated which differ from each other in terms of the approach but also the level of detail of the data and those produced from them. However, in order to be able to study the units, elements and disciplines, an analysis and recording of these and the methods of analysis must first be done.

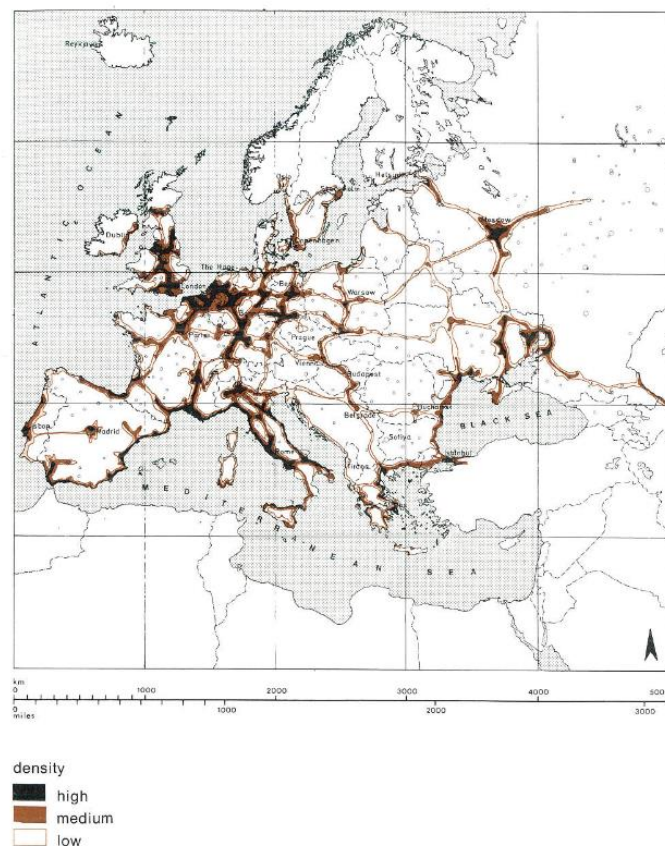


Figure 1. Map of Ecumenopolis in Europe, the habitation evolution in 2100 Source: (Constantinos A. Doxiadis, 1974, p. 371: 147 fig.

2. UNITS

In the book *Ecumenopolis* by Doxiadis we have the 15 categories, where we gradually move from a level of detail of the human being as a unit to the single future hypothetical city which will gather all people together. The intermediate categories concern small groups of people (neighborhoods), large cities where more people gather, metropolises which are a station in the network and finally we end up in the *Ecumenopolis*. All these categories have a geographical aspect as well as information technology depending on the elements that make them up, with the result that each one has a different level of detail. The level of detail (L.O.D.) for each category is different due to the nature of the log data. From the first category which refers to human we could say that the recording method is completely different in relation to a Metropolis without meaning that there is no coherence and connection of human with the other categories, because man is the one who constitutes part but also has created the communities through cultural, political and other characteristics. The first 2 categories (human and room) and perhaps the third one the house we would say have a similarity in the level of detail of the recording, the method in which we collect information about these categories is mainly the statistical recordings, as applied by the statistical services around the world. For example, the population census in Greece is carried out every 10 years and information is collected, through questionnaires and personal interviews, about the person and his family and the place where they live, as well as information about the income of each household [4]. Doxiadis had in the past tried to "record" in his own way with personal interviews in 18 Athenian neighborhoods, with which research on the inhabitants of Athens he tried to record and measure their adaptation to the emerging rhythm and spaces of the post-war city. The program was called (human community)[5]. Continuing from the first 3 categories, which are more or less statistical-census records, we move to 4 categories that are similar in terms of data recording and collection. From the house to the neighborhood we could say that there are similarities, due to the fact that the house is also part of the neighborhood. The spatial registration of these categories can be performed with Photogrammetric procedures, where through a number of photographs the three-dimensional reconstruction of the study area is made with geometric characteristics with the possibility of extracting the outline of the buildings. In the paper by (Mayank Sharma, Rahul Dev Garg) extracted from photogrammetric data (point cloud) the footprints of the buildings at Indian Institute of Technology (IIT) Roorkee, Uttarakhand, in an automatic way through algorithms and thus created the backgrounds for a "neighborhood" [6]. The above process of creating a background with the elements of the buildings is said to take precedence over the inventory of the previous categories (human, room), because through the elements of the buildings which act as a background to select the houses for collecting information from the people who staff them in order to have records at the neighborhood level from the statistical services. Then we will move on to something bigger, in the city and small town category, where the process of collecting information through a drone to create 3D information is quite difficult due to the area it occupies, for this reason the recording of information in such areas is common be performed by manned aircraft carrying either a camera or a lidar sensor. Procedures for extracting building information from lidar sensor recordings are often applied to such city sizes and the data are reliable. The data to be processed are also point clouds but with a different creation process, just as the characteristics of the points have information through which the classification of the points concerning the buildings in relation to other categories (vegetation, cables, etc.) is done by automatic procedures [7]. The recording processes of urban areas to extract the building stock can reach the city category due to the fact that in larger urban environments the data will be huge and the computing power will be required to be greater, but this is not a rule because it is common to happen, but the segmentation of a megacity or a metropolis into smaller pieces of recording and processing also helps control errors. The 4 categories of the metropolis and megalopolis can be seen in a larger spectrum of analysis and extraction of information. Data can be extracted from these categories one of Remote Sensing of the area occupied by the built environment in urban areas in order to analyze neighboring

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cities and how they spread and develop in space over time. In the metropolis of Hangzhou, China, researchers through remote sensing data identified the built environment between the years 1991 – 2014 through multispectral images from the Landsat satellite [8]. In this way we can have in our hands at a planetary level the structured and unstructured environment in a depth of time from 1985 to the present day. In the last category of the Eperopolis and the Ecumenopolis, no record could be made with spatial data because they are stochastic plans for the development of the single city envisioned by Doxiadis, but the above data from man to the megapolis and the possibility of a historical background either from multispectral data or from historical evidence of the evolution of cities, this vision can be given the possibility to be studied with precise spatial and informational data.

	Units	Method	Data collection
1	anthropos	Statistical record	G.I.S. in field
2	room	Statistical record	
3	house		
4	housegroup	Drone Photogrammetry & Statistical record	G.I.S. & Photogrammetry data
5	small neighborhood		
6	neighborhood		
7	small polis	Airborne Photogrammetry (lidar)	G.I.S. Airborne Photogrammetry
8	polis		
9	small metropolis		
10	metropolis	Remote Sensing/Airborne Photogrammetry	G.I.S. Remote Sensing/Airborne Photogrammetry
11	small megalopolis		
12	megalopolis		
13	small eperopolis		
14	eperopolis	-	G.I.S.
15	ecumenopolis		

Figure 2. Doxiadis' units and gis analysis

All the above mentioned in the Doxiadis units can be integrated into a single base where one will interact with the other in a gis environment. The level of detail of each category is evident in the text above, from the man in the big city we have a detail which differs greatly, because the data collection process also differs but in between categories.

3. ELEMENTS

The Elements that Doxiadis refers to in his book Ekumenopolis could be said to be something like a record of the elements that a city has but also the basic characteristics of the analysis of the above spatial data units. They are tangible features with a geographic background and obvious metrics of analysis, they are features that are a key ingredient to structure an urban fabric. Data such as infrastructure, nature and man are the ones that in the analyzes through gis have obvious characteristics and are shaped over time because they are a basic component of the functioning of human societies. In this category we have more of the organization of cities and the structures that make them up. In the foreground comes nature, both the natural environment and the built environment itself within the city, which also refers to those elements that human has contributed to shape the environment - nature in which he lives. In this category the analysis automatically switches to the characteristics of landuse & lancover. The category landuse as data are the areas in which man applies particular uses to his benefit. They are areas where anthropogenic activity forms areas with various characteristics. The specific categories are the ones where we can have information about human activity but also the spatial / geographical boundaries in which each category is surrounded.

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The landcover data category has more natural characteristics and refers to the covers that either man or nature has shaped [9]. In Siliguri region researchers applied analysis through remote sensing data to find suitable area for development of new urban area due to the problem of overpopulation. Data such as landuse & landcover were in the foreground due to the type of data referred to the surface category of the study area and through multi-tiered analyzes with other data such as elevation gradients but also features such as infrastructure were integrated into a gis environment to find these areas [10]. The next category could be said to be similar to the human category from the units due to the fact that the data in this category refers to the collection of data on human habits from interviews and recording them. Analyzes such as population density generated in a GIS environment can provide information on the concentration of people in an area [10]. Also, information such as ownership status is what organizes an area, with ownership and commons and utilities creating the quality characteristics of a city and driving decisions about a sustainable city. Public and shared buildings as well as commercial or other buildings in which there is a large concentration every day must also be studied. The suitability of an area for the reconstruction of such a building or the study of the existing ones is important for the structure and evolution of the city and is applied in a gis environment, due to the fact that from there we can apply tools such as kernel density which analyzes the characteristics of the input data with the neighboring similar features and accordingly the analysis determines the appropriate positions [11]. Next, one of the most important categories of data is transportation networks or other networks that play a role in shaping cities. In his publication Aleksandar Valjarevic studied the infrastructures of the networks (road, rail and ports) of Europe and through the analysis in a gis environment he identified the connectivity, mobility, availability, centrality and how these networks can and interact - they are connected to each other like tissue [12]. Finally, All of the above are what shape the next category "society" as a living organism with such elements that make it up and shape it over time the communities of people around the world..

	Elements	Data	Method	Analysis and Results
A	nature	Landuse/Landcover	G.I.S. / Remote Sensing	Multispectral data and Multispectral analysis
B	anthropos	Population, Labor force, Householders	G.I.S.	Population Density
C	society	Society Organization	G.I.S.	Society Organization analysis through G.I.S.
D	shells	Public benefits buildings, Commercial Centers, Industry Spaces	G.I.S.	Business analysis
E	networks	Road, Rail, Airline and Marine Network, Commercial Network	G.I.S.	Network Analysis

Figure 3. Doxiadis' Elements and gis analysis

4. DISCIPLINES

The Disciplines category, in turn, has characteristics that can be integrated into analyzes through gis. However, the specific category differs from the previous element in terms of the nature of the data, because in this category we are talking more about intangible characteristics. Characteristics which are formed by humans and the conditions in which they live in urban and other areas. These criteria do not have such obvious characteristics and are not as controlled by the respective researchers due to the fact that some of them have multiple interpretations, but this does not mean that they do not have a constant and a base. The first category to be analyzed is the economic characteristics for which the sources of data collection are the statistical authorities which, through the census, record economic data as well as the economic services of the states. An example of a study of economic characteristics at the level of analysis in a gis environment is the study in the territory of China where researchers studied the country's gdp and through various statistical models from machine learning algorithms in geographical backgrounds of the borders of the country's regions and cities. The sciences of statistics and GIS interact in such with the aim of qualitative results through interdisciplinary [13]. A category that is largely difficult to calculate and measure is the social category and it is difficult to calculate characteristics related to equality and equity. Inequalities are characteristics that are scattered in human societies and their calculation and their study in gis environments is a problem due to the nature of these data, but it is a regulatory factor in the study of neighborhoods and cities [14]. The next category is a station in human societies because through it the societies themselves are changed by specific decisions. The urban planning of cities has a political connotation because the respective governments, whether local or the central governments of the countries, are the ones who shape the cities [15]. The category of technology is necessary in the study because from there we have the current of the development of modern societies. In the study of Ekistics and the Ecumenopolis, the technological sector is a key component of the concentration of human resources, and this seems to have been happening in countries around the world for 150 years. Finally, the culture carried by the peoples of the earth throughout the centuries and is the one they carry to this day. The recording of this culture as well as the preservation is necessary to be recorded in such a way that not only will there be a historical background of recording but will help to preserve and spread it as well as to chart the course of modern societies. In the Nanjing region, Zhifeng Jiang applied a research on the cultural points of the region and studied the dynamics within a GIS environment and the accessibility of these points with other spatial analysis data [16].

Disciplines	Data	Method	Analysis and Result
I economic	Gross Domestic Product Country Level, Gross Domestic Product per Capita	Data analysis & G.I.S.	Choropleth map
II social	Social Divisions, Equality and Equity, Social Formation	Data analysis & G.I.S.	Thematic map
III political	Urban Planning, Wars	Data analysis & G.I.S.	Thematic map
IV technological	Accelerating change	Data analysis	Thematic map
V culture	Cultural Dynamics per Country	Data analysis & G.I.S.	Thematic map

Figure 4. Doxiadis' Disciplines and gis analysis

5. CONCLUSION

The above analysis of the elements (units, elements and disciplines) of the science of Ekistics helps us to understand the way of the nature of these elements and through analysis in a GIS environment, how it can work. From the human data records in Ecumenopolis as well as the analyzes of the tangible (elements) and the intangibles (disciplines) characteristics, researchers can have in their hands "tools" for the purpose of managing cities through GIS, but the engraving. path for a better sustainable city. The science of Ekistics by Doxiadis, in a way, we could say that it was shaped to be analyzed through GIS systems, although it had been created by it before the application of GIS came to the fore for the study of the city.

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Post-War Satellite Towns as Positive Living Environments: Examples from Istanbul, Turkey

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Abstract

Doxiadis' theory of Ekistics evaluates human settlements and their evolution. A "successful human settlement" achieves a balance between human beings and their built environment. The metropolitan areas of the second half of the 20th century had grown beyond the area of daily interaction; therefore, defined and comprehensible natural and built environments became necessary. This paper proposes a reading of planned post-war modern satellite towns as alternatives in terms of daily use and networking in terms of Doxiadis' theories. Indeed, many examples, based on various western models, to which Doxiadis' ideas were also directly related, tried to recreate positive personal experience and social and natural interaction in designed spaces and places.

Istanbul was already a large city by 1950, with a population exceeding 1 million. A municipal survey in 1953 put the lack of housing in the city at 30-40 thousand units. Housing projects of this period created new living places within the settlement areas or on their periphery along the proposed development axes to the north, west and southeast. The projects considered in this context are Levent Phases I-III (Kemal Ahmet Aru and Rebiî Gorbon, 1947-1956, 977 units), Levent Phase IV (Kemal Ahmet Aru, 1954-1956, 373 units), Atatürk Boulevard Block Apartment (Istanbul Municipality and T. Emlak Kredi Bank project offices, 1954-1956, 90 units), Ataköy Phases I-II (Ertuğrul Menteşe and the Baruthane Project Office, 1957-1964, 1514 units) and Hukukçular Block Apartment (Haluk Baysal and Melih Birsal, 1962, 66 units). While the block apartments followed Le Corbusier's *Unité d'Habitation* principle, Levent Phases I-III was a late garden city, and Levent Phase IV and Ataköy Phases I-II were new-towns. All except for the Atatürk Boulevard Block Apartment were located on the urban periphery along the development axes.

If these projects are considered in the light of Doxiadis' five principles of Ekistics, (a) maximizing the habitants' contacts with nature, people and built environment, and (b) minimizing the effort required for this, (c) optimizing the habitants' protective space and (d) the quality of their contacts, and (e) achieving an optimum synthesis of these principles, they may be considered attempts to create positive human settlements within a larger chaotic city. They became cases that may be considered in terms of Doxiadis' *Entopia*, meaning "place that is practicable, that can exist". Indeed, the inclusion of commercial-service, social, cultural-educational and natural-recreational spaces and places integrated within the projects as well as the quality of the built environment and circulation patterns, derived from former concepts of modern urban planning, made them so. The projects also present ecological urban landscapes for their inhabitants. Their sustained desirability in today's Istanbul, a *Dynapolis* and almost an *Ecumenopolis* in Doxiadis' terms, indicates that positive and livable environments were created.

Keywords: *Ekistics; post-war modernism; housing; satellite towns; Istanbul.*

1. INTRODUCTION

Constantinos A. Doxiadis, a visionary architect and planner, studied human settlements of almost all periods in order to develop his theory of Ekistics. He published these during the transformation period from Modernism to Postmodernism. Indeed, his ideas were related to modern urbanism but they were also instrumental in shaping postmodern approaches. This paper aims to evaluate post-war modern satellite towns and housing estates in Istanbul in relation with the theories Doxiadis published right afterwards, thus, discussing correlations between modernism and his theories in terms of positive living environments while considering their sustainability in the contemporary urban environment. Istanbul was already a large city by 1950, with a population exceeding 1 million, 70% of which lived in the Historic Peninsula, Kadıköy and Üsküdar. The new urban development axes on the European side were proposed along the Marmara shore to the west and along and behind the Bosphorus shore to the north, enlarging the urban area with extended arms and filling some of the vacant zones between the center and the peripheral settlements [1] (Figure 1). These axes were supported by new means of transportation, such as suburban railways and new motorways. A municipal survey dated 1953 put the lack of housing in the city at 30-40 thousand units. Housing projects of this period created new living places within the settlement areas or on their periphery along these axes. The examples chosen in this context are dated to 1947-1964, and were designed by prominent architects of the period; they still retain their importance as housing estates in the architecture in Turkey.

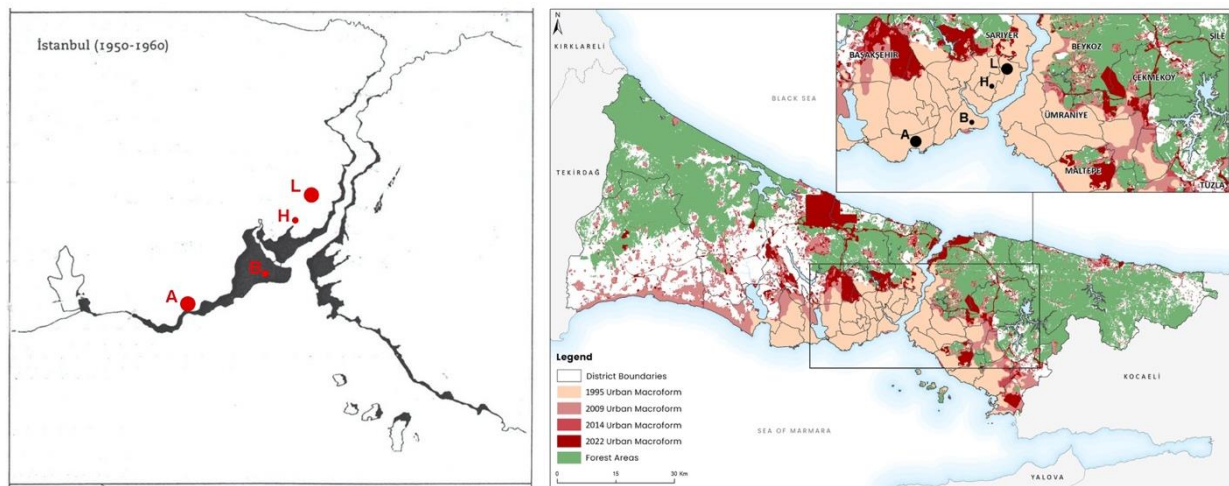


Figure 1. The locations of the case studies in 1950-1960s (left) [1] and present (right) [2] Istanbul urban macroform (A-Ataköy, B-Atatürk Boulevard Block Apartment, H-Hukukçular Block Apartment, L-Levent).

2. SPIRIT OF DOXIADIS IN URBANISM & PERI-URBAN THEORIES

Doxiadis [3] defined Ekistics as “the science of human settlements”. His pragmatic, objective and rational approach derived principles from an evaluation of past examples, and provided projections for the future: The settlement designs, “the city of optimum size, that is, a city which respects human dimensions”, should (a) maximize the habitants’ potential contacts with nature, other people, and the built environment; (b) minimize the effort required for the achievement of the habitants’ actual and potential contacts; (c) optimize the habitants’ protective space (“the selection of such a distance ... [to] keep [their] contacts ... without any kind of sensory or psychological discomfort”); (d) optimize the quality of the habitants’ relationship with his environment (nature, society, shells) and networks; and (e) attempt to achieve an optimum synthesis of the other four principles, “depending on time and space, actual conditions, and [their] ability to create a synthesis”. The natural environment plays an important role in this context [4: 20-37]: “naturareas”, “cultivareas”, “anthropareas” and

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“industrareas” need to co-exist in harmony. The inevitable Ecumenopolis should have a global balance with the Ecumenokepos (Figure 2).



Figure 2. Ecumenopolis 2060, C. A. Doxiadis, 1967 (© Constantinos and Emma Doxiadis Foundation).

In *Between Dystopia and Utopia* Doxiadis [5] proposes a solution to the dichotomy through Entopia, meaning “place that is practicable, that can exist”: “The present city – without reason, without dream – leads to dystopia and disaster. Utopias – without reason, with dream – cannot get us out of the impasse. There is only one road left – *with reason and with dream* – which should take us out of the bad place into a good place, which is not out of place, but in place – an entopia.” Thus, Entopia could become a useful tool in assessing positive living environments in urban context.

Attributing the entity to be an architectural design without standing resilient to time is unfair. Yet, the timelessness of a design proves itself with its positive potential, ready to be reformed and existing in future urban formations. Understanding Doxiadis’ Entopia as giving the character of a place in the practice of time lies on the macro form strategies in urbanism and its engagement of peri-urbanism. Early designers deemed the environment limitless to settle in and built timeless masterpieces under the hegemony of the human self. Urban expansion tightened the geographic environment. Lived-in geographies have been expanding at the outside edge of the urban fringe. Settlements have accumulated, and there could be no absolute place to stay as a peri-urban settlement forever on the outskirts of the cities.

Ancient Greeks used biological analogies for the development of urban macro forms. Aristotle stated, “ten citizens do not make a polis, while with 10,000 is a polis no longer”. Plato calculated the ideal population size to be 5,040, using mathematical theory, while Hippodamus identified populations in geometrical terms, dividing the land into three distinct zones: public, private and sacred [6: 54]. Doxiadis argues that the Greeks “employed a uniform system in the disposition of buildings in space that was based on principles of human cognition” with variations based on mathematical and geometrical formulae, which “represents a general theory of spatial organization – a theory of city planning” [7]. These considerations opened the way to his principles of Ekistics based on human interaction with nature.

Romans had a similar metaphoric approach when they settled Istanbul. They sustained the isomorphic geographical relation between Rome and Constantinople or “New Rome” on the mythical topographical formation of seven hills. So, the city had an opportunity for a revival, replicating the physical setting of Rome: “No longer are we cultivating more territory within our walls than we

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inhabit; the beauty of the city is not as heretofore scattered over it in patches but covers its whole area like a robe woven to the very fringe.” [6: 90, quoting Themistius, *Oratio XVII*].

Pre-modern urban geographers worked on the theories to create bonds between urban and town planning zones, dealing with the effects of the Industrial Revolution. Ebenezer Howard visited Chicago before publishing *Garden Cities of To-Morrow*, and experienced the frightening congestion: “These crowded cities have done their work; they were the best which a society largely based on selfishness and rapacity could construct, but they are in the nature of things entirely unadapted for a society in which the social side of our nature is demanding a larger share of recognition” [8: 38, quoting Howard, 1902: 50-57]. The public demand for decentralization boosted the suburbia and created considerable pressure on peri-urban formations as a result of the rising congestion in the city centre while the development of motorized transportation and private car ownership aided it.

The term Satellite City was first used in 1915 by Graham Taylor [9] to identify the industrial suburbs, which were differentiated from a suburb by having a centre and being not only a housing settlement. The peri-urban settlements in Istanbul are different in practice from their European/American counterparts with a rapidly urbanized distinctive metropolitan macroform, being not strictly suburbs or satellite towns in definition.

Walter Christaller’s Central-Place Theory [10] was a comprehensive design approach, bridging modern urban planning to handle the peri-urban formations with the central places while focusing the multi-central development strategies through practical human habitat. He generated a complete urban macro-form theory by concentrating on marketing, transport, and administrative principles in the unavertable expansion of the urban environment, thus, similar to Doxiadis in terms of human interaction. In 1964, Melvin Webber proposed a critique of Non-places of the modern urban realm, stating that “spatial distribution is not crucial determinant of membership in these professional societies, but interaction is” [11: 110]. The obsession of metropolitan planners with place is meaningless because central places may change, vary and lose their identical attributes [11: 137]: “For it is interaction, not place that is the essence of the city and of city life... it is now becoming apparent that it is the accessibility rather than the propinquity aspect of ‘place’ that is the necessary condition” [11: 147, 109]. Geographers also questioned the limits of the urban environment through the environmental affordances from an ecological perspective [12]. Even so, no limits in urbanism caused by the seduction of place [13] have not already been bringing distinct peri-urban areas that could be in practice. Doxiadis’ Ekistics also followed and addressed similar concerns.

The so-called death of peri-urbanism reveals the sprawling, growing *metamorphoses* [14] like parasitic organisms, occupying the territory with an uncontrolled desire to build via an unstoppable, uncontrollable understanding of the relationship through the theoretical framework under complexity in urbanism. Former peri-urban settlements have become congested and urban due to ever-continuous development (Figure 1) although they may retain their intrinsic Ekistic and Entopic value as a finished and limited urban form. Unfortunately, this does not mean that intrinsic transformations could take place in the future as illustrated by threats, which do not consider these settlements worthy of preservation. On the other hand, we are yet far behind the Ecumenical World (Figure 2). Ecumenopolis is not the end of peri-urban theories. Peri-urban areas still have the clues of the development strategies as positive living environments in urbanism and are also dedicated lands for architectural praxis like Entopia.

3. CASE STUDIES: POST-WAR SATELLITE TOWNS AND HOUSING ESTATES IN ISTANBUL, TURKEY (1947-1964)

The projects considered in this context chronologically are Levent Phases I-III (Kemal Ahmet Aru, Rebi Gorbun, Hakkı Uras, 1947-1957, 977 units), Levent Phase IV (Kemal Ahmet Aru, 1954-1956, 373 units), Atatürk Boulevard Block Apartment (Istanbul Municipality and T. Emlak Kredi Bank Project Office, 1954-1956, 90 units), Ataköy Phases I-II (Baruthane Project Office, dir. Ertuğrul

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Menteşe, 1957-1964, 1514 units) and Hukukçular Block Apartment (Haluk Baysal, Melih Birsal, 1962, 66 units), supplying about 10% of the housing lack in Istanbul. While the block apartments followed Le Corbusier's *Unité d'Habitation* principle, Levent Phases I-III was a late garden city, developed on the principles of Henri Prost's Istanbul Master Plan (1943-1953), and Levent Phase IV and Ataköy Phases I-II were new-towns. All except for the Atatürk Boulevard Block Apartment were located on the urban periphery along the development axes. It must also be noted that all the projects are related to T. Emlak Kredi Bank, which was the main developer and financier of housing in Turkey in this period [1, 15]. It is estimated that the bank produced and/or financed the production of 300,000 houses in Turkey between 1963 and 1973, totaling about 1/2 of the housing lack in the country.

3.1 Levent Phases I-III (Kemal Ahmet Aru, Rebii Gorbon, Hakkı Uras, 1947-1957)

Kemal Ahmet Aru was the most influential planner and architect for housing estates in the 1950s [1]. The suburban "garden cities" became an alternative to over-crowded traditional urban housing areas with the development of liberal economic policies. As a new development area, Levent was designed with its localized urban plans and infrastructure and did not receive planning, financing or construction subsidies from the state or municipalities. Levent Phases I-III was a garden city, and one of the earliest and largest projects of T. Emlak Kredi Bank in Istanbul with more than 1,000 units [15]. Koşuyolu Housing Estate (Kemal Ahmet Aru and Rebii Gorbon, 1948-1954, 519 units) was a similar project on the Asian side [16].

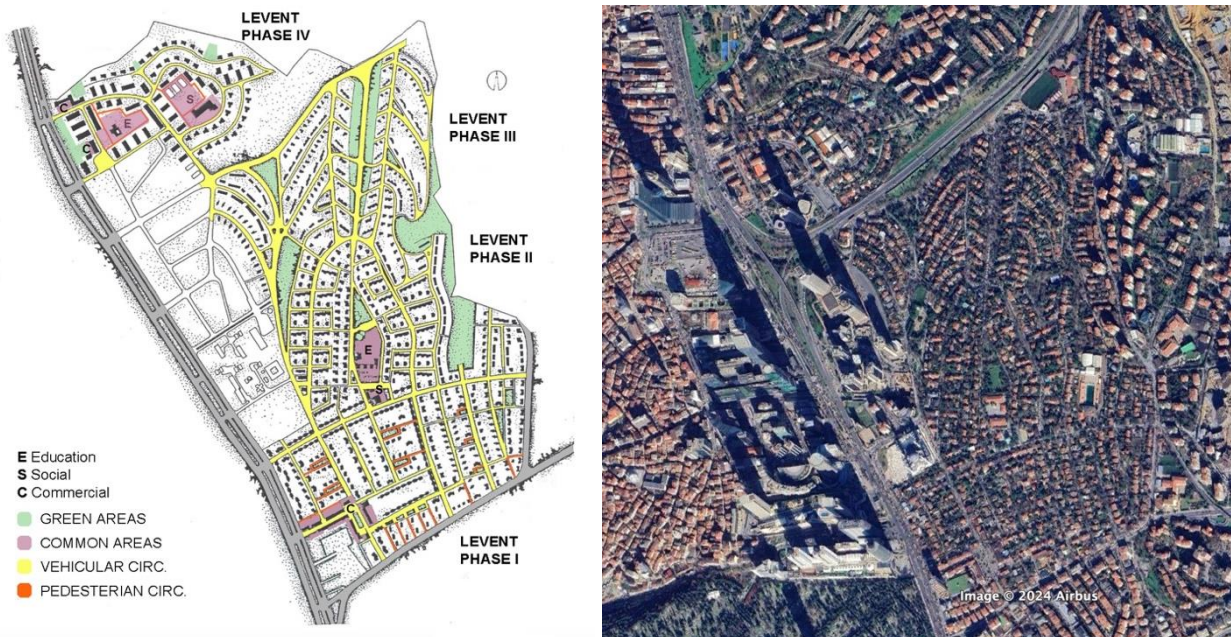


Figure 3. The original layout of Levent Phases I-IV (left; plan from the T. Emlak Kredi Bank Archive, with zoning marked by the authors) and the current aerial view of the area (right; GoogleEarth image, 9 February 2024, altitude 2.65km).

Settlement principles focused on changing the original topography as little as possible without major excavation and landfilling, segregating pedestrian and vehicular circulation, creating architectural variations and locating the houses in different relationships with the roads against monotony (Figure 3) [17]. The public green areas were located at the centers and between the units in addition to private gardens. The common areas included schools, commercial and social areas and other services. The population density was 66, 60 and 95 people per hectare and the built area density was 13, 13 and 19m² per hectare for phases I-III. 37 different types of houses were designed for Phase I alone, and

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12 different types were built, of which 7 were single houses, 3 were twins and 2 were rowhouses; 6 of the 7 single house types were single-storey and the rest had two storeys [17] (Figure 4). There were mixed-use double-storey rowhouses with shops on the ground floor in the commercial area. The settlement design aimed at a new neighborhood type, interacting within and with the rest of the city in a natural environment. Today the simultaneous transformation of the area into the central business district has changed the near built environment into a crowded high-rise typology and effected residential use, introducing commercial uses although the green layout is preserved inside the area (Figures 3 and 4).

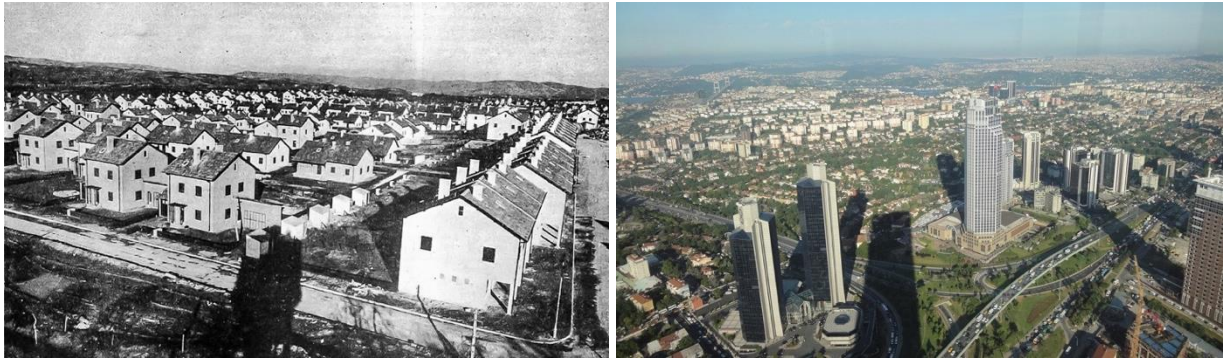


Figure 4. Levent Phases I-III in 1952 (left; Aru and Gorbon, 1952) and in 2012 (right; Nilüfer Baturayoğlu Yöney).

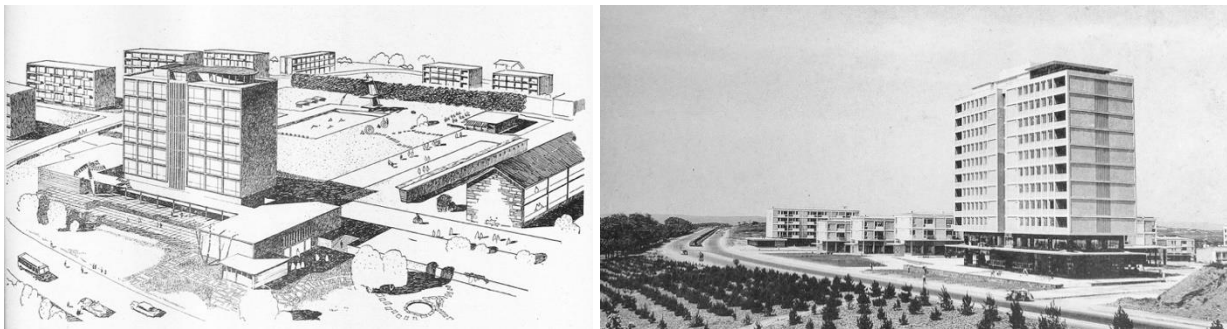


Figure 5. Levent Phase IV, view from Büyükdere Street, orthographic drawing of the design project (left; Bedri Kökten, 1956) [18] and photograph (right; 1957) [1].

3.2 Levent Phase IV (Kemal Ahmet Aru, 1954-1956)

While the construction of Phase II was continuing, Aru began designing Phase IV as a “new-town” with high-rise multi-unit apartments as well as single house types. The layout characteristics and infrastructure followed that of the earlier phases; the segregation of vehicular and pedestrian traffic was better regulated as parking lots were defined for the blocks, and commercial and socio-cultural uses were integrated into the ground and roof levels (Figure 3). All the open spaces, except for the private gardens of the single houses were public. The population density was 79 people and the built area density 16m² per hectare [17]. 18 different types of buildings were designed and repeated 1 to 16 times: Blocks had external corridors or *punkt* with one or more entrances; the flats ranged between 1+1 and 4+1, and 68 to 270m², and there were 4 types of single houses and 2 types of rowhouses [1, 18]. These were intended at providing a wide range of flexibility for housing many different types of families as well as creating architectural variations in the built environment (Figure 5).

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3.3 Atatürk Boulevard Block Apartment (Istanbul Municipality and T. Emlak Kredi Bank Project Office, 1954-1956)

This is a megablock, located on Atatürk Boulevard in the Historic Peninsula, one of the main urban axes designed according to the Prost Plan. The ground floors were designed as a pass-through commercial street with access to the upper floors and the roof level had social common spaces and services with integrated green spaces in the dense urban environment (Figure 6). Although commercial use at ground floors of residential buildings along main street were common, more complex functional integration similar to this case was an architectural approach of the period that could be seen in other examples, including Levent Phase IV and Hukukçular Block Apartment discussed in this paper. The 1650m² plot was built-up completely reaching c. 15.000m² at 8-9 levels with one bank branch, 35 shops and 90 3+1 apartments of two different types, 110 and 140m² [19].

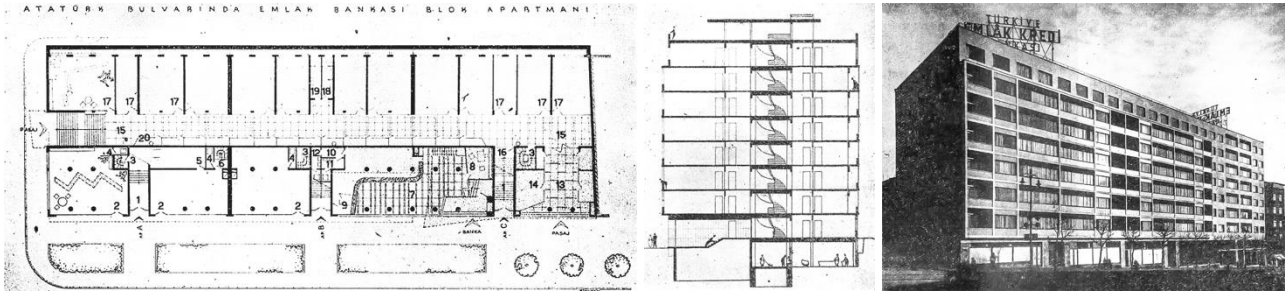


Figure 6. Atatürk Boulevard Block Apartment, ground level plan (left) and section, showing the interior street (center), and view from the main street (right; 1957) [19].



Figure 7. Ataköy, conceptual illustration, 1958 [21: cover].

3.4 Ataköy Phases I-II (Baruthane Project Office, dir. Ertuğrul Mentеше, 1957-1964)

Ataköy was a new-town morphology satellite settlement on the western development axis of Istanbul along the Marmara shore, also designed and implemented by T. Emlak Kredi Bank. Phases I and II included 90 blocks, 2-13 storeys high with 1514 apartments in 16 different types, ranging between 2+1 and 7+1 configurations and 93-248m² [20]. Luigi Piccinato consulted on the initial planning and layout. Similar to Levent Phase IV, all open spaces were public and interconnected as most block types were raised on pilotis (Figure 7); Condominium Ownership Act (1965) enabled this process. Commercial functions were separated as zones, and the flat roofs with pergolas provided social common spaces; two primary schools and recreational beach facilities. The zones around the blocks are for pedestrian circulation only with vehicular access to parking lots from the circulating main streets (Figure 8). The estate became a resort/waterfront settlement integrated with the city (Figure 9). The beach fell out of use due to marine pollution in the 1980s, and a shopping mall and marina replaced it whereas the motels and camping also along the shore were torn down in 2008 to be replaced with high-rise development, ending the relationship of the estate with the sea. However, the housing estate remains to be the least dense area in Istanbul's urban morphology.

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Figure 8. Ataköy Phases I-II, the land uses in 2006 with details for green areas (material produced in docomomo 1st International Workshop, 2006).



Figure 9. Ataköy beach facilities, 1965 (left; Aga Khan Archive, IAA11973) and the current situation of the Marmara shore, a photograph used by many real estate firms (right) [22].

3.5 Hukukçular Block Apartment (Haluk Baysal, Melih Birsal, 1962)

Designed as a megablock in the then almost rural Mecidiyeköy district, the twelve-storey building derives its inspiration from Le Corbusier's *Unité d'Habitation* [23]. The two-storey commercial section at the ground floor level included shops, a social club and main entrance to the apartments as well as gardens and terraces. The basement had a parking lot and services with open gardens. Further common functions were located at the roof level, including social halls, a youth club, a kindergarten and playground with open terraces and gardens (Figure 10). All functions were defined considering the needs of the users. There were three different types of units with 3+1 configurations, 12 simplexes, 30 duplexes and 24 semi-duplexes, totaling 66, and ranging between 117-151m². The flats opened to the environment and views of the city and the Bosphorus with integrated balconies.



Figure 10. Hukukçular Block Apartment, 1962: plans, section and design sketches [24].

4. CONCLUSION

Like many other post-war housing estates, these projects were based on concepts, derived from former modern urban planning and architectural design, as Doxiadis' theories were. If considered in the light of Doxiadis' five principles of Ekistics, (a) maximizing the habitants' contacts with nature, people and built environment, and (b) minimizing the effort required for this, (c) optimizing the habitants' protective space and (d) the quality of their contacts, and (e) achieving an optimum synthesis of these principles, they may be considered attempts to create positive human settlements. They became Entopias, "places that is practicable, that can exist" within an ever-growing chaotic city. The inclusion of commercial-service, social, cultural-educational and natural-recreational spaces and places integrated within the projects as well as the quality and variety of the built environment, and infrastructure and circulation patterns created estates with centers in different sizes, presenting their inhabitants with ecological landscapes. However, the naturareas are all domesticated in the urban environment. They are no longer peripheral settlements, and their desirability has increased in today's Istanbul, a Dynapolis and almost an Ecumenopolis in Doxiadis' terms, indicating that the positive and livable environments created are now more valuable. However, rising land values threaten them with denser development while their heritage status is being debated against economic considerations.

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**URBAN DESIGN GOVERNANCE: NUANCES AND
VICISSITUDES IN THE EUROPEAN SOUTH**



Changing Cities VI, Rhodes, 24 - 28 June 2024

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Governance of Urban Development Projects Following the Planning Reform in Greece: Special Urban Plans in the Case of Thessaloniki

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Extended abstract

The financial crisis in Greece has necessitated reforms in the planning framework, with a focus on promoting economic growth. The primary axes of reforms were to facilitate strategic investments, along with introducing new tools in the urban planning process, specifically the Special Urban Plans (SUPs). The complex and novel elements of SUPs, related to urban development, have thus far prevented firm conclusions about the impact of the changes it will bring to urban space. Questions arise: Is the new framework as flexible and effective to facilitate urban development as it was intended? Do SUPs foster the engagement of all interested actors/stakeholders? In what terms is the quality of urban planning and design integrated into the governance process? To what extent has the SUP been advanced as a tool to establish a new urban design culture?

In Greece, it is observed that urban planning processes remain obscure while the public and involved stakeholders are not adequately informed or trained to easily understand the recent changes in the official planning framework and its impact on urban life. However, there's an increasing availability of technological and participatory tools that significantly aid in bridging this gap. Consequently, evolutions in spatial issues do not align with the local and community needs, putting at stake the sustainability of cities to the detriment of development and investments, as well.

The purpose of this paper is to highlight, through the perspective of different publics and specialists in planning, the issues of governance in urban design and planning within the context of the development and promotion of SUPs, focusing on the promoted SUPs in Thessaloniki, city of almost a million inhabitants and second in the national spatial hierarchy. Thessaloniki was the first city in Greece, where SUPs have been widely applied to implement urban development projects and serve as an example for both the reformed urban planning processes to be followed and the development to be pursued. SUPs in the case of Thessaloniki have been identified as development frameworks or aimed at modifying existing urban configurations. Following extensive empirical investigation, the evolution of SUPs in Thessaloniki (formal and informal tools, design governance, stakeholders, etc.) is documented and examined emphasizing weaknesses and shortcomings in terms of their efficiency, effectiveness, and credibility in improving and integrating urban planning and design qualities at all scales of Metropolitan Thessaloniki. A structured questionnaire was also developed as a research tool, addressing the relationship between different publics (laypeople, experts, etc.) and urban planning and design practices, the SUP itself as a tool, the role of visual representations, and the role of public consultation.

Thus, the paper sheds light on the intricate challenges and opportunities presented by the analysis of forwarding the numerous SUPs in the case of Thessaloniki and enhances the importance of engaging not only technical aspects but also broader governance issues, fostering a comprehensive approach towards sustainable and inclusive urban development.

Keywords: *Special Urban Plans, urban design governance, consultation, community engagement, Thessaloniki*

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Sikh City vs Latina in the Pontine Plain

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Abstract

In the 1980s, Sikhs migrated to the Pontine Plain from Punjab, one of the wealthiest and most fertile regions of the Indian subcontinent. To the Sikh migrants, the Pontine Plain was not just a foreign land but a place that echoed their homeland's rural character and physical features. Sikh settled between Latina, Pontinia, Aprilia, Bella Farnia, Sabaudia, Borgo Hermada, San Felice al Circeo, Terracina, and Fondi, transforming many former farm sheds into places of worship, social gatherings, and political discussions. According to estimates, in 2018, around 11,000 Sikhs lived in the Pontine Plain. However, the actual number may be more than twice as high. This Sikh community is considered the second-largest in Europe. Based on research carried out by C. Pallini for the EU-funded project Modscapes and ongoing work by D. Bose for his MA thesis, this paper explores the settlement patterns of the Sikhs, arguing that their settlement might provide an asset for the future, taking into account the challenge of climate change.

Keywords: Sikh settlement; Pontine Plain; public space; urban-rural continuum; climate change.

1. INTRODUCTION (Punjab and the Pontine Plain present some similarities)

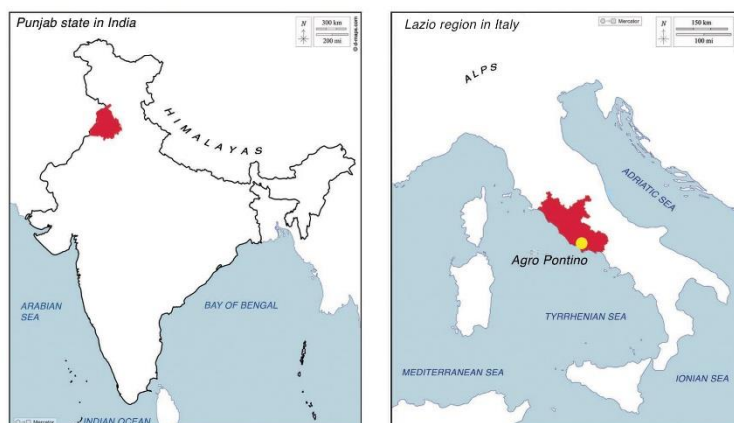


Figure 1. Punjab state in India and Agro Pontino in Lazio region (Italy)

Punjab is a region in northwestern India. Its name translates into “land of five rivers,” namely the Jhelum, Chenab, Ravi, Beas, and Sutlej, which belong to the Indus basin. These rivers, unsuitable for navigation, have been extensively used for irrigation, and many canals have been cut from them. Historically, Punjab has long served as a gateway to the West. The province gained autonomy in 1937. The separation of Pakistan from India in 1947 resulted in the division into East and West Punjab, with Hindu and Muslim minorities. This division led to violence and the mass movement of about 10 million people. In Indian Punjab, rural development took priority. To irrigate 370,000 acres, the multi-purpose Bhakra-Nangal project was implemented. By 1955, 677 miles of main and 3,958 miles of secondary canals had been built, leading to the irrigation of one million acres. Upon completion of the project, 6.5 million acres were reclaimed [1]. The landscape of Punjab continued

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to change during the Green Revolution of the 1960s, when mechanised pumps, fertilisers, and various high-yield crops brought about great agricultural prosperity and a dense framework of small and medium-sized villages linked by water networks. These dense Sikh villages sharing distinguishing physical connotations in the local language are called *pinds*. Scattered in the vast agricultural areas of Punjab, *pinds* are tightly packed settlements hosting from 1000 to 5000 people who cultivate small plots of land watered by canals and irrigation pipes. Some *pinds* have a Gurudwara temple associated with a sacred pond (*sarovar*). *Pinds* foster a strong community identity by often organising wrestling matches (*kushti*) in the traditional gymnasium (*akhara*). They are usually associated with a larger open space for seasonal fairs (*mela*) or the weekly vegetable market (*haat*). These open spaces are also multifunctional, used for sports like *kabaddi* (a contact team sport dating back to ancient India) and cricket. The houses, generally one to four stories high, can be made of mud and straw (*kutchra*) or designed to be solid and permanent (*pucca*). The roads may be metalled or unmetalled. *Pinds* have a specific Sikh or Punjabi genius loci with a celebratory, energetic and warm feeling connected with the agricultural land, ecology, cattle and community life. The festivals, food culture and dances like *Bhangra* and *Gidda* often create an intense experience of the Sikh countryside. The *pinds* are rich in art, culture, crafts and gastronomic delights, which usually find access to the urban population moving on the highways through traditional highway restaurants (*dhabas*).

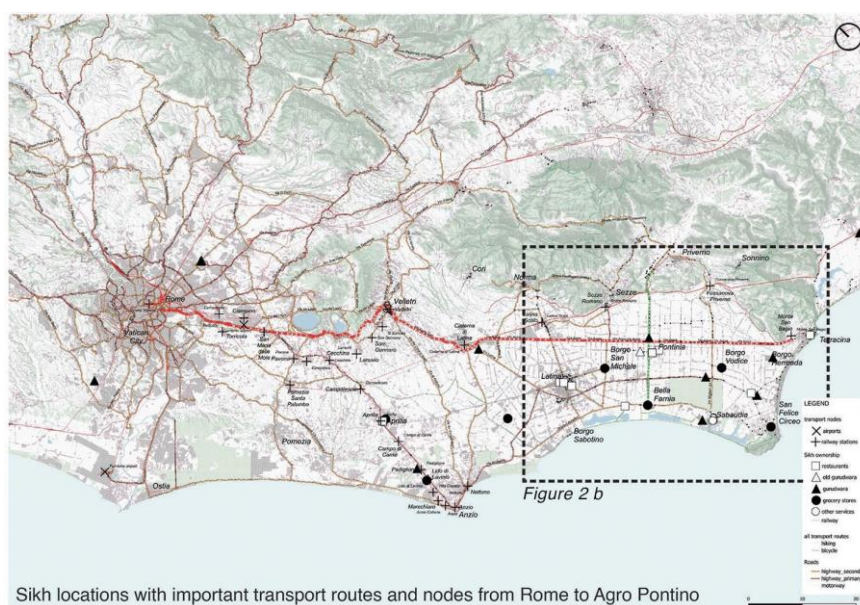


Figure 2a. Locations of Sikh owned public facilities in relation with transport routes and nodes from Rome to Agro Pontino

The Pontine Plain, stretching southeast of Rome between the Lepini Mountains and a belt of coastal dunes, underwent similar changes a few decades earlier. Attempts at its drainage date back to the Romans and were repeated various times without much success. Countless travellers described the Pontine Marshes as alternating swamps with thick woods and dry areas, populated by hunters, harvesters, herds of cows, buffaloes, and sheep or planted with wheat and maize. The region was a pestilential place of torment in the heat of summer, but it became a sea of flowers in May and June. The Appian Way in ruins provided an open-air museum for lovers of antiquity. Reclamation was finally achieved under the Fascist government between 1930 and 1934, resulting in a modernist rural landscape featuring three new towns — Littoria (1932), Sabaudia (1933), and Pontinia (1935) — and a system of rural service villages hinged on a new road network [2]. Most settlers came from the then-poor and overcrowded regions of Veneto, Friuli, and Emilia. They received arable land, a house with

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stables, animals, and tools. Their debt was to be gradually paid off by transferring agricultural production to the state. Newly established villages initially acted as logistic centres for reclamation workers and later as connecting centres between the various farms. They comprised a school, a small church, storage, shops, and offices providing for the settler's needs. Many scholars from various disciplines, particularly architecture and town planning, have repeatedly extolled the resulting built environment, combining classicism, rationalism or even picturesque [3]. After the Second World War, when the Pontine Plain was integrated into the areas supported by the Development Fund for the South of Italy (Cassa del Mezzogiorno) [4], considerable labour availability favoured the establishment of chemical, food, and pharmaceutical industries which, in the 1970s and 1980s, attracted many immigrants, mainly from Abruzzo, Campania, and Sicily. In the early 1980s, the first Sikhs turned the Pontine Plain into an international demo-sociological case study. Sikhs settled in the Pontine Plain because of its agricultural character, similar to their places of origin in India. Sikhs are a religious group that broke away from Hinduism in Punjab in the late 15th century, following Gurū Nānak. They are the predominant ethno-religious group in Punjab. Since the late 19th century, many emigrated to Western countries, primarily the United States, Canada, Australia, New Zealand, and the United Kingdom. Sikhism gained momentum during India's general awakening, accounting for millions of followers worldwide. Their skills in agriculture made it easier for them to find an occupation, which also explains why they chose to migrate to a rural area rather than a city [2].

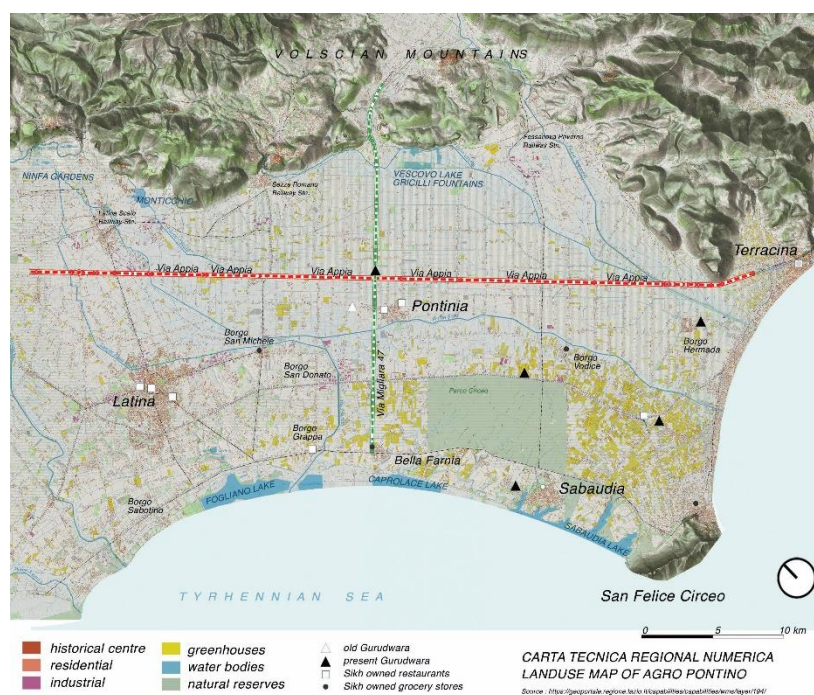


Figure 2b. Sikh Gurudwaras and other facilities on Regional technical landuse map (CTRN) (WMS metadata source : <https://geoportale.regione.lazio.it/capabilities/capabilities/wms/layer/959/>)

In the eyes of the Sikhs, the flat Pontine Plain resembles Punjab's agricultural landscape with year-round crops, small settlements, and an extensive canal system. Somehow, the presence of the Volscian mountains reminds the Shiwalik Himalayas rising above the northern edges of Punjab. The settlement pattern of the Pontine Plain features three towns — Latina, Pontinia, Sabaudia — and a regular grid of roads (Migliare) is similar to the territorial grid surrounding Chandigarh. When planning the capital of Punjab, Le Corbusier was very careful to frame fine views of the Shiwalik mountains as a backdrop to the flat lake. Similarly, Pontinia's and Sabaudia's main roads frame the views of the mountains which Sikhs crossing the plain perceive on a daily basis.

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2. THE SIKH PRESENCE IN THE PONTINE PLAIN

Currently, Italy has the second-largest concentration of Sikhs after the UK. They arrived in the 1980s, settling in the Po Valley in northern Italy and the Pontine Plain south of Rome. Since the very beginning, when their extensive migration was partly due to political reasons, they were looking for work in the agricultural sector. Afterwards, their migration was also influenced by increasing globalisation trends: Punjab's overpopulation was somewhat complementary to depopulation in Italy despite a prosperous agricultural sector.

In the 1980s, the number of Sikhs in the Pontine Plain soon rose to 7,000, mainly in Aprilia, Cisterna, Pontinia, Sabaudia, Terracina, and Fondi. In the 1980s, Sikhs concentrated in Bella Farnia (Latina), which they called *pind* (village) or "Little India." There they found a refuge upon arrival, a haven in an unfamiliar land, and a place to establish new roots.

Bella Farnia is a hamlet (*frazione*) of Sabaudia spread over 0.85 km². The 2011 census registered a population of 1002 people, doubling from 458 in 2001. According to the 2013 registry data of Sabaudia municipality, 86% of the population of Bella Farnia were Indians (Sikhs) [5].

The housing complex of Bella Farnia Mare, derived from a parcelling plan started in the early 1980s and never fully completed, hosts the largest concentration of Indian immigrants in the Pontine Plain. This complex, particularly the plots where single villas were built, is still partly owned by Italians. The remaining parcels belong to the Sikh community which is bringing the neighborhood back to life.

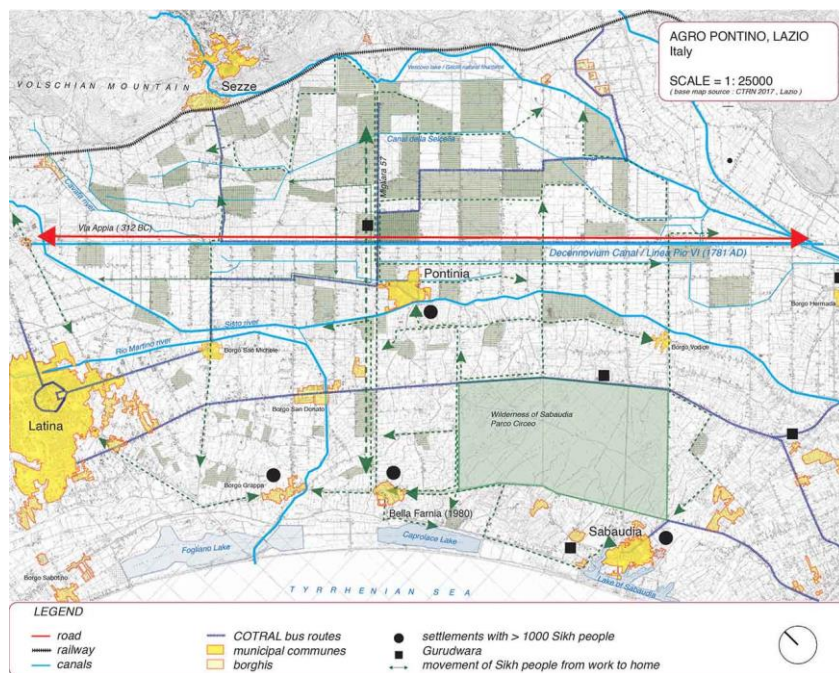


Figure 3 a. Sikh locations and movement patterns in Agro Pontino

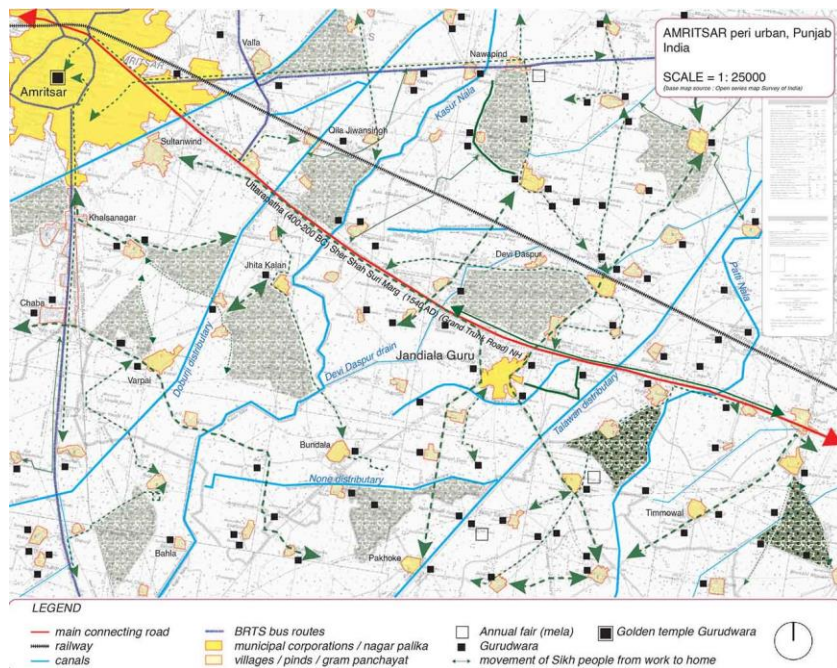


Figure 3 b. Sikh locations and movement patterns in Punjab, India

Bella Farnia is located in a privileged landscape position between Fogliano and Caprolace Lakes near Circeo National Park, just 3.5 km away from the sea. It was initially designed as a seaside resort featuring various types of houses. Unfortunately, most of the houses were not sold and remained unoccupied. However, the low cost of rental and purchase made it an attractive economic opportunity for the Sikhs who arrived in the 1980s. This was just when the Bella Farnia Mare project had failed. Bella Farnia Mare shows the clash between the rural economy and tourism, with income and the market being the deciding factor. As per Sabaudia's registry data, the Sikhs occupied the smaller villas, which are two to three floors, with a utilisation rate of 134% to 251%, which signifies a highly crowded living condition.

For about twenty years, however, the Sikh community has remained almost entirely unknown. Currently, they represent the Pontine Plain's first largest foreign community. According to ISTAT data, their numbers are second only to Romanians. They are more prosperous agriculture, manufacturing, and public service professionals.

Bella Farnia is now an entirely self-organised village where many Sikh Indians live. More recently, many families moved to the smaller (former) rural service villages like Borgo Grappa and San Donato. Borgo Grappa was established in 1929 for workers constructing the Littoral road. San Donato was built at the intersection of two reclamation roads between 1933 and 1934.

The number of Sikhs is ever-increasing as more younger men find stable employment in agriculture while the elderly try to set up their small businesses after working as farmers for ten or twenty years. Sikh men tend to a specific economic cycle: they accumulate capital and skills, start a family, and transition to other activities. Yet, when individuals and communities purchase commercial and residential land, it reflects their capital accumulation. This is especially evident when they buy properties for business purposes, such as restaurants. Sikhs are becoming increasingly visible in both the social and cultural spheres and residential and commercial land use. They organise Sikh festivals and celebrate the birthday of Gurū Nānak and Baisakhi, the Sikh New Year. Most recently, the community purchased land for building a Gurudwara temple, which welcomes all visitors as long as they cover their heads. Elsewhere, the gurdwaras have proven essential for diasporic consciousness and cultural production, allowing Sikhs to move beyond the initial stages of invisibility [6]. Despite these social and economic changes, territorial policies remain stagnant [2].

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Sikh migrants manifested and moulded their cultural identity by adapting to the Pontine landscape while creating a community of amiable, diligent, selfless, and peaceful caretakers of the land. Statistical data show that their connection with the former new towns and service villages is vital, [7] As of 2022, the population of Latina was 127,719, showing a decline of 0.11% from the previous year [8]. According to the latest ISTAT data, 55,446 foreigners have registered in the province of Latina. In 2023, 12,030 new arrivals were recorded, making up 9.4% of the total population. Of the total number of foreign arrivals in Latina province in 2023, 11.9% were Indians, mainly Sikhs. They comprised 964 males and 465 females who arrived in 2023 [9]. After settling in the Pontine Plain, Sikhs try to obtain Italian citizenship. Since many have already acquired it, the foreigners' figures do not represent the Sikh community. In 2021, 1364 Sikhs got Italian citizenship, accounting for 11.85% of the foreign population and 1.07% of the total population in the Latina province, including Pontinia, Sabaudia, Terracina and the entire plain [10]. The official figures report 30,000 Sikhs in the Pontine Plain, but the exact number is estimated to be significantly higher. Out of them, 12,000 reside in Sabaudia [2].

Anyone reaching Latina, much less Pontinia or Sabaudia, realises that the new towns built by Mussolini in the 1930s have changed and expanded well beyond their original layout. Yet, the countryside is still characterised by many distinguishing features acquired over time.

The Appian Way runs parallel to the Linea Canal, perpendicular to a regular system of roads and drains (*migliare*) set one mile apart. This grid forms the backbone of the territorial palimpsests established in the late 18th century and extended in the 1930s.

Over the last decades, Sikhs have navigated this territorial palimpsest. Initially, they were considered a community "of arms" (*di sole braccia*). As their population increased and settled, their "arms" have contributed to re-shaping the region.

Primarily concentrated in the rural service villages around Pontinia, Latina, and Sabaudia, The Sikhs utilised existing farms and greenhouses for their daily activities, including work and leisure. Exploring their living and working practices, we realise the importance of ecological artefacts that serve as the primary connection between people and their natural surroundings. These artefacts play an essential role in the migration history of a community trying to find meaning and a sense of belonging in a foreign territory. Every day, they leave their imprints, which can be difficult to express using urban design or territorial mapping tools. This kind of resignification of the territory goes well beyond the rural-urban dichotomy, showing that taking roots for a foreign community may be embedded in a natural and rural environment.

3. GLOBAL COUNTRYSIDE AS A SPACE OF NEGOTIATION

Sikh migrants generated new settlement patterns in the Pontine Plain, involving negotiation processes, which the globalisation literature may partly explain. Geographer Michael Woods coined the term "global countryside" to highlight the interconnectedness of rural areas worldwide where primary and secondary economic activities are centred around producing and transporting agricultural products to consumers, often through extensive commodity networks, which are also essential for those who live and work in the rural areas concerned. Somehow, migration and globalisation are rooted in the complexities of the global countryside, yet the effects of globalisation on rural areas may vary significantly from region to region [11]. The global countryside is rapidly changing, especially in India, where over 60% of the population is rural (Punjab has a rural population of 62%). A more anthropological approach can also help understand how Sikhs viewed (and view) their presence in a new territory. Identity plays a crucial role in a globalised world, particularly for migrating diaspora communities who seek to define their citizenship and sense of belonging in a complex and heterogeneous context. According to anthropologist Arjun Appadurai, migrant communities live in the tension between cultural homogenisation and cultural heterogenisation, fearing cultural absorption, mainly when arriving in a well-established territory [12]. In the case of

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Sikhs, they have to deal not only with a country extremely rich in history and heritage like Italy but also with the solid modernist imprint embedded in the towns and villages of the Pontine Plain.

The Pontine Plain has experienced multiple waves of migration from other regions of Italy. However, Sikhs, who have migrated from a distant region and have a culture that is very different from any Mediterranean culture, have found it more critical to maintain homogeneity among themselves. This has resulted in fewer opportunities for integration.

In the public Italian discourse in mass media at a local and national level, Sikhs are generally considered a supportive and cohesive community of excellent and pacific workers immersed in a religious dimension of life [13]. Even if in the Indian subcontinent, Sikhs have lived in conflict and religious tension for over four centuries, in the Pontine Plain, they have maintained the image of a peaceful, hardworking, friendly and open community accepting the hardships of daily work in the fields. The memory of Mahatma Gandhi and his life based on “non-violence” and of Mother Teresa’s actions foster the definition of a positive and homogeneous community, where internal religious and cultural distinctions are played down [13].

As the Sikhs first established themselves economically and later built their community while negotiating with Italian partners, they created a new settlement pattern regarding physical and social infrastructure. Weber sought a city that combined conditions and dynamics, forcing residents and leaders into creative, innovative responses and adaptations [14]. These adaptations occur on both sides, the Sikh community and the Italian administration, resulting in a certain degree of embeddedness of all people on the territory, adding the human factor to the traditional physical layers of hydrology, ecology, and built environment. Instead, embeddedness is in particular conditions, opportunities, constraints, needs, interactions, contestations, and interests [15].

4. MAPPING SIKH CITY IN THE MAKING

Specific aspects of this trans-continental rural-urban and urban-rural migration between Punjab and Agro Pontino deserve our attention. The phrase “Sikh City” in the title of this paper refers to the areas where Sikhs reside and work, as well as the broader set of reference points that demonstrate a novel approach to living in the plain through negotiation and a unique way of practising the Pontine landscape. The subsequent arrival of Sikh migrant farmers and their consolidation into a community helped them establish themselves as Italian citizens, opening up new opportunities for land ownership and use of agricultural land.

News reports and discussions with local people show a persisting degree of invisibility of Sikh migrants. The first generation tended to live “encapsulated” in the community, at least in everyday social and working life. Italians perceived this behaviour as a non-threatening sign that the newcomers were devoted to hard work and spiritual life [13]. However, this invisibility should not be mistaken for complete obscurity but rather a visibility within the community. When travelling by bus from Latina to Pontinia or waiting at the railway stations of Latina Scalo, Sezze, and Priveno, or taking a walk in Pontinia we come across Sikh men with a turban and their families in Indian clothes, occupied with their daily activities. Sikhs become visible in public spaces during special occasions, such as Vaisakhi celebrations and Nagar Kirtan [13]. Driving along the Migliare roads, one can see the daily commute of Sikh men biking long distances from their homes in locations like Bella Farnia to the northeast of the plain, where most fields and farms are located. They move from the higher southwestern areas along the Fiume Sisto river, geologically called the “marine terraces”, about 12-30 metres above sea level, towards the lowland lying 1 to 2 metres below sea level, corresponding to the permanent swamp of the Pontine Marshes. Bella Farnia is a place commonly known as “Little India” as indicated by a road sign, while locals refer to it as *pind*. The densely populated area is characterized by the strategic use of public spaces for playing cricket or taking a stroll after a long day of work in the fields, reminiscent of a typical village in Punjab. At Bella Farnia the ‘*pind*’ translates in physical terms, with high-density living, using open areas for sports and owning

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restaurant business as well as in intangible terms of identity, community, celebration and belongingness.

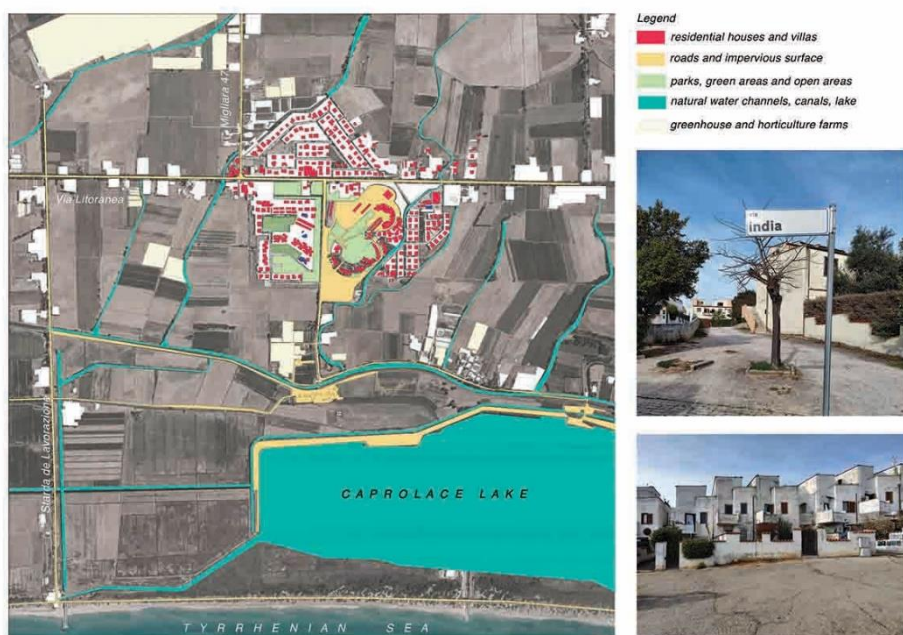


Figure 4. Map of Bella Farnia **Figure 4a.** Street named “Via India” at the central core of Bella Farnia **Figure 4b.** houses used by Sikhs as residential buildings in Bella Farnia

Using GIS statistical and analytical cartography, we tried to map how these dynamics impacted the territory and how the former new towns and service villages are evolving. Over the last 10 years, the land-use change in Italy has been mapped using CLC (CORINE Land Cover) which shows some land-use changes in the Pontine Plain from 1990 to 2012.

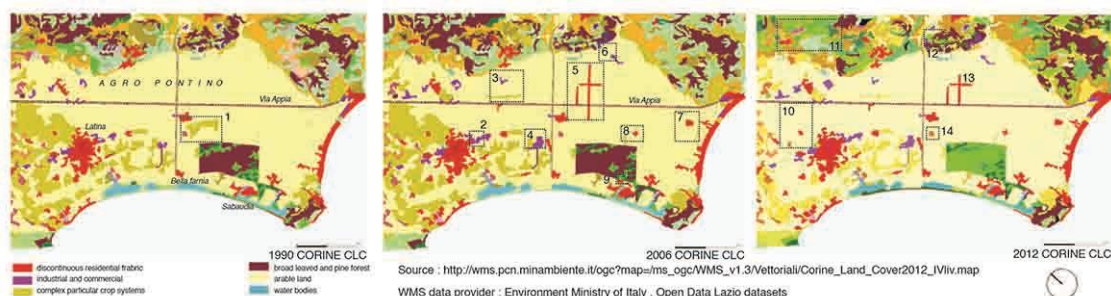


Figure 5. CORINE CLC land use classification from 1990 to 2012.

We can synthesise the following observations :

1. complex crop system along fiume Sisto near Pontinia disappears from 1990-2006;
2. discontinuous residential fabric fuses with industrial landuse in Eastern part of Latina city;
3. new industrial area near Sezze Romano railway station is visible with a new complex crop system towards Via Appia;
4. Borgo San Donato industrial area expands with new discontinuous residential fabric;
5. a new linear discontinuous residential fabric is visible at Via Migliara 50 x Strada del Quartaccio junction that is a unit Migliara segment North of Messa/Ad Media Roman ruins on Via Appia;
6. Mazzocchio I and Mazzocchio II industrial areas are visible near Fossanova railway station;

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7. Borgo Hermada shows up as a discontinuous residential fabric along with a strip of complex crop system;
8. Borgo Vodice shows up as discontinuous residential fabric;
9. discontinuous residential fabric of Sabaudia expands North Eastward towards Parco Circeo
10. complex crop system landuse, North of Latina disappears to be replaced by arable land;
11. broad leaved trees and pine forests in Volscian mountains between Sermonetta, Bassiano and Sezze disappear;
12. broad leaves forests increase at the foothills of mountains near Ceriara and Priverno;
13. discontinuous residential fabric at the Via Migliara 50x Strada del Quartaccio junction shrinks;
14. a new vineyard shows up South West of Pontinia;

The OSM service mapping on GIS for popular public services was also used to map amenities owned by Sikhs. The time travel plugin of QGIS was used to generate isochrones maps for 30 minutes bicycle path from important travel zones and 30 minutes pedestrian accessibility zone for Bella Farnia. On-the-spot investigation and interviews with Sikhs and local stakeholders, however, were equally fundamental. Cross-referencing these data shows that the Sikhs found a new way to inhabit the plain beyond the rural-urban dichotomy. Moving daily between the fields and the villages of the plain, they established relationships with Italians and other migrants. While using existing facilities, they also identified new reference points based on the symbolism they attach to physical features. These reference points involve territorial artefacts such as the Appian Way, Fascist landmarks such as piazza, water towers (pani tanki), church as girja (Punjabi), water bodies and water-pumping plants, gardens and groves. Some reference points are fixed, while others, such as the Gurudwara, move over time. The relationship between topography and mobility infrastructure explains the selection of sites for the Gurudwara.

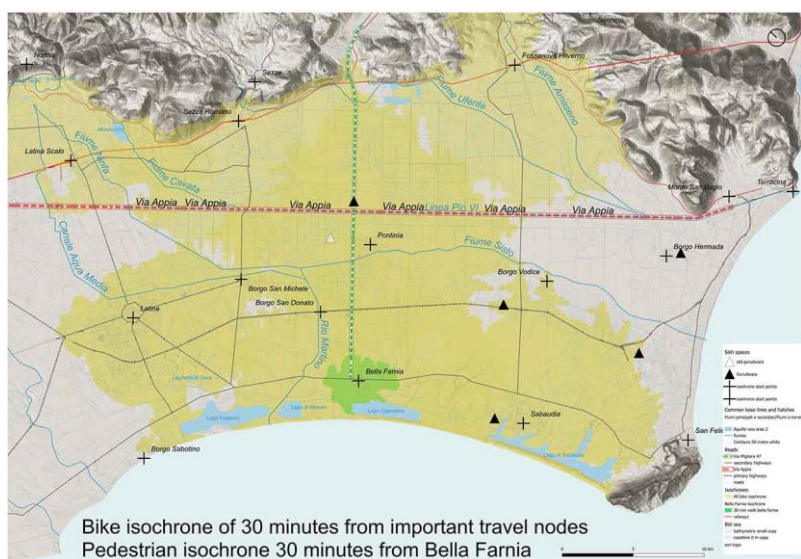


Figure 6a. GIS analytical cartography of isochrones of 30 minutes showing accessibility by bike (in yellow) from main transport nodes and by walking (in green) from Bella Farnia

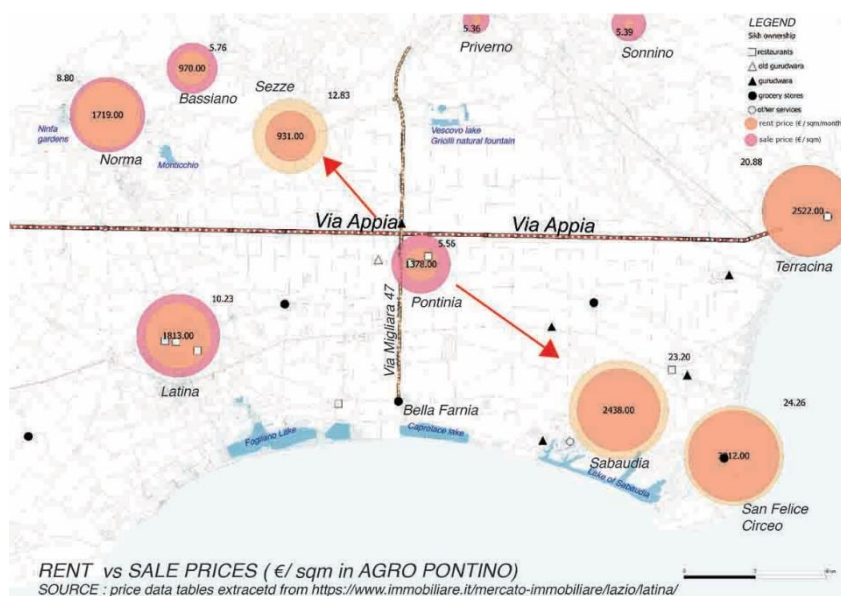


Figure 6b. GIS statistical cartography of property renting and sale prices for the year 2023 as extracted from real estate website : <https://www.immobiliare.it/mercato-immobiliare/lazio/latina/>

The presence of the Gurudwara is related to the lowest sale price in Pontinia as compared to Latina, Sabaudia and Terracina. We compared the property prices around Agro Pontino from a popular real estate company website "immobiliare.it" and mapped on GIS. At the same time, we observed that, Sabaudia and Sezze has a comparative sale price lower than comparative rent price . The presence of a highest number of Sikhs in Pontinia and a new Gurudwara which the Sikhs community built after buying the existing property near Via Appia and Via Migliara 47 junction corresponds with the property price mapping.

4.1 The Gurudwara as a genius loci

Since the 1980s, subsequent waves of Sikhs travelled over 6,000 km from Punjab to reach Italy, bringing knowledge of their homeland and establishing new social networks while working and expanding their families in Italy. In this process, many individuals became heads of a family and set up a business, thus creating a new social body evolving in the space. Until the end of the 1990s, Sikh migration remained predominantly male [6]. Gurudwaras initially emerged as spaces of male hierarchical sociability, where unique power relations within and beyond the community were negotiated and contested [6].

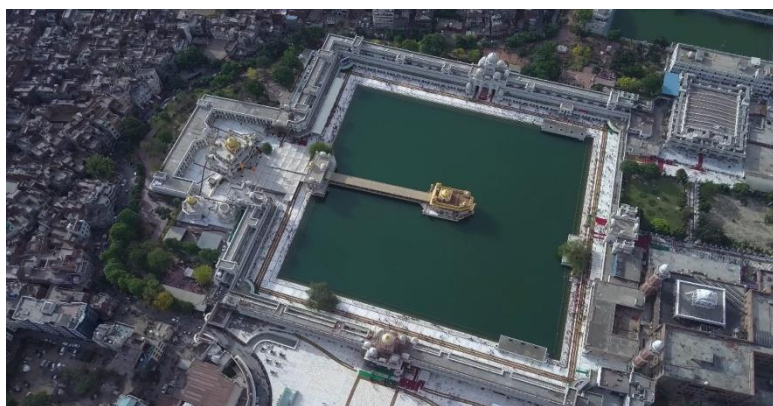


Figure 7. Golden Temple in Amritsar, India, the most sacred Gurudwara temple for Sikhs
 (Source : https://commons.wikimedia.org/wiki/File:Golden_temple_aerial_shot_in_Amritsar.jpg)

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The Sikh identity remains with each migrant not only through his beliefs and ideals but also his work ethic and decisions regarding marriage and family, which later helps him build a Sikh community centred around shared well-being and work-related networks, many of them centred around the Gurudwara. As in their homeland, Gurudwaras are conceived as sites of spirituality and for transmitting Sikh principles, yet they also contribute to enhancing community wellbeing and development [6]. The working Sikh youth, the Sikh man with a family, the Sikh wife, an elderly Sikh lady, or the Sikh children, everyone finds a relational genius loci from their deterritorialised context in the space of the Gurudwara which initially hides its form in old warehouses, but later takes shape out of dedicated space in the countryside surrounded by agricultural fields, negotiating with Appian Way and Migliara 47 and creating microcosm landscape around it.

The earlier Gurudwara and Gurughar (smaller versions of Gurudwara) were located in warehouses between Latina and Sabaudia. They changed their place, until the Sikhs pooled money to buy a land near the intersection of Via Appia and Via Migliara 47 for a permanent Gurudwara. The new location is surrounded by a row of villas along the Migliara and one can see the canopy pines of Via Appia extending across to the horizon. The Gurudwara is surrounded by a vastness of green agricultural field. It has its own parking space for cars, garden, a small water body (nascent *sarovar*), kitchen, dining (for *langar*) and praying hall that doubles as a community gathering and school for Sikh children to learn their native language Gurmukhi.



Figure 8. Gurudwaras in Borgo Hermada, near Borgo Vodice and in Terracina in Agro Pontino

The openness around the Gurudwara and its direct contact with the agricultural fields and landscape around is unique and lets the tired Sikh workers find spiritual peace and community support on Sundays. It is also the place where Sikh women come with their children and organize various cultural events.

The Gurudwara as a new location of socialization and land ownership is starkly different from the historic center of Pontinia, where the view and landscape is framed and controlled by the axes, material and monumentality of the planners of ONC.

4.2 Nagar Kirtan (processional parades)

The largely invisible Sikh community working hard in farms and greenhouses find sporadic visibility during their festivals, such as the birthday of Gurū Nānak (*Guruparb*) and Gurū Gobind, the first and tenth Gurūs of Sikhs celebrated with great enthusiasm. The Sikh New Year *Baisakhi* in mid-April is also a time of community congregation and celebration. These festivals are an occasion for Sikhs to organise processional parades around Pontinia called the Nagar Kirtan. *Nagar* means town, and *Kirtan* means singing divine hymns of the Gurū. The *Nagar Kirtan* is often associated with an initiation by *Prabhat pheri* (morning rounds) by a smaller group of Sikhs. Later in the day, the Nagar

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kirtan is a grander form of celebration. During *Nagar Kirtan*, Sikh men carry their holy book Gurū Granth Sahib, an embodiment of their living Gurū in a vehicle tableau. The procession is led by holy men or priests dressed in saffron or blue, often carrying *khanda* (swords) that mark the valour of the Sikh community. The procession is followed by all Sikh people, men, women and children. Some of them perform martial arts and *gatka*. The mayors of Pontinia, Latina, Sabaudia and local Italians also attend the festivals, which have now become a significant cultural event for Agro Pontino. The interaction with global networks may transform traditional practices and systems, but the result is frequently not standardisation but the production of ‘localised hybridity’ [16]. Some years the Nagar Kirtan procession reaches one km of colourful people singing hymns and expressing their happiness. They generally start at the respective Gurudwara and continue to the nearest Piazza at the centre of Pontinia and Sabaudia. Significantly, the Nagar Kirtan originates in a Sikh gurudwara in the countryside and terminates in a 1930s Italian square. This mobile genius locus is notable in its ephemeral process that takes the primary votive artefact of a Gurudwara along a mobility infrastructure to the centre of a modernist urban artefact, the main square of Pontinia. In this process, which might last four to six hours following a certain route, the spatial dynamics of the people might vary with changing cultural activities like hymns, slogans, music, and martial arts. Towards the end, people greet each other on reaching the square, and spend leisure time, often accompanied by a community food service or ‘*langar*.’

4.3 ‘Langar’ Community Kitchen and ‘Bhangra’ Dance

The langar, as one of the important Sikh social activities, has a direct relationship with the Sikh agricultural history, which finds easy continuity in the Pontine Plain. *Langar* is a community kitchen associated with permanence in a Gurudwara and ephemerality in the case of Sikh religious festivals. The Golden Temple in Amritsar has the world’s largest community kitchen, serving over 50,000 meals daily. The Gurudwara on the outskirts of Pontinia, Sabaudia, and Terracina all have an attached community kitchen facility for language service. The langar services in the Gurudwaras are periodic, unlike the Golden temple’s daily services. During the langar service, first the vegetables and cooking ingredients are brought and stored. Then, through volunteer Sikh men and women, the food items are washed and prepared in the Gurudwara premises as a collective activity. Then, the food is cooked in large pots. The food items are always lacto-vegetarian as per the Sikh religious principles. The principle of preparing langar food with the community is called *sewa* or selfless service. Later, the prepared food is served to everyone as they sit on the floor in rows and respectfully consume it. The langar breaks social barriers and provides a socio-religious platform promoting the equality of all humans. Langars are open to all religious faiths and all social classes. As a community kitchen, the langar is also served in temporary structures during festivals in urban centres when the Sikhs mobilise their volunteers to provide food. This creates a social and spatial unit among travelling Sikhs who link agricultural produce and food service in both the city centre and the countryside.

The Sikhs in Agro Pontino are also active in preserving and promoting their traditional dance, *Bhangra*. They formed the Sikh dance company Bhangra Boys and performed across dance festivals in Italy. Bhangra is a dance originating from the Sikh countryside in Punjab and has diverse themes related to love, life, friendship, family, valour, and patriotism. The Bhangra Boys in Agro Pontino performed at festivals in Latina and Festival dell’Oriente in North Italy. They also organise dance workshops for everyone. *Bhangra* is used as a tactical tool to showcase Sikh culture and use different spaces in the city and countryside to mark the presence of Sikh identity.

4.4 Planting Trees to make Sikh Sacred Groves in a public park

Sikhism embodies a considerable amount of reference and reverence to nature, mostly depicted in the hymns and verses of their holy book the Gurū Granth Sahib. They have a memory of sacred and monumental trees spread across the landscape of Punjab where the Gurūs gave sermons. There are

14 species of trees mentioned in their Holy Book, like Mango, Neem, Date palm, Berries, and Sandalwood. It is considered a sacred act (daan) to donate and plant trees. In 2020 the Sikhs donated 550 trees to mark the 550th birth anniversary of Gurū Nānak. It was part of the global Eco Sikh project that has targeted climate change through ecological stewardship by planting 1 million trees around the world. The Parco San Marco, Piazza Alpi, and green areas near Cepla cooperative in Viale Le Corbusier. Green Oasis Susetta Guerrini in Latina was the location where the trees were planted. The Sentiero Gurū Nānak was part of this landscape project carried out with the Latina Municipality and the studio Sand and Birch.

These ecological tools for a sustainable future used by the Sikhs are not only physical infrastructure but hold spiritual and cultural meaning for belongingness in the Pontine Plain. They bring a new ecological genius loci embedded in the culture and spiritual tradition of Sikhs creating new openings in the fascist urban plan of Latina.

CONCLUSION

When we refer to Sikh City as opposed to Latina, we evoke precisely this bottom-up process which is singular and universal simultaneously. Aldo Rossi considered the “*centro storico*” as the genius loci of Italian cities. The cities of the Pontine Plain share a similar character, originally dictated by the central state, and following a similar programme. According to ONC official Ugo Todaro (1937), the embryo of a reclamation town was to be a square with a mountain or sea view, big enough to accommodate the population of the entire municipal area. Architects were to create a scenic effect and a stylistic code in the first geometric void, where there should be no lack of state-sponsored buildings representing the social order enforced by the new political course.

Victor Turner, a British cultural anthropologist, believed that transitions between times, statuses, and places were experiences that created meaning [17]. The life journey of the Sikh man adds meaning to the territory through the networks and agencies he builds during his lifetime, which can range from community brotherhood to friendship, family, employer relationships, and business partners. This process transforms a migrant individual into a member of a community and an agent of territorial change. Using Gurudwara as travelling genius loci both from their place of origin to the Pontine Plain and around different locations in the plain, the Sikhs took root overcoming their deterritorialised condition. In the Pontine Plain, the Sikh presence has brought back the emphasis on the identity traits of the countryside rather than the cities, thus picking up the thread of a very long history to build a possible future.

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Chronicle of peri-urban (mis)governance: values and defense of the territory vs. governance vacuum and institutional incompetence. The case of the *Vega Sur* of Granada (Spain).

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Extended abstract

It begins with an explanation of the Spanish case in terms of governance and participation, outlining the reasons for an unequal culture of urban planning as a venue for collaborative decision making. This structural imbalance is related to the territories' centrality and urbanity, as well as the transfer of urban planning powers to the autonomous regions. This implies a significant difference between the various regions of the state in terms of democratic principles regarded to be necessary in the planning processes.

Granada is an example of contemporary metropolitan construction, with half a million inhabitants distributed in more than thirty functionally dependent municipalities. The geographical support is a geographical depression of the Quaternary period, vertebrate by the Genil river basin, and that originated an agricultural area of exceptional environmental, historical, and ethnological value, from the Roman and Arab times, through the flourishing of the early twentieth century and current role. All this forms a central identity landscape to understand today the whole territory of "the extended Granada". The urbanization pressure of the second half of the 20th century, the increasing metropolitan mobility, and the lack of control of the administrations of these growths by polarization, have been segmenting the agrological matrix that today is more threatened and fragile than ever. The safeguarding initiatives of civil society, very meritorious and intense in recent decades, contrasts with urban development projects of all kinds -most of municipal initiative-, which fall on the peri urban space without transparent or participatory processes. The intermunicipal situation of this territory is the perfect excuse for the neglect in its management and planning, unprotecting its watercourses, its historical paths and its special areas such as the *Vega Sur*, which are increasingly abandoned and disconnected from the urban and geographical support to which they have always been linked.

The presentation will try to expose the current situation, drawing the diagram of a territorial (dis)governance that only has civil society as an actor aware of its special landscape value and economic potential in an essential scenario of greater sustainability and the fight against climate change. The conclusions will be drawn from the contrast between this reality and certain positive examples of the area itself and other experiences in assimilable peri-urban spaces in other contexts, such as the case of *Els Rajolars*, in Oliva (Valencia), within the framework of the European architecture competition *European 15* and its subsequent implementation.

Keywords: *governance; public participation; urban planning; peri-urban space; landscape*

(Mis)Using Urban Design Governance as an identity building instrument – the case of Tirana

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Extended abstract

Urban design governance makes use of acupunctural interventions as means and processes of designing the built environment. The focus of this method, in particular, is on the quick and effective use of the so called “soft powers” and “allied financial mechanisms” to influence design quality and political impact, with the latter being particularly inclined towards confined scales of intervention due to the limited time and resources of each political mandate.

This article traces the scope, and confronts the effectiveness of the approach vis-a-vis other formal and informal (non-regulatory) urban governance tools that governments, municipalities and others policy makers have at their disposal, taking Tirana as a case study.

The article places such tools within a critical analytical framework discussing the success factors for an effective urban design governance.

This article looks into the case of “Urban design governance” of Tirana as a city emerging from a communist past and eager to get itself a new (European) identity. The design practices adopted in this place-making process are closely examined paying particular attention to the participatory aspect and the extent to which citizen engagement is ensured.

Keywords: *Urban design governance, identity building instruments, Tirana*

Discussing the planning policy gap in the development of tall buildings in Greece

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Extended abstract

Nowadays tall or high-rise buildings have become a form of ‘urban habitat’ and not just a symbol of the city’s power. Their role as essential urban infrastructure comes increasingly to the forefront, as European policies for urban planning (such as compact city, 15-minute city, energy-efficient city, increased walkability) push to higher densities that are related to vertical urbanism. However, many European countries and cities (re)consider the development of tall buildings with more scepticism than in the past. Despite the fact that many cities, especially in the Northwestern Europe, have developed policies for interweaving tall buildings into the urban fabric, having taken into account the townscape, the skyline, the sightlines, vistas and views they often experienced a reaction against the construction of tall buildings. This reaction was mainly related to the conservation of historic urban centres and the city’s skyline as part of the cultural heritage and the urban landscape (cityscape). In addition to that, high-rise urbanism has aggregated spatial and social impacts on a) the city/metropolitan level and b) urban life, which are tended to be neglected by policy makers. For example, the fragmentation of cities into soaring towers may lead to the loss of any sense of neighbourhood context or community, create sharp disjunctions and a non-conscious urban space. Taking into account that individuals and institutions reclaim their built environment and put greater emphasis on sustainable development, the relationship of tall buildings with the human scale and the quality of life offered around and between tall buildings becomes an issue of crucial importance for successful city planning, public realm and creation of cohesive and attractive at eye-level cityscapes. These challenges become more urgent to be confronted within the Mediterranean European city, many of which have no or very limited policies regarding the development of high-rise buildings. In Greece the lack of policies for the allocation and development of tall buildings paves the way for radical urban and social transformations and highlights the need to formulate a comprehensive planning policy framework that addresses the challenges for the integration of tall buildings into the social and urban realm. Tall buildings developments are going to have both a sound impact on Greek city and neighbourhood level; in particular, on skyline, urban landscape, urban microclimate and social life. The current paper discusses the planning policy gap in Greece and gives implications for the formulation of an urban planning and design policy framework for tall buildings development.

Keywords: tall buildings; high-rise; planning policy; landscape; Greece

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Land Development and Urban Governance in Cyprus

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Extended abstract

As a particular geo-political mosaic, the Mediterranean region continues to be an important and intriguing context, functioning as a notional buffer or “transition zone” (Chiodelli, 2021) between the global North and South. It may be articulated as an epistemological terrain in which the *South and South-Eastern European* peripheral countries are able to be placed. It is also arguably an ideal territory for studying the complex interplay of informal and clientelist planning procedures and high homeownership rates that produce particular patterns of residential settlements (Allen et al., 2004; Leontidou, 1990). Furthermore, within this highly variegated region, lies the challenge of applying Western urban theory to societies with different socio-political systems. Specifically, the urbanisation processes in Cyprus make a particularly interesting case study in order to analyse the concepts of urbanisation in the region’s mixed geo-political, cultural and economic relations. This paper explores the notion of “territory based urban governance” (Schindler, 2015, p. 10) through the contextualisation of planning procedures related to the co-production and transformation of land in Cyprus.

The hybrid relationship between formal and informal practices in urban governance and social institutions have been fundamental in the parcellation and development of land for homeownership. The dominance of the private real estate sector, land speculation on the fringes of cities and the supporting role of an enabling/clientelist state, are brought into relief with the aim of contributing to critical urban theory in the wider European peripheral region. The methods used combine an analysis of theoretical papers, newspaper articles, housing and planning policy with empirical data of the morphological patterns and visual characteristics of the urban-rural continuum of Cyprus.

Key findings indicate that the relationship between clientelist and territory-based forms of urban governance have resulted in a patchwork of suburban (or peri-urban) environments characterised by the juxtaposition of oversupply of residential land and undersupply of affordable housing. Rather than outright formal planning policy, the combination of mechanisms for boosting land value, the historic evolution of clientelism and formal-informal interactions and negotiations that govern land development, have had a greater impact on the transformation of urbanizing areas.

Keywords: *South-Eastern Europe, urban governance, homeownership, planning, clientelism*

**CITIES IN TRANSITION: INNOVATIVE APPROACHES IN
SHAPING URBAN CULTURAL HERITAGE**

**CHANGING
CITIES**



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Organized and chaired by Assoc. Prof. Maria Grigoriadou

Assoc. Prof. Maria Grigoriadou, Department of Architecture, Democritus University of Thrace, Greece

Innovative reuse approaches of industrial building heritage: The case study of two tobacco warehouses in Kavala and Xanthi

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Extended abstract

Traditionally, heritage has been viewed as a “passive victim” of rapid urbanization, facing threats to its survival rather than being recognized for its potential to actively contribute to the sustainable development of cities. In addition to that, it is a fact that when cultural tangible heritage protection is not prioritized in agendas, “the availability of resources (economic, technical or human) allocated to conservation efforts may be compromised, which could result in neglect or abandonment of cultural assets”¹, despite the fact that cities could benefit from the protection of its heritage. It is well known that conserving historic buildings provides significant economic, cultural and social benefits.²

Within this context, it is necessary to redefine how cultural heritage nowadays is understood and which role could play for the city’s resilience. At that point, it is necessary to refer to the 2004 Agenda 21 for Culture, concerning the understanding of culture as a fundamental dimension in sustainable development, but also to the 2030 Agenda for Sustainable Development and in particular Target 11.4 concerning the efforts to protect and safeguard the world’s cultural heritage in order for making cities and human settlements inclusive, safe resilient and sustainable.

Moreover, the complexity surrounding heritage should therefore compel society to engage in its holistic management rather than to conserve only specific structures, as happened in the past.³

So, in this framework, and by having in mind on the one hand that “heritage is dynamic, as it links the past, the present and the future⁴” and on the other hand that heritage protects and enhances collective historical memory, the paper presents two recent research programs, concerning on the regeneration, revitalization and integration of architectural heritage of tobacco warehouses in the contemporary urban environment of three different cities of northern Greece: Drama, Kavala and Xanthi.

By analyzing two tobacco warehouses as case studies, the basic project aim was to include all the necessary stages - from documentation to restoration of good practices - in order for the buildings to be integrated into the urban fabric, as well as the whole socioeconomic city network.

Keywords: *cultural heritage; urban regeneration; urban resilience; tobacco warehouses; sustainability.*

¹ https://savingculturalheritage.eu/fileadmin/user_upload/Deliverables/ARCH_D7.2_GoodPractices.pdf

² Bullen & Love, the rhetoric of adaptive reuse or reality of demolition: Views for the field. *Cities*, 27 (4), p. 215-224

³ Managing cultural world heritage, United Nations Educational, Scientific and Cultural Organization (UNESCO) Resource Manual, 16-11-2013

⁴ Farida Shaheed 2011 report, https://www.agenda21culture.net/sites/default/files/report_7_-_cultural_heritage_sustainable_development_-_eng.pdf

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By the water: Looking at lakeside urban space formation

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Abstract

The proposed paper discusses the evolution and changes in time of the lakeside front of Lake Pamvotis in Ioannina in northwestern Greece, from the time of the creation of the lake until the present day. The current study examines the development of the lakeside area over time, its division into public and private areas and the reasons that led to this fragmentation. It presents the particular urban qualities of lakeside fronts and areas that have developed on the shores of lakes both in Greece and in neighbouring Balkan and European countries.

The evolution of the development of the city's lakefront is documented and studied, the causes that contributed to these changes are investigated and the possible future changes that may result from continuous human interventions are assessed. The boundary situation between the undeveloped natural landscape and the fragile lake ecosystem is examined and studied in relation to the built landscape of the lakeside urban fabric.

The phases of development of the urban fabric of the city and the location of individual activities in relation to Lake Pamvotis are studied. With regard to the lake, its topography and the catchment areas it contains are examined, as it is protected under European regulations.

For this research, historical data (maps, photographs, etc.) and studies that have been carried out over time for Lake Pamvotis are used. The form of the lake front, as influenced by mainly human interventions in four distinct periods, is studied.

The most significant changes in the lake front occur from 1959 onwards, when major technical flood protection works of the basin and land reclamation for the needs of agriculture and livestock farming in the area were carried out, which dramatically reduced the perimeter and the total area of the lake.

The rapid development of the city since 1980 and afterwards, as the city is the economic, cultural and administrative center of northwestern Greece, resulted in a large increase in the population of the city and the settlements along the lake. This, combined with the particular natural beauty of the lakeside area, has resulted in the development and creation of luxury housing, leisure and entertainment areas, sports and hotel facilities on the available areas of the city's lakeside front. In other words, there are urban qualities that are not found in other areas of the city.

The present paper approaches the development of the lakeside area as it has evolved to date, the residential development that has followed, and seeks and draws conclusions about the current form of the area in relation to the rest of the city's residential development.

Keywords: *urban qualities, lake, lakefront, Ioannina, Lake Pamvotis.*

1. INTRODUCTION

All major European cities have historically been located and developed in areas adjacent to rivers and lakes, because lakes and rivers provide a special environment for the development of cities and settlements. This occurs as they facilitate various human activities: they provide water for energy production and agricultural land for the production of food, and they also facilitate trade through transport.

The water quality of rivers and lakes deteriorated after the 19th century due to the increasing number of settlements that developed on their banks and industries that discharged untreated sewage. In addition, human interventions modified the river and lake banks due to urban development, the

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construction of facilities to serve the shipping industry and the construction of anti-flooding structures. [1]

The present study focuses on the evolution over time of the lake front of Lake Pamvotis, on the western shores where the city of Ioannina in Greece is developed. It divides the lakeside area into public and private areas, the reasons that led to this fragmentation, and presents the particular urban qualities of lakeside fronts and areas that have developed on the shores of lakes both in Greece and in neighbouring Balkan and European countries.

The evolution of the city's development in relation to Lake Pamvotis from the time of its creation to the present day is recorded and studied, and the possible future changes that may result from continuous human interventions are explored and assessed. The boundary situation between the undeveloped natural landscape and the sensitive lake ecosystem in relation to the built landscape of the lakeside urban fabric is examined and studied.

By studying examples of lakeside fronts in Greece, Europe and the Balkans, it was found that in all cases lakes are created due to the particular morphology of the terrain of a region, where a basin is surrounded by mountainous areas and at its lowest point the rainwater is "trapped" with no escape route. The selected lakes vary in size, but have several characteristics in common. After research and assessment, it is observed that the urban qualities identified and developed next to the ponds have some common characteristics not found in other urban environments.

In particular:

- Similar conditions are created for the urban development of settlements as, due to the mountainous terrain of these areas, there is limited space available for the expansion of urban borders.
- The lakes function as natural receptors of a network of streams with a high drainage capacity of rainwater, which erode the mountainous soils, carry away sediment and create siltation in the lake area and its banks, resulting in a change in both their capacity and their natural contours over time. The siltation reduces the capacity of the lakes and causes flooding of the lakeside areas. The land resulting from the siltation of lakes is also an attractive area for urban expansion.
- Areas around the lakes are used as agricultural land, due to the existence of water for their irrigation
- Human activities affect the sensitive ecosystems of the lakes (water pollution from waste, pesticides, etc.)
- Some cities include historic castles and settlements
- The special natural environment of the lakes' shoreline increases the demand for the creation of recreational areas for urban residents (creation of squares, parks, hiking and cycling trails, etc.)
- Tourism is growing and spaces are being targeted for the creation of tourist facilities
- Lakes are usually home to a large number of rare plants and birds and many other living organisms and are therefore protected areas under European regulations.

2. HISTORICAL DEVELOPMENT OF THE LAKESIDE FRONT OF THE LAKE PAMVOTIS

In the following chapter the development of the lakeside front of the Lake Pamvotis in Ioannina is recorded, categorized and described in various periods of time. The selection of the periods was based on the main human interventions on the lake front, which led to its present form.

2.1 First period: From the creation of the lake to 1900

Ecological balance established in Lake Pamvotis

Lake Pamvotis is considered one of the oldest lakes in the world and its age is estimated at about 7 million years. [2]

Lake Pamvotis in the area of Perama communicated through a narrow strip of water with the adjacent Lake Lapsista. Lake Lapsista occupied an area of 40 km² and had a depth of 1-3m. [3], while Lake Pamvotis covered an area of 23.8 km² [4] and had a maximum depth of 8m. [5]. The two lakes formed a single network of lakes and, through the sinkholes at Rodotopi, the lake ecosystem communicated with the river Kalamas and the sea and for centuries ensured the flood protection of the basin.

On the southeastern side of the lake are the areas that were flooded and through other sinkholes were drained to the Louros River. [4, 5]

During this period, the lakeside front had a longer length, while the urban fabric of the city of Ioannina is in contact with the lakeside front only in the area of the historic castle of Ioannina.

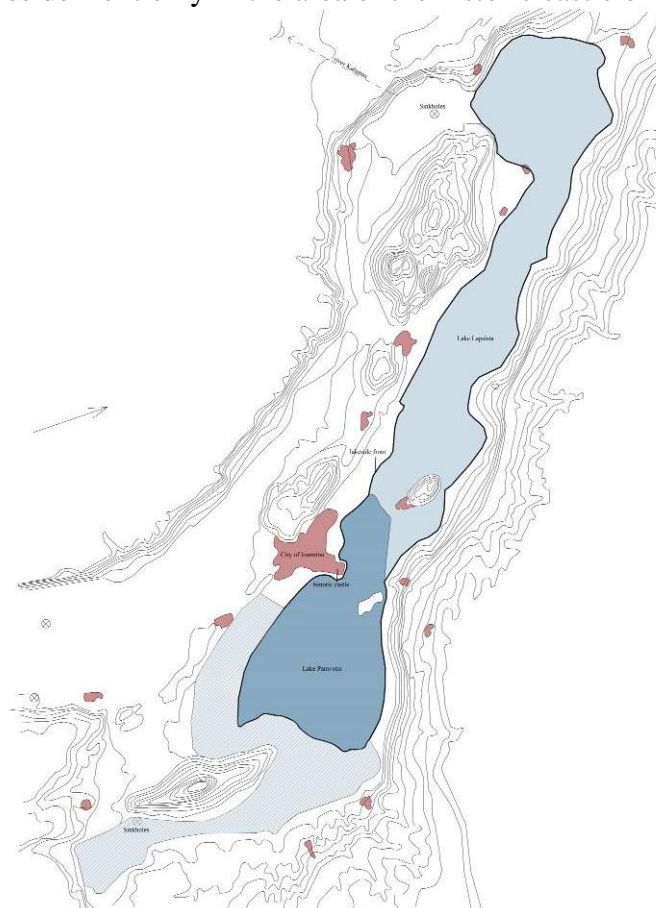


Figure 39. The original shape of the lake front of Lake Pamvotis and Lake Lapsista, as well as the areas on the southeastern side of the basin that were flooded.

2.2 Second period: From 1900 to 1959

During this period, the mild utilization of the lake continues to meet the needs of society, such as fishing, hunting and irrigation (e.g. vegetable garden area).

The figures below show the catchments and streams feeding Lake Pamvotis as well as its location in the basin and sections of the lake. It can be seen from the drawings that the lake is located at the lowest point of the basin. Due to the morphology of the terrain of the basin and the fact that the lake and the mountains are natural boundaries, the city of Ioannina is forced to develop on the north-south axis and parallel to the western shore of Lake Pamvotis and in contact with the historic castle of the city.

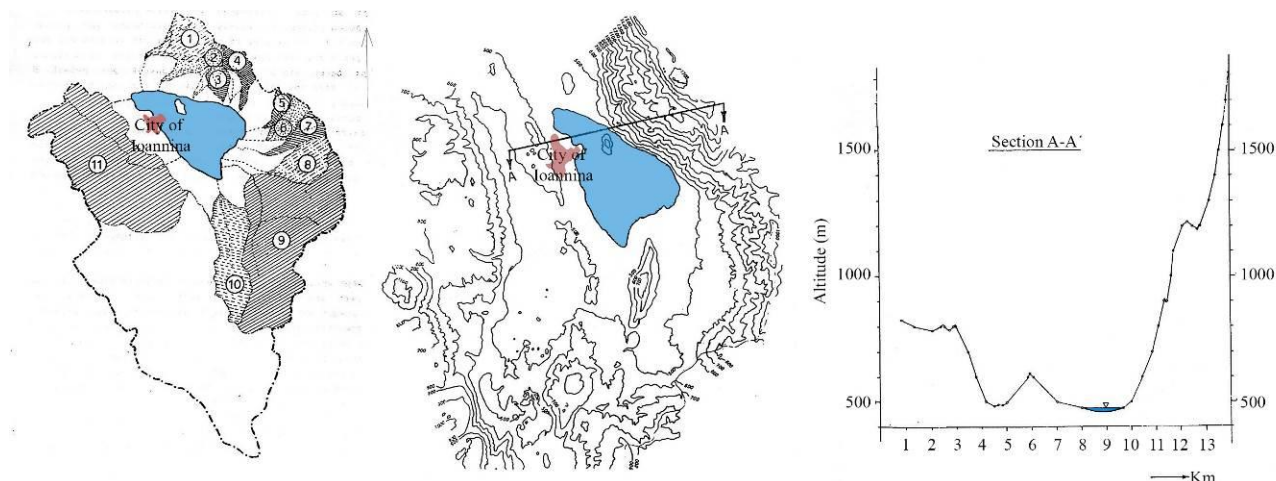


Figure 40. The figures show the catchments and streams that feed Lake Pamvotis, the location of the lake and its section. [5]

Also, due to the high altitude of the mountains, sediment and mountain streams end up in the lake, creating siltation and reducing the size of the lake.

From the Historical Archive of the Municipality of Ioannina, copies of maps drawn in the early 19th century were obtained and constitute historical sources. The following maps show that the historic castle and the areas of the vegetable gardens are developed on the coastal front of the city of Ioannina. [6]

The map of the approved town plan of 1915 and the map of Melirritos in 1919 show the desire to exploit the public space in contact with the lake and around the historic castle of the town, the creation of streets and green spaces, the placement of a row of trees along the road, the integration with the vegetable gardens in the area of Matsika and the partial urbanization of the area of Matsika in contact to the lake.

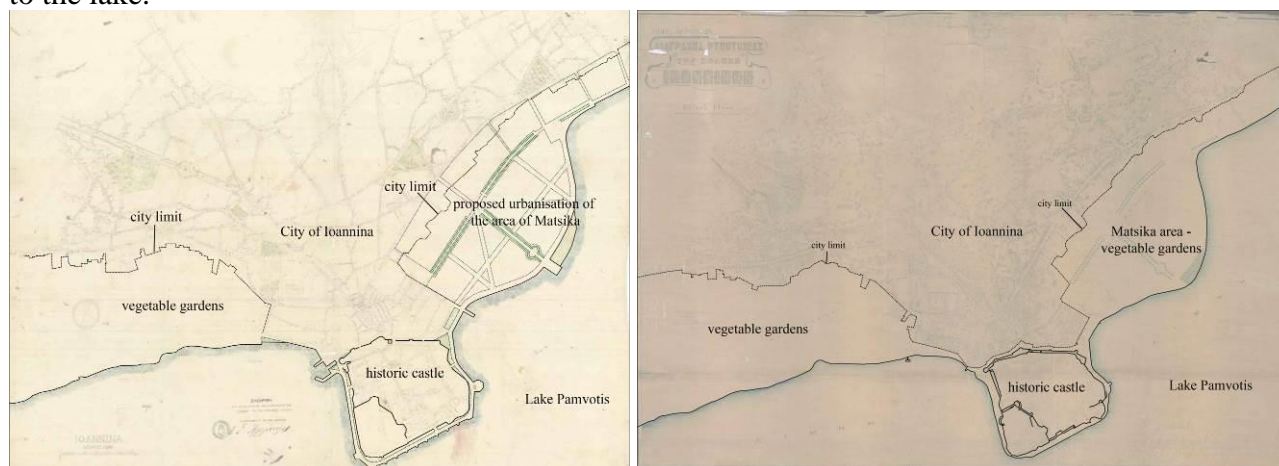


Figure 41. The map of the approved town plan of 1915 and the map of Melirritos in 1919 for the development of the lakeside front of Ioannina

Four years after the approval of the 1915 plan, the government of Eleftherios Venizelos assigned Ernest Hébrard to design the urban plan of the city of Ioannina in 1919. [7]

Ernest Hébrard foresees economic and political development of the city, as there are embassies of foreign countries, and even plans a tramway, seeing the city's development path towards the current district of Anatoli - due to the morphology of the basin. The city's vegetable gardens on the lakeside front are mapped and preserved, and there is provision for integrating these spaces with other public areas, such as squares and parks, within the city. Furthermore, Hébrard plans an industrial area in contact with the lake after the vegetable gardens towards the district of Anatoli.

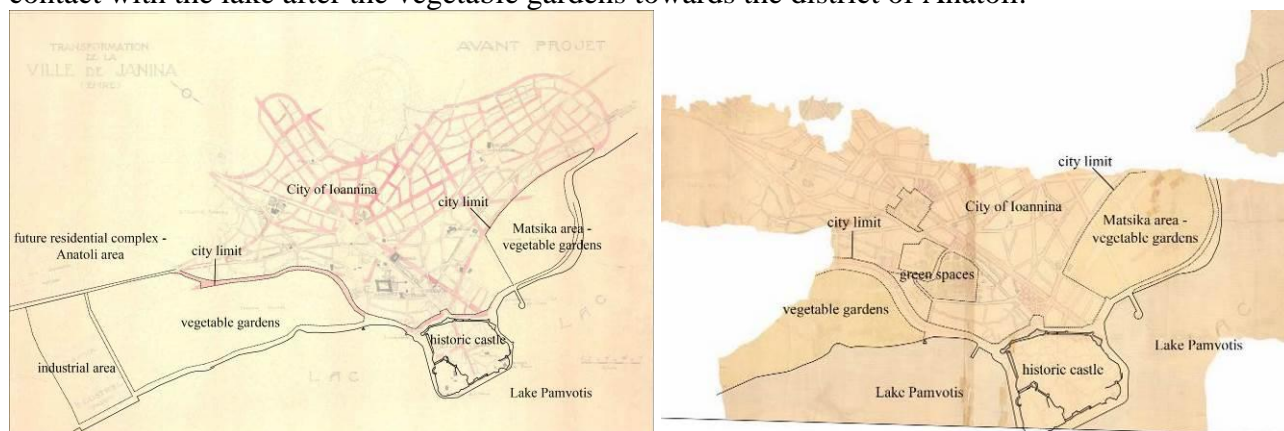


Figure 42. Ernest Hébrard maps for the development of the lakeside front of the city of Ioannina

During this period after the Asia Minor catastrophe, part of the public space was granted by the State for the refugees' residences on the lakeside front and at a short distance from Lake Pamvotis, in the areas of Matsika and Anatoli. [8]



Figure 43. From the aerial photograph of 1945 it is observed that the urban fabric of the city of Ioannina is in contact with the lake front only in the area of the castle of Ioannina. The other settlements that are created are located at a distance from the lake front. [9]

2.3 Third period: From 1959 to 1980

Major engineering works disrupt the ecosystem of the lake

During this period, a series of major technical flood protection and land reclamation projects were completed, which irreversibly changed the boundary line and the balance of the lake ecosystem of Lake Pamvotis [4, 5].

Within a program for the strengthening of agriculture and livestock farming of the rural population of the basin, the following were carried out:

1. The construction of embankment dams in the districts of Perama and Anatoli-Katsika for the drainage of Lake Lapsista in 1959 [10] and the creation of arable land which was granted to the rural population of the city.
2. The construction of a dam in Perama for flood protection of the basin, which determines the maximum elevation of the lake level and - through the Lapsistas ditch - channels the flood waters to the river Kalamas.
3. The reclamation works that ensured the irrigation of these fields by the waters of Lake Pamvotis - as continues today. These works transformed the lake from a free natural ecosystem into an irrigation tool (a large storage reservoir) and a tool for the exploitation of agricultural land in the basin, resulting from the draining of the marshes of Lapsista, etc., as mentioned above.

The interventions on the lakefront were made because of economic development, political will and the safety of the residents. [11]

However, while these interventions were initially made with good intentions, such as draining the marshes to improve the lives of the inhabitants of the city and the lakeside settlements, creating areas for agricultural exploitation and livelihood of the local rural population, etc., they ended up having negative to dramatic long-term impacts on the lake ecosystem. The uncontrolled use of chemicals and other waste on agricultural land has degraded the quality of the lake's water.

In addition, the construction of these projects has cut off the supply of clean water to the lake from important sources, resulting in a dramatic deterioration in the quality of its waters and the quality of life of the organisms endemic to the lake.

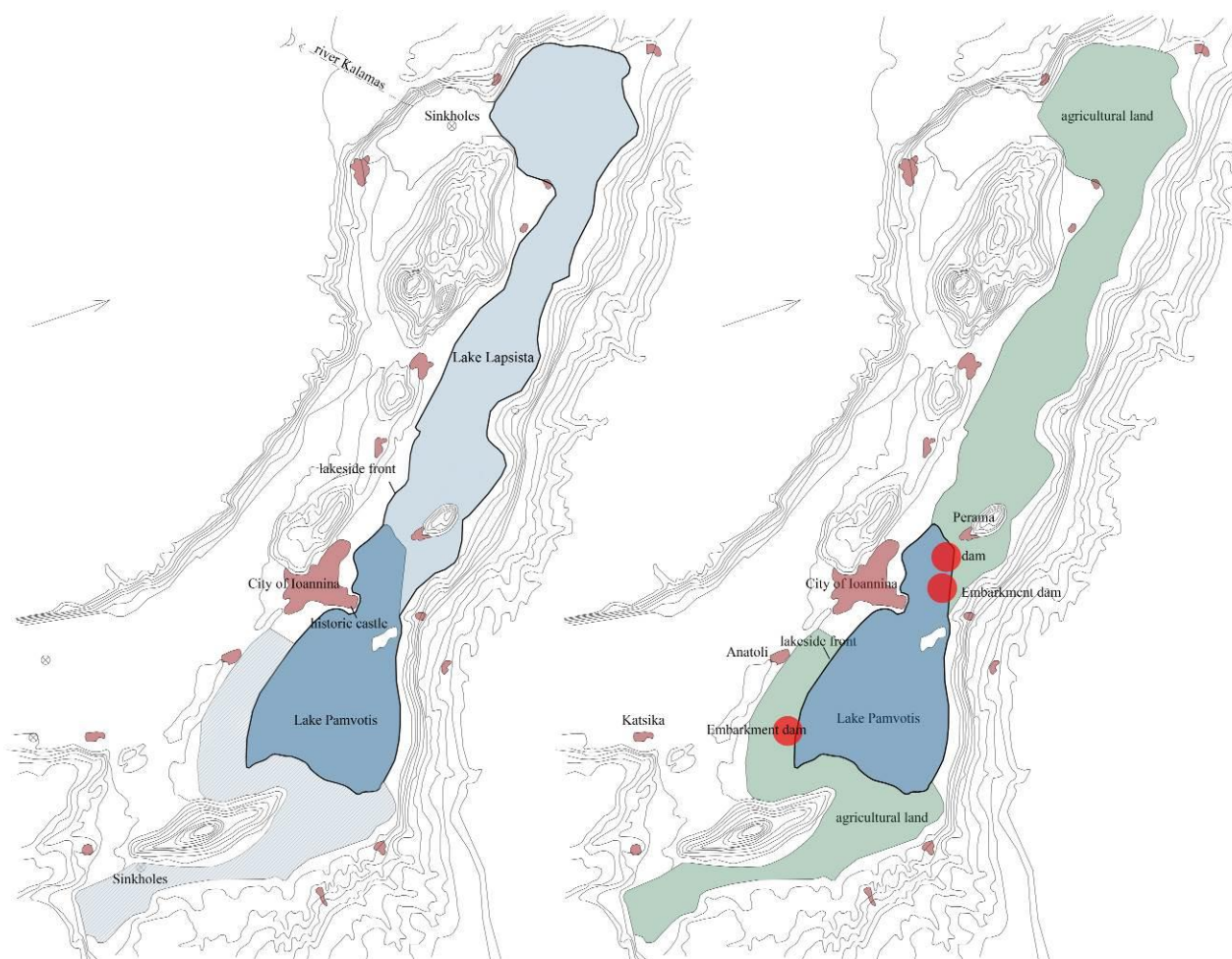


Figure 44. The figure shows the original shape of Lake Pamvotis and its connection with Lake Lapsista as well as the final shape of the lake with the interventions that have changed the boundary line of the lake front.

After the construction of major flood protection and land reclamation works, the size of Lake Pamvotis is reduced to 22.8 km² [12]. The total length of the lakeside front of Lake Pamvotis today is approximately 24km.

Interventions have been made in the lakeside area with the aim of shaping the public space and creating the lakeside front, with rows of trees, squares, roads, parks, etc. The lake front which was developed covers about half of the perimeter of Lake Pamvotis. On this side of the shore, in contact with the urban fabric of the city of Ioannina, the biggest interventions that change the lake's boundary line are located.

At the same time, the city is experiencing rapid growth. The University with the University Hospital, the increase of economic activities in the region, the opening of the border with Albania made the city an administrative, economic and cultural center of the wider region of north-western Greece. This resulted in a large increase in the city's population and an explosion of building activity.

Outside the city, all the large settlements of the basin (Anatoli, Perama, Katsika, etc.) developed. The town expanded towards the settlements and towards the shores of Lake Pamvotis and absorbed the arable land.

The major residential development on the lake front is observed on the western side of the lake within the boundaries of the residential fabric of the city of Ioannina and the settlement of Anatoli. This particular residential development is not found in the other parts of the lake.

The rest of the perimeter of the lake is not in a similar situation and the lakeside sections do not show any changes, as they retain their original character as wetlands or arable agricultural land.

2.4 Fourth period: From 1980 to the present day

Lake Pamvotis is part of the European network of protected areas Natura 2000 [13]. However, multiple human activities and the city's large-scale residential development have resulted in pollution of the lake's waters, which has endangered its sensitive ecosystem.

Studies were carried out by various scientific bodies and techniques were applied to help revitalize the lake. The completion of the biological treatment of the city was crucial to its preservation.

In general, the benefits that can accrue to lakeside cities from improving the urban water environment include:

1. Creating opportunities for access to the natural environment, providing new open spaces for amenities and recreation, and green networks for wildlife and people,
2. reducing the heat island effect,
3. reducing urban water pollution by incorporating sustainable drainage systems and restoring contaminated land; and
4. enhancing biodiversity

Achieving these benefits can have wider socio-economic consequences, as restored urban water bodies create an attractive environment that encourages recreation, creates open spaces and a more natural landscape, enhances the physical and mental health of residents, encourages business investment and tourism, increases property values but most importantly because it can lead to the sustainable development of cities. [1]

At the same time, the city of Ioannina is a regional and inter-regional development center and a hub of trans-European road networks.

Due to its historical and cultural value and the particular natural beauty of the city and the areas it is adjacent to, the city is experiencing a population explosion and a rapid increase in tourism. In the 1921 census the population of the Municipality of Ioannina was 20,765 inhabitants, in the 1961 census (the period when the major technical flood protection works of the basin and land reclamation works were carried out) the population was 34,997 inhabitants, while in the last census of 2021 the population rises to 113,978 inhabitants. [14]

In recent years there has been a strong movement of the city's residents for recreational purposes towards the lake front. Hiking trails by the lake are a daily habit of a large number of town residents. Visiting the cafes and restaurants that have been established have moved the recreational center of the town to the lake area. Large sports facilities (sports fields for various sports, indoor sports facilities, swimming pool, etc.) in the Limnopoula and Anatoli areas are a daily gathering point for a large number of citizens. Also the recently constructed Mavili Square, small theatre in the area of Skala and the cultural area created after the development of the site of the old slaughterhouses of the city host numerous events organized throughout the year, with a huge increase in human flows to the lake front. The lake is now an integral part of the daily life of the city's residents.

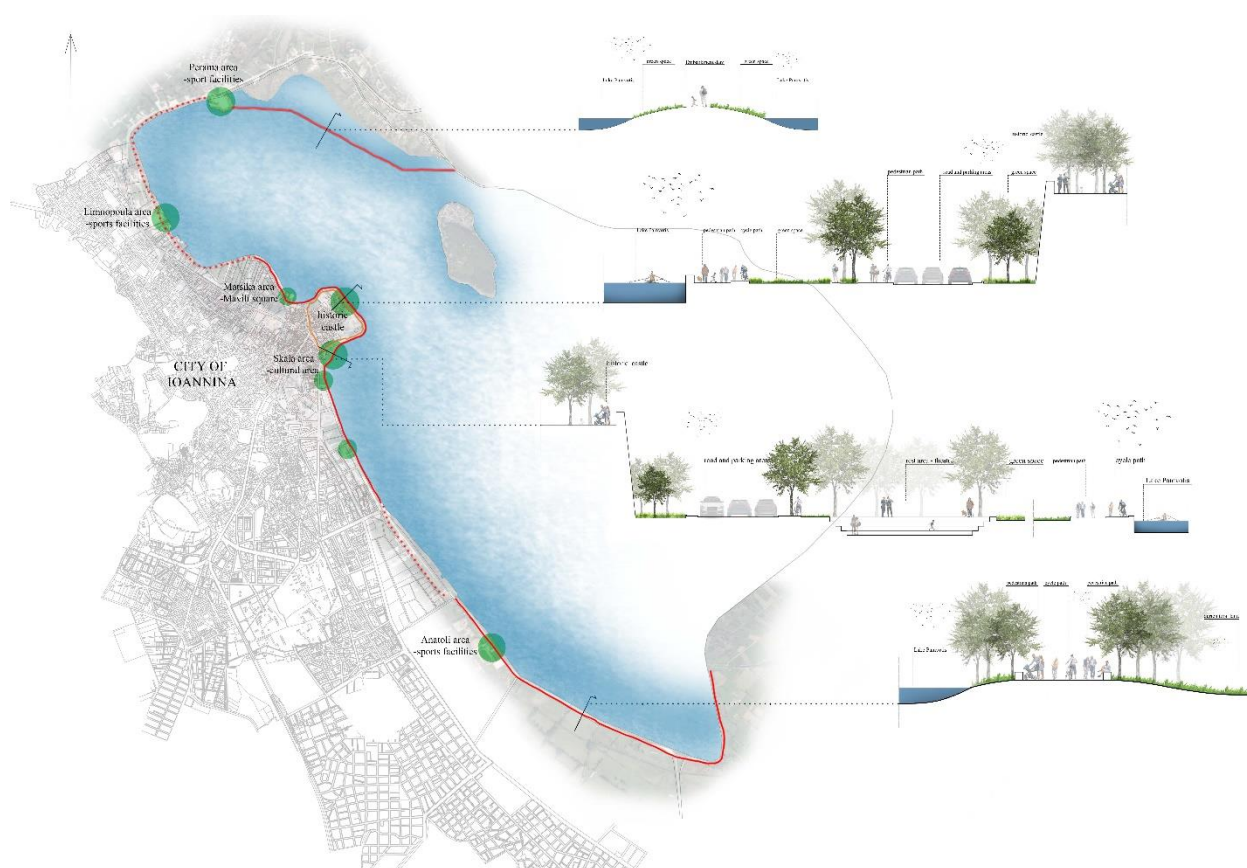


Figure 45. The figure shows the interventions on the lake front of Ioannina. The continuous line shows the existing walking and cycling route, while the dotted line shows the intention for a future connecting route. The rest of the lake front has not been affected.

There is an increasing need to make use of the few public spaces available, in particular the lakeside frontage, by creating parks, squares, hiking and cycling trails, etc. The agricultural land along the shore is the only one available, which of course has the exceptional privilege of being of particular natural beauty due to its proximity to the magnificent natural landscape of the lake. The lakeside front is being compressed residentially due to its special natural beauty - it is a first choice for development and creation of housing, leisure and entertainment facilities (cafes, restaurants, sports and recreational facilities) and many hotel units.

The economic growth of the city and the increased real estate prices are creating high pressure on the management of the land around Lake Pamvotis leading to the issue of changing the boundary of the lake.

However, human interventions over time have significantly affected the sensitive ecosystem of the lake and restrictive and other measures should be taken immediately to save the lake.

4. CONCLUSION

The human interventions that have been made over time on the lakeside front of Lake Pamvotis in Ioannina have dramatic consequences on the shape of the lake and the quality of its waters. The conversion of parts of the public lakeside area to private through concessions from the state to meet the needs of refugee housing and farms has led to claims for residential development in these areas. The economic, administrative and cultural development of the city resulted in the construction of numerous sports, cultural facilities and subsequently tourist facilities to meet the needs arising from

the large tourist development of the city and nearby settlements. This resulted in the creation of urban qualities that are not found in this form in the rest of the urban fabric of the city of Ioannina. Uncontrolled residential development is a burden on the sensitive ecosystem of the lake and there is an immediate need to establish a framework that defines land use throughout the lake front to protect the sensitive ecosystem, which is protected by European NATURA regulations.

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Reshaping the industrial urban landscape: an innovative approach or a means to gentrification?

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Abstract

The paper questions the meaning of preservation of industrial remnants in former industrial cities. Isolated buildings as factories and abandoned infrastructure and equipment dated on the industrial era are often demolished in favor of contemporary buildings which seem to better correspond to contemporary aesthetics. The concept of industrial heritage is changing with the emergence of Critical Heritage Studies which consider heritage as an evolutionary process that responds to the needs of contemporary societies in terms of sustainable development, economy, or culture.

The two case studies of the paper are considered as exemplary models of architectural and urban design forms in former industrial cities. On the one hand we have the reconversion project Ile-de-Nantes, a brownfield within the former industrial city of Nantes, a city with a significant industrial heritage. On the other hand, we have the reconversion project Docks-de-Seine, a brownfield located in the city of Saint-Ouen in the outskirts of Paris, a city characterized in the last 20 years by its urban transformations (spatial, economic, social), in which industrial activities have never ceased to exist. The study and comparison of the two case studies revealed the risk of gentrification in former industrial cities as their working-class identity changes due to the arrival of executives and the rejection towards the cities' periphery of the modest socio-professional categories. We must also note the high cost of such operations, even in the case of large, deindustrialized cities, because the financing of such projects requires significant economic funds, at the risk of disfavoring other municipal actions.

Keywords: industrial heritage, urban regeneration, cultural identity, gentrification, France.

1. INTRODUCTION

Former industrial cities are characterised after their deindustrialization by the presence on their urban fabric of remnants of their industrial past such as buildings, infrastructure and equipment reflecting industrial activities of previous decades. The question of reintegration of these elements to the urban fabric and the consequent transformation of the former industrial landscape are primarily based on urban regeneration programs and on the social, economic and environmental reactivation of the deindustrialized sites [1]. These programs usually involve the conservation of industrial buildings as a measure of preservation of local history and collective memory of the living and working conditions of former industrial workers [2]. At the same time, we observe in several cases of urban regeneration programs in deindustrialized cities conflicts of interest between the procedures of heritage making and neoliberal urban development practices in architecture and urban design which lead to the demolition of infrastructure and equipment dated on the industrial era and the consequent construction of contemporary buildings by star architects which seem to better correspond to users' needs and contemporary aesthetics [3]. The decision to preserve or not preserve the places of industrial production is not neutral, according to French researcher Vincent Veschambre [4] and it depends on the decisions of the municipalities of deindustrialized cities and project managers of urban regeneration projects on the ways in which architectural and urban design is supposed to face the consequences of deindustrialization (social and economic decline) [5].

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The question of preservation of industrial heritage and its reintegration to the urban fabric is based on the principle of conservation of historical urban forms as well as a reminiscence of the social character of the architectural design of the buildings of these areas, especially of the industrial workers' houses [6]. In France, Robert and Reichen, propose new forms and uses for the old industrial buildings such as industrial museums and houses based on the principles of circular economy (recycle of buildings) and preservation of urban heritage [7]. In Great Britain the urban fabric of former industrial cities that were highly urbanized such as Liverpool and Manchester retained its centralities from the industrial era as a result of the strategic relay points of trade routes [8]. Even though the media highlight the clash between different values and meanings (on one hand the conservation of cities' past that no longer exists and on the other hand the cities' future based on new forms of architecture and economic activities), we must underline that there is a different approach in the content of urban regeneration/renewal programs. This means that decision-makers (local elected officials, developers, urban planners, architects) choose either to restore and reuse old industrial buildings or to demolish them in order to transform the industrial urban landscape [9].

2. HOW TO RESHAPE THE INDUSTRIAL URBAN LANDSCAPE? INTRODUCING THE CONCEPT OF CRITICAL HERITAGE STUDIES

The concept of industrial heritage is changing with the emergence of Critical Heritage Studies which consider the conservation of industrial heritage as an evolutionary process that responds to the needs of contemporary societies in terms of sustainable development, economy, or culture [10]. This practically means that the appearance of preoccupations since the 1980s at international level about social, economic, and environmental sustainability of cities, creates new challenges for the preservation of industrial heritage as the industrial buildings can be restored and reused in order to have a second life for example as housing units and cultural spaces [11]. We must also underline the fact that many reconversion projects of industrial brownfields contribute to boost social actions and environmental responsibility in architecture and urban design [12] such as the case study of the urban regeneration project Ile-de-Nantes in France.

In this context the principal hypothesis of the paper is to consider that the preservation of architectural and urban design forms in former industrial areas can lead to the reshape of the industrial urban landscape and to the conservation of essential meanings in architecture and urban design as a means against a possible gentrification scenario. Through a critical examination of the procedures of preservation of industrial heritage in programs of urban regeneration in deindustrialized cities, which are often characterized by neoliberal practices, the objective of the paper is to question the policies and tools which seem to contribute to the transformation of deindustrialized territories. At the same time the paper will investigate the ways in which a balance in city planning could be achieved between the construction of new contemporary buildings and the conservation and reuse of industrial buildings. In order to respond to the main hypothesis of the paper we used data (interviews, socio-economic elements) collected from two programs of industrial reconversion in France which highlight the context of preservation of industrial heritage and the risks of gentrification.

3. REUSE, RESHAPE, TRANSFORM THE INDUSTRIAL URBAN LANDSCAPE OF FRENCH DEINDUSTRIALIZED CITIES

The two case studies of the paper are considered as exemplary models of architectural and urban design forms in former industrial cities as they allow the dialogue between buildings, equipment, and infrastructure of different eras (industrial, contemporary). On the one hand we have the reconversion project Ile-de-Nantes, a brownfield within the former industrial city of Nantes at the west of France, a city with a significant industrial heritage. The project functions as a vector for the development of new architectural forms in public buildings (for example the local courthouse). On the other hand, we have the reconversion project Docks-de-Seine, a brownfield located in the city of Saint-Ouen in the

north suburbs of Paris, a city characterized in the last 20 years by its urban transformations (spatial, economic, social), in which industrial activities have never ceased to exist. The project functions (as the first case study in Nantes) as a vector for the development of new architectural forms in office buildings (for example the buildings of Alstom).

The study and comparison of the two case studies revealed the risk of gentrification in former industrial cities and the swift to different values and meanings in architecture closer to a more productive dimension due to the design of public and commercial buildings by star architects, the limited number of social housing units and the uses of the former industrial buildings. The results of this trend are the arrival of executives in deindustrialized areas and the rejection towards the cities' periphery of the modest socio-professional categories.

Categories	2009	2014
Total	165840	178471
Craftsmen, tradesmen, businessmen	6778	8208
Senior managers and professional occupations	39726	46379
Intermediate professions	49798	54931
Employees	48162	47849
Industrial workers	21376	20457

Table 1. Number of working positions in Nantes, *INSEE and City of Nantes* (2018). It is interesting to compare the numbers of senior managers and intermediate professions to the number of industrial workers, in order to understand the swift to a different economic model.

Categories	2009	2014
Total	34466	36060
Craftsmen, tradesmen, businessmen	1912	1969
Senior managers and professional occupations	11353	13489
Intermediate professions	8829	8623
Employees	6801	6807
Industrial workers	5571	5115

Table 2. Number of working positions in Saint-Ouen, *INSEE and City of Saint-Ouen* (2018). It is interesting to compare the numbers of senior managers and intermediate professions to the number of industrial workers, in order to understand the swift to a different economic model.

3.1 The Ile-de-Nantes project: regeneration based on the local sources.

In 1987 the Bougainville, is the last ship constructed in the shipyards located at the west of the industrial site of Ile-de-Nantes. After a prosperous industrial era, only brownfields remain on this site. The future of the territory was part of the debates during the municipal elections in Nantes in 1989. During the 1990s the team led by Jean-Marc Ayrault launched a period of reflections on the future of the site which embodies both the preservation of its industrial past and the solving of social problems linked to the closure of shipyards, as well as the possibility of reactivation and regeneration of the site. The idea of transformation of the entire territory, uniting its three parts in a dynamic way, emerges. The desire of the municipal team for an extension of the historic center of Nantes towards the site of Ile-de-Nantes is shown by the proposal of the city to the French government in 1996 to

construct on the site the new City Courthouse. To formulate the project the Municipality launched a contract in 1998.

The Atelier de l'Ile-de-Nantes, a team of architects, urban planners and landscape architects led by the architectural studio of Alexandre Chemetoff, was the first to be selected in order to implement the strategy and political ambitions of the municipal team. The first phase of studies, which lasted ten years (2000-2010), resulted in the desire to reconsider the island as a whole and to define an urban regeneration project adapted to the new economic, environmental, and social challenges without denying the local urban history that has shaped its territory. In this context several industrial buildings were preserved especially on the site of the former shipyards and were reused as museums and exposition spaces.

During the ten years of project management by the team of Alexander Chemetoff we can see his vision for the regeneration of the site through small-scale urban projects concerning the site's public spaces and buildings. These include: the Schoelcher footbridge built in 2001, a pedestrian bridge that connects the historical center of Nantes to the site, the Boulevard De Gaulle built in 2007 that connects the north and south part of the site and the Quai des Antilles built in 2007 which echoes the industrial and port memory of Ile-de-Nantes. We should note the will of the Municipality of Nantes and the team of project management to create an urban project whose design is linked to territorial experiments. In fact, the Guide Plan, a design method proposed by the team of Alexander Chemetoff for the urban regeneration project of Ile-de-Nantes based on a reconfiguration of the site's public spaces, provides broad guidelines for the development of the urban regeneration project which allow the preservation of the industrial heritage in the redevelopment of the different site sectors.

The turning point towards more neoliberal practices in architectural and urban design forms is the construction on the site of Ile-de-Nantes in 2008 of the Beaulieu Commercial Center and Nantes School of Architecture in 2009 which will give a new vision for the resilience of the site based on cultural and commercial activities. The later construction of the University hospital center of Nantes on the site of Ile-de-Nantes is based on the same principle which underlines the importance of big infrastructure and equipment in order to achieve urban resilience. Besides this vision towards a productive dimension in architectural and urban design we must underline the risk of gentrification as we have seen previously in the Table 1 which shows a swift towards tertiary activities.

The restoration of the link between the territory and its industrial past through the redevelopment of the quays and banks, which was part of the strategy of the Chemetoff team, is pursued during the project management led by the team Smets and Depuydt (2010-2017). During this phase of the project the banks of the Loire River are transformed into places for walking and leisure. The study of site's landscape relief is also based on other founding elements of the site's urban history, such as the railway infrastructure, which is integrated into the site's regeneration project in order to play a new role.

In this second operational period of the project, we can see the will of the management team and the Municipality of Nantes to continue the redevelopment processes, begun by the previous management team. On the other hand, it should be noted the different policies for the preservation of industrial heritage during this phase of the project which are not based on the rehabilitation of the industrial buildings of the site but on the inscription of traces of the industrial past in a system of parks that unite the various neighbourhoods of the site. In addition, it can be noted that the Transformations Plan, a design method proposed by the team Smets and Depuydt based on the study of the landscape's relief, is an operational document that provides broad guidelines for the development of the project, as was done previously by the Guide Plan of the team Chemetoff. We can therefore see a local urban planning approach (*urbanisme à la nantaise*) that highlights territorial experiments in architectural and urban design which allows a balance in city planning through the construction of new contemporary buildings and the conservation and reuse of industrial buildings. However, it should be mentioned that the construction of big infrastructure and equipment on the site such as the University

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Hospital and the City Courthouse, as well as the creation of neighbourhoods that promote commercial and cultural activities, have modified the social character of the project. The shift to different values and meanings in architecture closer to a more productive dimension is evident and has as a result the arrival of executives and entrepreneurs and the increase of rentals and property sale prices.

3.2 The Docks-de-Seine project: regeneration based on a national program for the reactivation of wastelands (*friches*).

The willing of a group of industrialists to create an outer harbour downstream in Saint-Ouen near the Paris Metropolis has contributed to the economic attractiveness of the city and its surroundings with the arrival of internationally renowned companies and many state-owned enterprises. The departure of the industries gradually changed the face of the district of the Docks-de-Seine. At the beginning of 2000 (departure of Total in 2003 and Alstom in 2004), discussions began at municipal level in order to give new functions to the Docks site while preserving its industrial heritage. This objective was interpreted by the Municipality of Saint-Ouen and the project management team as the need to connect the city center of Saint-Ouen to the industrial remnants of the site in order to offer to the Docks new development perspectives. The goal of the Municipality of Saint-Ouen and the developers is to transform the industrial site into a mixed-use sustainable neighbourhood (*écoquartier* in French) an urban planning practice already used in other French cities, with the reuse of former industrial buildings and the maintenance and development of important metropolitan facilities on the site (energy pole of Saint-Ouen). The project management team selected is led by Makan Rafatdjou (architect) and is consisted by urban planning and landscape agencies (Agence Reichen & Robert & Associés, Olga Tarraso, Hélène Saudecerre, Peria & Pena, Coup d'Eclat, Beri, Ter Agency). The development of the urban regeneration project of the Docks-de-Seine began in 2007 with the creation of the ZAC of the Docks (Urban Development Zone).

The realization of the development project is the result of two factors. On the one hand, the creation of the ZAC, result of a reflection carried out by the Municipality of Saint-Ouen for the transformation of its territory. On the other hand, the announcement of Total in March 2003 of the closure of its factory at the east part of the site of the Docks, resulted in the lifting of the Seveso perimeter (industrial sector with a risk of major accidents) and in the first urban planning projects for the site's redevelopment in 2004 as part of the local PADD (Planning and Sustainable Development Framework). According to the PADD the site of the Docks will be part of an urban regeneration program that includes all city's brownfields while at the same time its urban regeneration program is in line with the Municipality's strategy to preserve and demonstrate its industrial fabric through the rehabilitation and reuse of former industrial buildings.

The purchase of 18.8 ha of the site of the Docks by the French real estate group Nexity in March 2004 (initially they belonged to the French enterprise Alstom) shows the differentiation of the project from other sustainable neighbourhoods in France, because in this case we can find a private company among the team of developers of the urban regeneration project. This vision to include private companies in the development of the site is described in the 2008 PLU (Local Urban Planning Plan) as a strategy that aims to attract private investors who in turn will contribute to new forms of architectural and urban design as well as to economic resilience.

The strategy of the Municipality to attract private companies for the funding of the project of the Docks-de-Seine led to a shift from industrial activities to tertiary ones, to the demolition of industrial buildings in order to construct new buildings in the perimeter that belongs to Nexity as well as to a change of the socio-professional status of the city's inhabitants as we have seen in previous part of the paper. The construction of office buildings on the site of the Docks is also linked to the previous construction of office buildings to the nearby Victor Hugo neighbourhood in which former industrial buildings were demolished.

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The real estate developer Nexity is looking to develop a policy of co-creation of the territory and collaboration in the processes of urban regeneration. Through its role as a contracting authority, it seizes to guarantee opportunities for the group's real estate development subsidiaries and companies. What we should note from Nexity's speech is its ambition to be directly involved in urban regeneration projects, as is the case of the Docks-de-Seine. In this context, Nexity tries to assume the financing of the whole urban regeneration project (buildings, equipment, infrastructure) and become a contracting authority through the purchase of the industrial land. We should also mention the swift to the values and meanings in the architectural design of social housing in an industrial area as the prices of Nexity's housing are higher compared to the ones of other companies. A tripartite agreement between the Municipality of Saint-Ouen, Séquano Aménagement and Nexity was concluded in 2009, before being revised in 2012, in order to guarantee the project management of the ZAC of the Docks. The agreement signed between the Municipality of Saint-Ouen, Séquano Aménagement (project's contractor) and Nexity seems to have slowed down the ambitions of Nexity to develop and commercialize the Dhalenne sector and thus profoundly change its working-class character in architectural and urban design forms. However, its involvement in the urban regeneration project of the Docks, following the purchase of land by the Alstom group, attracted several investors interested in tertiary activities and led to the demolition of industrial buildings even though certain buildings such as the Hall Alstom were preserved and restored. These activities change the meaning of urban resilience in industrial areas as the social character of the Docks project (a project for all, especially low-income families, and immigrants) is confronted with a productive dimension in architectural design and with the gentrification processes already observed in Saint-Ouen and in other municipalities of the Ile-de-France region.

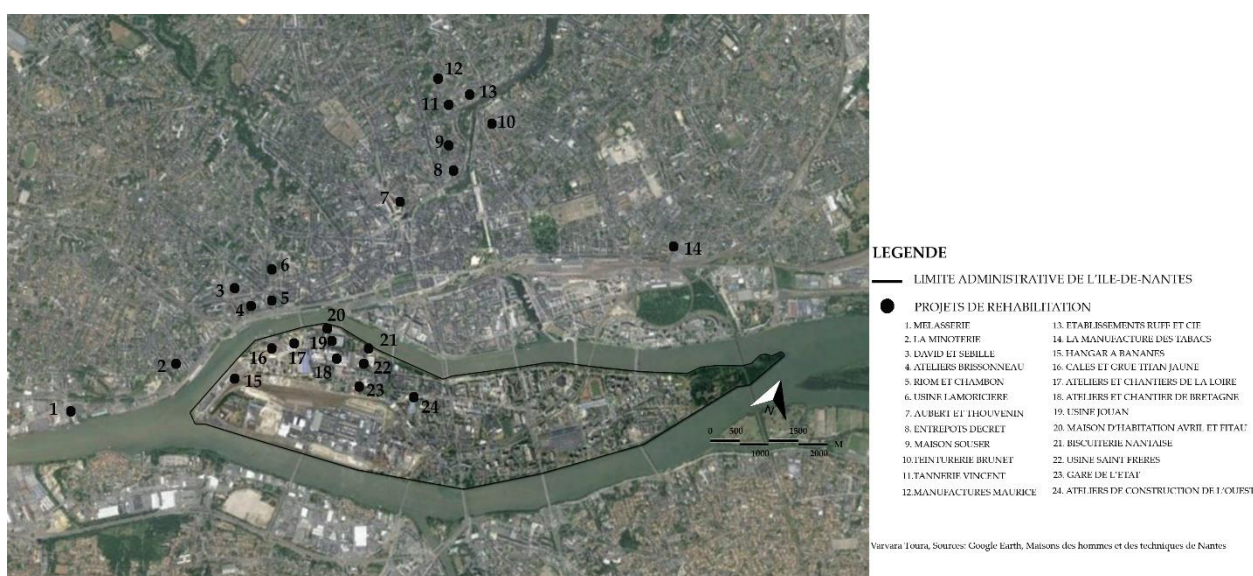


Figure 1. Map of the industrial buildings that were reconverted and reused in Nantes, Ile-de-Nantes sector and city center, Source: Varvara Toura, 2023

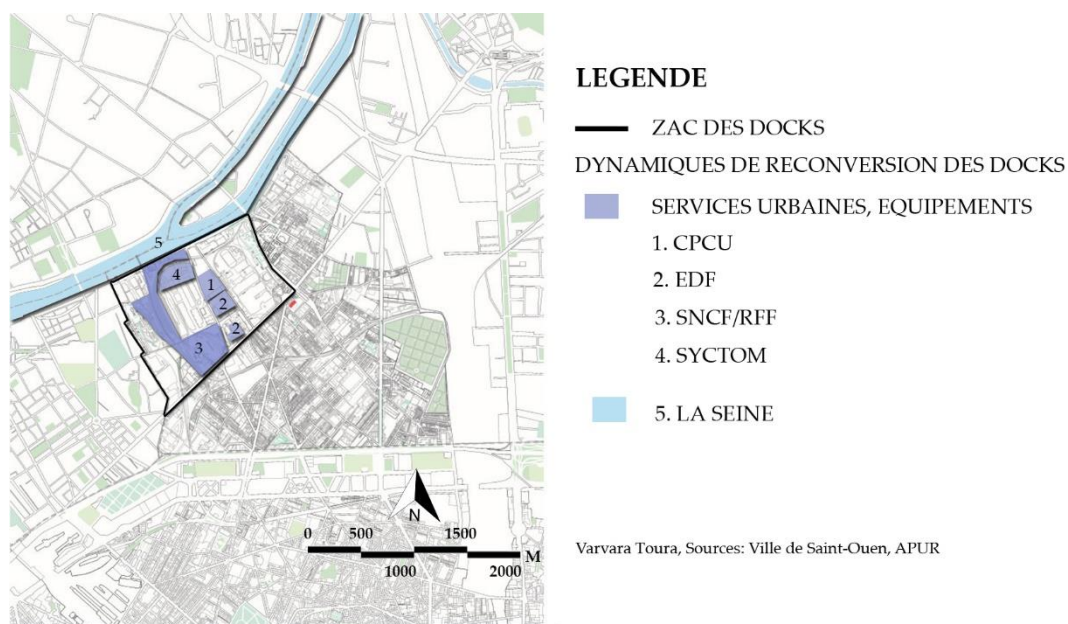


Figure 2. Map representing the industries present on the site of the Docks-de-Seine and the proximity with the river Seine, Source: Varvara Toura, 2023



Figure 3. The transformation of the industrial urban landscape of the Ile-de-Nantes, reconverted industrial buildings, housing units and tertiary activities, Source: Varvara Toura, 2019



Figure 4. The transformation of the industrial urban landscape of the Docks-de-Seine, reconverted industrial buildings, industrial units and tertiary activities, Source: Varvara Toura, 2019

4. CONCLUSION

The issue of preserving the industrial urban heritage, which is often cited by stakeholders as a good practice regarding the subject of urban regeneration of industrial brownfields, has also its contradictions according to the two parameters of preservation of industrial heritage (preservation of the built heritage, preservation of the social fabric). It is evident from the previous analysis of the context of the two regeneration programs that the working-class character of former industrial districts no longer exists with the arrival of executives in these territories. Despite the replacement of industrial activities by tertiary ones, traces of the industrial past are still present on both sites (we can note the rehabilitation of old industrial buildings in the Ile-de-Nantes project and the continuous presence of industrial activities on the site of Docks-de-Seine). The preservation of industrial heritage of the two sites goes beyond the rehabilitation of certain industrial buildings and also includes the creation of industrial museums, publications, and exhibitions regarding the places of industrial production and the living conditions of former industrial workers, as well as guided tours of industrial monuments. Therefore, it can be seen, that the industrial heritage contributes to the urban resilience of the two cities with the preservation of architectural and urban design forms while at the same time it offers the possibility of a collaborative economy with the direct participation of local communities in the planning processes of their living environments.

5. DISCUSSION

To go further on the subject of urban regeneration of industrial brownfields and their development in a resilient and beneficiary way for the local communities, we should underline the link between the location of brownfields (inside or on the outskirts of cities), the architectural and urban design forms of the industrial era (factories, small industrial units, social housing, administration offices) and the policies and obstacles for their reconversion. Brownfield sites on the outskirts of large cities are part of urban expansion dynamics in order to respond to the need for new housing that is less expensive to the real estate prices in central districts. Real estate prices in peripheral neighbourhoods have increased over time and have led to a change in the identity of these neighbourhoods, which are no longer working-class neighbourhoods but rather gentrified places. Brownfield sites inside cities

centers are part of urban regeneration programs which include the reuse and reconversion of industrial infrastructure and the creation of public spaces on these sites.

These urban regeneration programs often include the construction of new residential buildings whose real estate prices are the same to those in other central city neighbourhoods. The socio-economic identity of central city districts has changed, as has done that of the peripheral districts, with the arrival of executives, which in turn led to the gentrification of working-class neighbourhoods and the rejection of modest socio-professional categories to the periphery of cities. At the same time many industrial buildings were demolished in order to construct new commercial and office buildings. Can we continue to talk about the industrial urban landscape in the context of the gentrified city? Policies such as the reuse of industrial buildings as social housing, property prices' controls and equal access to housing could reverse this trend. However, we must ask ourselves under what conditions are such policies possible while maintaining the industrial and popular character of these sites?

The local political and social context plays a major role in making decisions about the content of brownfield conversion programs. All cities do not have the means to take such operations, either because they lack funding or because they are in economic decline. Voluntarism and political stability at local level (we should mention that the reconversion programs last for several years and the continuity of local policies is a strong point for their implementation), the active associative network (both architectural associations and inhabitants and activists) and the favourable financing conditions (public-private partnership, public funds, European Union funds in the case of member countries) make these policies possible and at the same time differentiate them according to the challenges and orientations determined by the different actors. In addition, we should note that a certain number of cities, especially at European level, find the opportunity to finance such operations through the organisation of sporting (for example the Olympic Games in London in 2012 where the Olympic Village was built on an industrial brownfield on the outskirts of the city) or cultural events (such is the case of the European Capital of Culture in which the host city is often a deindustrialized one and industrial buildings are reconverted and reused for cultural activities). We could, therefore, underline the exceptional conditions and means (financing, media coverage) that lead to the realization of this type of operations.

We should also note the confrontation between the concepts and forms of regeneration in the processes of transformation of the industrial urban landscape. In several cases they are based on low-cost practices such as the reuse of existing buildings. In other cases, especially those of large-scale urban regeneration operations, the cost is high as it usually involves the demolition of existing buildings and the construction of new ones. The financing of such projects requires large amounts of capital, at the risk of disadvantaging other municipal policies (health, education, housing). We can see therefore that a balanced transformation of the industrial urban landscape could be achieved through a multiform regeneration program that involves the construction of small-scale contemporary buildings and the conservation and reuse of industrial buildings.

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Re-activating the abandoned: The integration of Mycenae's Xenia pavilion into a contemporary network through the mediation of collective memory

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Abstract

In Mycenae, and its neighbouring Fichti, the threshold between myth and history, the utopia of vacation and the reality of contemporary daily life, the landscape is overrun with spatial folds (plis) that represent different temporalities: zones where time expands or becomes suspended. Mycenae's Tourist Pavilion and the old railway station in Fichti are two such zones. Located on the plain of Argolis, Peloponnese, near the World Heritage archaeological site of Mycenae, the two buildings used to be nodes of wider networks. The old station, part of the railway network of the Peloponnese region, is a prime example of industrial architecture in Greece. The Tourist Pavilion, completed in 1951 to the designs of modernist architect Kimon Laskaris, formed an early addition to the Xenia network, the post-war tourism development programme run by the Greek National Tourism Organisation (GNTO). The programme aimed at the improvement of Greece's run-down tourist infrastructure and the modernisation of local communities. The pavilion was a small-scale intervention in a sensitive natural landscape, servicing visitors to the adjacent archaeological site and rendering Argolis a potent tourist destination. However, the transformation of the economy and the structural changes of the tourism industry that have been taking place since the turn of the century, rendered part of the cultural and tourism network of Argolis inactive, leaving the pavilion and the station without a designated function. Moreover, the lack of facilities and infrastructure in both Fichti and contemporary Mycenae and the changes in transportation transformed the visit to the archaeological site of Mycenae into a short and fleeting experience, depriving the two settlements of an active role. *Pavillon abandonné* workshop (2022), organised by a consortium of Greek university departments and faculties, under the umbrella of the *Fichti Art Festival*, aimed at the pavilion's documentation through archival material and the reactivation of local collective memory. The workshop aimed at reinstating the pavilion as a node of a re-imagined local cultural network. In 2023, *Pavillon relancé* workshop temporarily revived the pavilion through curated actions and performances with a strong, yet temporary, spatial imprint. The ultimate goal of this work in progress is the adaptive reuse of the pavilion and the old railway station, by integrating them into a new cultural and tourist network that will lead to their local reactivation and sustainable development and sustain a new identity for the two landmarks with a wider social impact.

Keywords: *Xenia pavilion; collective memory; network; community reactivation; Mycenae*

1. INTRODUCTION

Contemporary socio-economic conditions and demographic shifts, as well as transformations in transport and tourist culture that have been taking place in Greece since the turn of the century, have

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led to the gradual neutralisation of part of the state's infrastructure that was scattered across the Greek periphery. Mycenae's Tourist Pavilion and its neighbouring old railway station in Fichti, both located near the World Heritage archaeological site of Mycenae, are two such cases. The two buildings used to be nodes of wider networks; the old station, a prime example of the 19th-century industrial architecture in Greece that has been recognized as a "work of art of buildings that need special state protection", was part of the railway network of the Peloponnese region, while the Tourist Pavilion formed an early addition to the Xenia network, the post-war tourism development programme run by the Greek National Tourism Organisation (GNTO). Mass tourism and the consequent transformations of vacations have turned the visit to the archaeological site of Mycenae into a short and fleeting experience, depriving the two settlements of an active role in the tourist market and creating a community weakened by these losses, that is now trying to adaptively reuse its abandoned infrastructure for the benefit of its citizens.

Fichti Art [1], an annual festival launched in 2021, is an initiative based on the transformative potential of ephemeral actions and aligned to a bottom-up awareness of the value of historical-cultural assets as a common/shared good. Through the development of collaborative creative activities centered around the two abandoned historic buildings, the festival aims at their reuse and reappropriation by the local and/or wider community. Under the auspices of *Fichti Art* festival, the two Experiential Learning Workshops of Architectural & Artistic Investigation, *Pavillon abandonné* (2022) and *Pavillon relancé* (2023), inspired by relevant archival material and oral testimonies, temporarily revived and reactivated the Tourist Pavilion for the duration of the festival. Based on this experience, the paper aims to stimulate a discussion on the role of the creative mediation of collective memory in temporary interventions in neglected historic buildings and their connection to current issues of cultural identity, resilience, adaptation and sustainable development.

2. CULTURAL HERITAGE, MEMORY AND TEMPORARY CREATIVE RE-ACTIVATION

Globalisation, improvements in transport and telecommunications technology, social changes, and cultural uniformity, have raised concerns about a homogenised world, redrawing the attention of scholars/researchers on the cultural identity of contemporary societies. Cultural heritage, as a bridge of communication between past, present and future, plays a crucial role in the formation and maintenance of collective memory and cultural identity. The document *Culture 21: Actions* recognises cultural heritage - in all its multiple forms, from memories to landscapes - as "a resource for the construction of the identities of people and communities" which is in constant evolution, like "something that is alive" [2]. Viejo-Rose (2015) [3], drawing both on the neuroscientific perspective that memory is a process of construction, of remembering the past and imagining the future, and on the fundamental dynamics of heritage, such as interpretation, reproduction, narrative and imagination - especially as a process of meaning-making - foregrounds the point of convergence of memory and heritage. Although she refers to heritage sites as "anchors, fixing narratives of memory and history, identity and belonging, to places and people" (3: 10), she indicates the mutability of their interpretation and understanding, highlighting their potential to create links with the past and references for the future. Additionally, Assmann (1995) [4] argues that cultural memory is a storehouse of knowledge from which a community draws its sense of unity and identity, and, it is that "need for identity" which controls access to and transmission of this knowledge. He also states that although cultural memory is fixed in immovable figures, it operates through reconstruction, thus, it always relates knowledge to the present contemporary context. This is achieved through various ways such as critique, appropriation, preservation or transformation. Therefore, the appropriation of heritage through transformation and reuse reconstructs memory and creates opportunities for the continuity and development of communities, while creating possibilities for new memories and heritage [5].

At the same time, the identification of cultural heritage as a critical factor for sustainable development [6, 7], as well as the growing demographic, economic and environmental issues that have limited the opportunities for new construction, leading to the implementation of circular economy models for urban policies, have increasingly directed the attention of academics, architects and policymakers to new challenges related to the adaptive reuse of existing historic buildings in order to ensure their long life-cycle and sustainability. Architectural heritage is a “non-renewable resource” [6] and susceptible to abandonment. Vacant historic buildings are at great risk of damage and decay and, according to English Heritage [8], the best strategy to protect them is to keep them occupied. Taking into account that top-down policies for permanent reuse take a long time to be implemented, temporary adaptive reuse may act as an *incubator* for historic buildings complementing the traditional role of preservation. In recent years, many international bottom-up initiatives have temporarily reactivated disused or underused historic buildings, aiming to reclaim missing value and augment heritage sites, by providing new memories, raising awareness and reconnecting communities with their historical past. Such collaborative actions in line with the eleventh article of the 2005 *Council of Europe Convention on the value of cultural heritage for society* [9], which encourages voluntary initiatives that complement the role of public authorities, can enhance social cohesion, reduce environmental degradation and stimulate urban regeneration [10]. Creative re-activation actions, often led by local groups, individuals or organisations usually use the abandoned cultural scene as a platform to influence, inspire and activate communities, through interdisciplinary collaborations and public participation, towards cultural heritage conservation, preservation and adaptive reuse. The possibilities for such appropriation and temporary reuse of historic buildings, based on cultural memory and identity, are discussed in three characteristic case studies.

The rapidly changing urban environment of Berlin's inner city in the years following the fall of the Wall transformed the new capital of Germany into an experimental hub for the temporary reuse of its countless vacant buildings, providing useful insights into the preservation of historic buildings through creative reuse and public participation. *Kunsthau Tacheles* (Art House Tacheles) in the Mitte district of former East Berlin is such a case. The five-story building first opened in 1909 as one of the largest department stores of Berlin at the time. After 1928, it accommodated a variety of uses, such as travel agency, office space by the National Socialists, professional school, and movie theatre. During World War II it was moderately damaged, while in the early 1980s, a part of it was demolished in order to free space for a new urban development. The demolition of the remaining part, planned in 1990, was prevented by a group of local artists from both former parts of Germany. This historic cultural squat achieved to reverse the planned demolition - in collaboration with experts that verified its good structural condition - as well as to unearth the historic background and to register the building in the city's long list of monuments [11]. During the twenty-three years of the occupation, the building was open to the public, offering workshop and exhibition spaces, a cinema, a theatre and other facilities. In 2000, when Berlin was undergoing major urban revitalisation projects and was focused on spectacular cultural facilities, *Tacheles*, gained great local and international attention and became a landmark of Berlin's dynamic cultural scene [12]. The global financial crisis that followed and the change of ownership led to the artists' permanent eviction in 2013. Today the building accommodates a photography museum (*Fotografiska Berlin*) and cultural space and is part of a large-scale redevelopment designed by Herzog & de Meuron. Although the project aimed to restore the site's historic significance by developing a new urban narrative that incorporates its historical footprints, the result lost the social and collective spirit that pervaded the site after the fall of the Berlin Wall.

The war material factory *Braço de Prata*, located at the eastern part of Lisbon, is a case where bottom-up processes sometimes oppose to top-down processes that are oriented towards the international market and often tend to the homogenisation of the heritage, material and symbolic space [13]. The factory was built at the beginning of the 20th century on the military arsenal site, employed 12.000 workers and closed in 1998. At the same time, the realisation of the World Expo in this part of the

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city triggered the transformation processes of the post-industrial zones of eastern Lisbon, influencing their cultural meaning and spatial perception. Thus, this post-industrial working-class neighbourhood attracted the interest of investors, and the vast spaces of the former factory were designated for the construction of a series of emblematic buildings, bringing about a novel lifestyle that in no way echoed area's former character. The factory's administrative building, a 19th century mansion, was planned to serve as a sales pavilion for the luxury residential complex, *Prata Living Concept*, which is near completion. When the construction of the building was suspended, due to a dead-end phase, the philosopher Nuno Nabais suggested its reactivation as a cultural space, obtaining free use in exchange for its maintenance. Thus, in 2007, the *Fábrica de Braço de Prata* re-opened its doors, this time for the public, offering a reading space, two bookshops, art galleries, bars and a rich cultural program, transforming the disused building into a vibrant and dynamic cultural venue, renowned across borders [14]. The principle of minimal intervention and reversibility, dictated by the ephemeral nature of the project, and the habitation scenarios, led to the adaptive reuse of the site in a harmonious coexistence with its industrial essence. In 2008, following the bankruptcy of the owners, the initial concession agreement was annulled and the *Fábrica* continued to operate illegally ever since. However, the Lisbon City Council embraced this project acknowledging its potential for change and creativity, despite its questionable legal status. Given the sweeping changes in the urban, social and financial fabric of the area, this place bears testament to Lisbon's twinkling spirit of resilience.

The reactivation and reuse of historic and abandoned buildings have also been the focus of ephemeral or recurrent actions. *Budapest100* is an annual two-day community festival that unveils and celebrates the built heritage of the city. The project aims to draw attention to the value and history of local architecture (irrespective of their legal protection status). Through guided visits, exhibitions and shared stories narrated by local residents and qualified professionals (architects, urbanists and researchers), the festival aims to keep the past of these buildings alive in the collective memory and to establish a connection between heritage and community. This community festival inspired self-organised actions, resulting in restorations, renovations and minor architectural interventions in some buildings. *Budapest100* also attracted the attention of tourists, local businesses and municipalities, establishing a platform for common dialogue on issues related to the city and its citizens, and encouraging decision-making processes at municipal and urban planning levels.

The above-mentioned cases emphasize the role of temporary reuse in reclaiming abandoned historic buildings as a common good, protecting them from decay at low cost, which can be interpreted as a strategic approach towards sustainability. All initiatives succeeded in attracting the attention of the public authorities while capturing the imagination of local communities. In the case of *Kunsthau Tacheles*, this led to its conservation and, finally, to its permanent reuse, while the success of the *Fábrica de Braço de Prata* lies in the fact that it has modified, so far, the initial intended plan, which can be attributed to its sensitive integration into the industrial fabric, carried out with great respect for the memory of the place; the building itself and its former use, and the life of the working-class that depended on it [13]. All cases, capitalising on the concepts and resources of heritage and memory, reconnected communities with their historical past, raised awareness both in local communities and a wider audience and offered opportunities for creating new memories and heritage through shared experiences.

3. ABANDONED HERITAGE: THE TOURIST PAVILION OF MYCENAE

The long-abandoned Mycenae Tourist Pavilion is a typical architectural example of the GNTO's post-war programme that aimed at the improvement and modernisation of Greece's run-down tourist infrastructure. It was completed in 1951 to the designs of modernist architect Kimon Laskaris, in order to render Argolis as a potent tourist destination. The pavilion was expected to function as a crucial node - servicing the nearby World Heritage archaeological site of Mycenae - of an integrated network of modern facilities that included the Tourist Pavilion of Epidaurus (1950) and the

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conversion of the fortress of Bourtzi into a guesthouse (1951), both designed by Laskaris, the hotel Xenia Amfitryon (1951 & 1956), designed by Kleon Krantonellis, the hotel Xenia Acronafplia (1958) and the organised beach of Arvanitia (1962), designed by Ioannis Triantafyllidis and, later, the Nafplia Palace (1970-1975), designed by Thymios Papagiannis. These facilities, built on natural sites of outstanding beauty and/or into major archaeological sites, were to form the core of the country's emerging tourism industry, attracting visitors from Greece and abroad. At the same time, the overtly modern architecture of the GNTO's tourist facilities served as a vehicle for ushering Greece's remote communities to modernity [15].

The Mycenae Tourist Pavilion, located to the south of the prehistoric archaeological site and at a short distance from the contemporary village of Mycenae, on a natural hill with unobstructed views of the plain of Argolis, is a discreet, single-storey construction of square plan (approximately 420m²), with a small semi-underground space (around 150m²) with four rooms designated for the employees. It accommodates a 'T' shaped restaurant that extends across the building, leading to a south-facing porch and to a north-facing elevated atrium, due to the slope. The flat roof, yielding panoramic views, is accessible via an external, built-in staircase. The floorplan evokes traditional typologies of enclosure around a central courtyard that may be found throughout the Mediterranean, with additional, subtle references to the formal attributes of the Mycenaean *megaron*. The richly textured facades with the extruded mortar joints animate the thick stone walls in the changing light, mitigate the severity and austerity of the single, solid mass. Consistent with the GNTO's policy for small-scale spatial interventions that harmonise with the surrounding landscape, the design of the pavilion distinguishes itself for its gentle geometry and its tempered modernism. The *pièce de résistance* of the restaurant's decoration was a now-lost large-scale portable fresco by artist Nikos Nikolaou - with prehistoric iconography rendered in a modern style - hanging over the fireplace [16] (Figure 1).

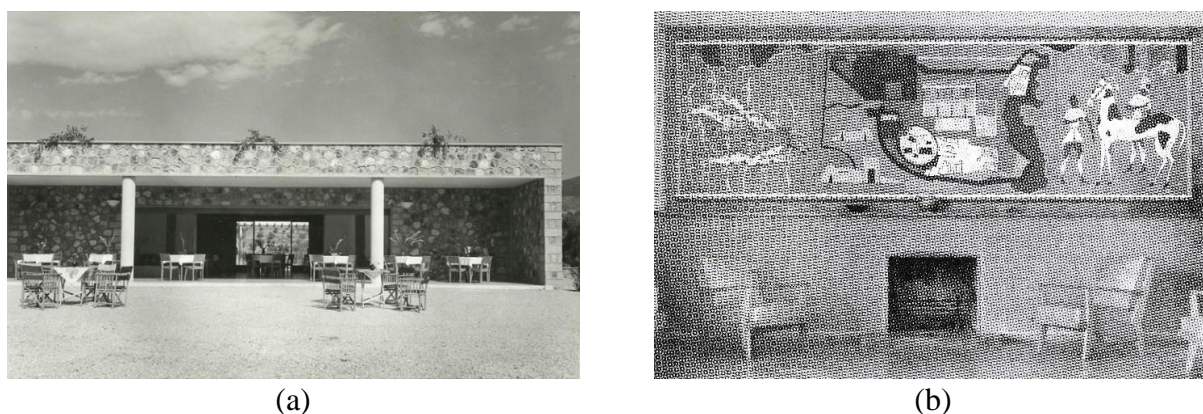


Figure 1. Mycenae Tourist Pavilion: (a) South facade | photo: S. Meletzis (c.1957) © Ministry of Infrastructure and Transport photographic archive | source: D. Krasonikolakis (2017) *Fourteen tourist photos of the Greek countryside*, (b) Main hall - fresco by N. Nikolaou | photo: N. Tombazis (1953) © Benaki Museum Photographic Archives | source: T. Sotiriou (2016) *Mycenae tourist pavilion*

The final synthesis - like most of the state-run tourist facilities of the era - can be characterised as an example of an early 1950s attempt at total design, since it involved many interlocking levels of spatial intervention, such as the organic integration of the pavilion into a dynamic network of distant tourist facilities, its placement in a sensitive historic and natural environment, the design of a well-functioning restaurant, the synergy of art and architecture, and, finally, the design of furniture and other fixtures in accordance to the overall visual identity of the Xenia network. The pavilion operated all year round and provided a popular venue for a wide range of activities for both tourists and locals. In addition to its basic function as a café-restaurant, it provided a suitable setting for events and celebrations - on occasion attracting audiences of up to a hundred people - and, on special functions,

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according to local narratives, its few rooms hosted eminent personalities. The tourist pavilion remained popular until the early 1990s when the property lease expired and the building was abandoned. This happened at a time when the ascetic design and vacation philosophy promoted by the Xenia programme began to fade out of fashion and a new model of leisure was emerging both in Greece and abroad [17]. At the same time, this was a transitional period for the GNTO, which now focused on promoting tourism in Greece, thus abandoning its ambitious, multifaceted construction programme of the previous decades [15]. Furthermore, despite their architectural qualities, the fact that GNTO tourism facilities were unable to adapt to the new energy performance and seismic safety measures and regulations made their rehabilitation and retrofitting particularly demanding. The Mycenae Tourist Pavilion is comparably in good condition, despite the vandalism it has suffered during its long neglect (**Figure 2**).



Figure 2. Mycenae Tourist Pavilion, current condition (a) South facade | photo: Authors, 2023
(b) Main hall | photo: Authors, 2023

To manage and exploit the properties owned by the GNTO, *Hellenic Tourist Properties SA* was established in 1998. In the years that followed, and in particular since 2001, every exploratory proposal aiming to reactivate and develop the site, most recently in 2010 with a feasibility study by the then Municipality of Mycenae, came to a dead end for various reasons. In December 2010, the ownership of the property was transferred to the present-day *Hellenic Organisation of Cultural Resources Development (HOCRED)*, operating under the supervision of the Ministry of Culture and Sports. Since then, no action has been taken, while, at the same time, due to its omission from the first documentation of the historic Xenia network, the official listed status of the building as a monument of cultural heritage is still pending.

However, despite its long abandonment and worn-out condition, the pavilion is still attractive; summer travelers with their motorhomes find a cool shelter for an overnight stay in its lush and onerous landscape while groups of local youths appropriate it for fleeting moments of escape. According to oral testimonies, it has also served as the natural setting for a modern/contemporary play, but this has not been verified. The Mycenae Tourist Pavilion, entangled in bureaucracy and state inertia, fading in the memories of the community, and condemned to the ravages of time, waits for its reactivation in the contemporary daily life of the community through a coherent long-term strategy for its adaptive reuse that will lead to its reconnection with the place and essentially to its sustainability.

4. THE WORKSHOP EXPERIENCE: TOWARDS THE TEMPORARY REACTIVATION OF THE PAVILION

To this end, two art and architecture workshops were designed and organised by our team in the context of the second (2022) and the third (2023) *Fichti Art* festivals that took place in Mycenae and the nearby village of Fichti. They were populated by faculty and students from the following

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academic institutions: Department of Architecture, Aristotle University of Thessaloniki; Department of Interior Design, International Hellenic University; School of Humanities and School of Applied Arts and Sustainable Design, Hellenic Open University. Both workshops were organised as a reflection on the aforementioned case-studies, where the temporary reactivation of architectural heritage increased public scrutiny over the fate of endangered buildings and ultimately led to their restoration and reuse. The workshops aimed at raising awareness both in the local community and a wider - though specialised - audience, comprising architects and artists, about current aspects of cultural heritage and identity reclamation, through the creative mediation of cultural memory. The short-term goal of the workshop was different each year, and so were the actions-events that took place. These are briefly discussed in the following sub-sections.

4.1 Pavillon Abandonné - Experiential Learning Workshop of Architectural & Artistic Investigation - Mycenae 26/07- 01/08 2022

The first workshop had multiple aims. In particular, it utilised the material/spatial trace of the decommissioned tourist pavilion as a vehicle for renegotiating lived or even imagined experiences and reactivating local memory. In the context of this workshop, students formulated policy pilots and devised conceptual protocols for the critical reactivation of collective memory and the reintegration of the tourist pavilion in the contemporary life of the local community. More specifically, students engaged in three successive but interconnected stages of reflection that included: a) memory mapping, b) spatial experience mapping and c) transcribing lived memory and experience into spatial imprints. The first goal of this workshop involved aspects of memory mapping and documentation of the vandalised pavilion. After its abandonment, all furniture and equipment was removed, including the fresco that adorned the wall above the fireplace. During the first stage of the workshop the collection of archival material provided information about the history and the operation of the pavilion. This material, although limited, offered great insights into its routines. In addition, the pavilion was mapped using photographic, video and architectural drawing techniques, leading to the thorough updating of the official blueprints of the building. During this phase, the kaleidoscopic recording of the local community's living memories and experiences was also pursued through (a) the collection of personal mementoes (i.e. family photographs, etc.), as testimonies of their relations with the tourist pavilion, and (b) the recording of interviews, in the vein of a typical oral history project, with a view to develop a dynamic cultural memory archive and to explore the potential for the adaptive reuse of the pavilion. Oral narrations pointed out the problems, needs, objectives and aspirations of the community. Collecting all this information and documenting the pavilion in as much detail as possible will serve as an important basis for our preliminary restoration and reuse feasibility study, i.e. the main focus of our next workshop.

This phase also involved the multimodal and multimedia mapping of the experience of walking through the site via the creative documentation of various trails, designating the tourist pavilion as a crucial reference point. Using a common/free mapping tool (i.e. Google Earth), many official/public and unofficial/private landmarks of the region, including the tourist pavilion, were introduced into a common, annotated cultural database as pins on a user-friendly, interactive digital map of the wider area. Different types of pins corresponded to different kinds of monuments (i.e. natural, cultural, historic, etc.). Utilizing the abandoned railway station in Fichti as a starting point and the archaeological site of Mycenae as the final destination, and vice versa, the mapping tool calculated different routes, based on the preferences of the user, where the tourist pavilion served as an important stop, thus reinstating it as a node of a re-imagined local cultural 4km-wide network (**Figure 3**). The tool would calculate mono or multi-thematic walks (i.e. nature, culture, history, etc.), e.g., combining pre-historic burial sites with the happenings organized by the *Fichti Art* festival. The final deliverable, the interactive map, was presented to the local community in situ, during the festival, provided a

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platform for the dissemination of our work and functioned as a *digital diary* that may be used as a guide for future workshops and, most crucially, by the local community for memory reactivation.



Figure 3. Experiential Learning Workshop of Architectural & Artistic Investigation (a) The re-imagined local cultural network | image: Authors, 2022 (b) Main hall | photo: Authors, 2023

4.2 *Pavillon Relancé* - Experiential Learning Workshop of Architectural & Artistic Investigation - Mycenae 24-31/06/2023

The experiential architecture and art workshop *Pavillon Relancé* furthered the explorative framework and extended the ambitions of the previous workshop (*Pavillon Abandonné*). In particular, it sought to reactivate the living memory of the Mycenae Tourist Pavilion through targeted actions, inspired by the history and the architectural qualities of the building. The content of these actions was the objective of working groups comprising architects and artists. Archival material collected and interviews conducted during our previous workshop provided a sound foundation for the speculative investigation into the different habitation scenarios of the tourist pavilion. In an effort to convey a sense of function and scale, we created luminous traces of the original furniture and prop layout on the pavilion's ceramic tile floor, identified through research, while original light features were installed along the main longitudinal wall. In addition, the main hall, namely the café/restaurant and the outdoor serving area, were partly re-furnished with the vital contribution of the local community. To recall its former glory and to highlight its neglect, archival photographs of the pavilion's former condition were also put on display at selected locations. This also provided a way to juxtapose our installations against printed testimonials of the pavilion's original atmosphere. Additionally, to enhance the feeling of place, the team studied the soundscape of the site and designed a new soundscape - a speculative investigation into the original sounds that corresponded to the years of its heyday - as an important environmental element that provided opportunity for reflection. At the same time, artists from the Department of Fine and Applied Arts of the University of Western Macedonia captured the special atmosphere of the derelict pavilion, reflecting on its relationship with the surrounding area and the topography of the Argolic field through installations in the atrium, the kitchen and other areas. This curated 'revival' of the pavilion (**Figure 3**) served as the dynamic backdrop for a spontaneous event that took place in its courtyard on the closing day of the festival. It offered our guests a unique opportunity to experience this long-disused and depreciated edifice as a temporary artistic event, while showcasing the extreme potential that lies in its future spatial reappropriation through the transformative practices of remembrance.

5. CONCLUSION- FUTURE CHALLENGES: HERITAGE AND ADAPTIVE REUSE

This paper demonstrates how the mediation of collective memory is being used in temporary creative practices that re-imagine historic buildings as *social condensers*, connecting the public to their historical past, both recent and distant, while creating new, contemporary memories by inspiring the community to engage in the co-evolution of its architectural heritage. Such approaches, it is argued, bring together the social, creative and scientific capital of the community and act as a lever to activate not only residents but also stakeholders and policymakers towards seeking solutions for the viability of endangered historic buildings. However, the case of *Kunsthau Tacheles* is a reminder of the susceptibility of abandoned heritage to political and bureaucratic intrigue, both past and contemporary, that offers overly reductive, simplistic interpretations of cultural and collective memory, rendering it into instrumentalised and marketable narratives, driven by international trends and therefore not adapted to the memory and identity of the place.

Argolis, an area that in the recent past spearheaded Greece's bid for a thriving tourism market, is a par excellence example of a place that seeks to adaptively reuse its disused tourism infrastructure for the benefit of its citizens. Our experience with the two workshops provided us with a valuable opportunity to document the Mycenae Tourist Pavilion through an exploration of its multiple interactions with the surrounding environment and the locals, both in the physical space of their daily routines and in their memories. The exploitation of these outputs in the temporary re-activation of the pavilion constitutes a critical contribution to the discussion of the notion of collective creativity. Moreover, this active and interactive approach led to the revival of local memories and functioned as a kind of maieutic process that enriched our research. Future actions anticipate the active involvement of the local community and various stakeholders (e.g. the local authorities, the local ephorate of antiquities, local arts and culture societies, etc.) with the aim of exploiting the site's capacity to host architectural and artistic events, i.e. a reactivation of the tourist pavilion of Mycenae and its experimental integration into the local network of existing cultural sites and routes. Finally, the ultimate goal of the project is the development of adaptive design proposals based on the needs of the local community, the potential of the site and the requirements of the spatial context. Ultimately, the paper discusses a realistic and coherent long-term approach in the building of cultural identities and sustainable communities that assesses the complex and multilayered connections of the place and values the role of cultural and collective memory in the adaptive reuse of heritage.

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Protection or Isolation Boundaries? Designating the cultural heritage in a Greek contemporary city

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Extended abstract

Protection boundaries are always a point of concern in every restoration and designation project on archaeological sites, architectural ensembles and monuments. Architects' desire for appropriate integration of the monuments in the daily life of citizens as part of Greek contemporary cities' public space contradicts the regulatory framework promoted by the ephorates managing our cultural heritage. Restoration of monuments within urban areas in Greece is not usually accompanied by a corresponding procedure for integration and restoration of the relation that these buildings had with the rest of the city and citizens in the past. On the contrary, in the majority of restoration and projects, distinct and impassable boundaries are intentionally emplaced between the monument and the city. Boundaries' The form of these boundaries usually goes beyond the one of a simple fence and is emphasized through its architectural design, the choice of plantings and other configurations. Such boundaries are proposed and constructed both in the surrounding area of detached monuments and in restored complexes, even of the newest architectural heritage, such as in industrial complexes and complexes of educational buildings among others. Examining the issue of the boundaries through urban plans of Greek cities, mainly in northern Greece, since the beginning of the 20th century, the difference is identified, in the way important landmarks were integrated and opened to the city and citizens in the past. Main roads and road network organization of the cities were performed in a way that allowed monuments to be featured and to ensure suitable viewing conditions. A typical example is the city of Thessaloniki where, in Hebrard's plan for the reconstruction of the city's stunned zone, the landmarks consist of points of a cultural heritage network, on which the new urban plan was articulated. On the contrary, in Greek contemporary cities in an attempt to over-protect the monuments, this relation has changed and often the boundaries proposed to protect the monuments eventually lead to their isolation from the city, also degrading their image. At the same time, this isolated zone on the perimeter of the monuments often offers the right conditions for the action of fringe groups, turning the area into a ghetto. Through the presentation of the above-mentioned issues, regarding the necessity or not of the boundaries between the monuments and the city, the form they usually take in Greek contemporary cities and the presentation of different alternatives, a concern for the improvement of the form of the boundaries in a way that protection and real monuments' designation and integration co-exists, will arise.

Keywords: *cultural heritage; security boundaries; contemporary Greek city; isolation boundaries*

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Transformations in the city of Kavala: The Evolution of a Tobacco – Centric Urban Center and its Socio – Economic Impacts

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Abstract

The present paper delineates the chronological evolution of Kavala as a tobacco city, spanning from its prosperous era in tobacco production to the gradual fading of its tobacco identity. It highlights the alterations in the urban fabric that have steered the city towards its present condition within a socio – economic context. Kavala, situated in Northern Greece, boasts a deep – rooted history entwined with tobacco production. Positioned within Eastern Macedonia and Thrace, an administrative region in the northeastern part of Greece, Kavala functions as one of its principal seaports.

Due to its advantageous seaport location and favorable climate and soil conditions, the city has a historical tie to tobacco cultivation dating back to the late 19th century. By the early 20th century, it had risen as a significant tobacco center, marked by the construction of tobacco warehouses dedicated to processing, production and trade. The surge in tobacco production attracted international investors to the city, particularly during the first half of the 20th century. This influx was accompanied by the affections of European urban models, that led to modernization and development of the town.

The infusion of wealth from the tobacco trade spurred economic prosperity in the city, propelling its urban advancement. Tobacco merchants funded the construction of tobacco warehouses and commercial structures, while grand mansions and infrastructure projects were undertaken to meet the demands of the burgeoning industry. The cityscape underwent a significant transformation with the erection of new buildings, influenced by emerging urban models, as well as the establishment of trading centers, all of which became integral parts of the urban fabric. This metamorphosis was accompanied by the migration and temporary relocation of populations seeking employment opportunities and goods, leading to further changes within the city.

Under such conditions, Kavala emerged as a primary tobacco - centric urban hub, especially during the first half of the 20th century, being called as ‘Mecca of tobacco’. This designation fueled economic growth, fostering job creation and bolstering local revenue streams. It further brought about social changes, facilitated by the influx of migrants seeking opportunities, thereby fostering cultural diversity and demographic changes. However, the city began to shift away from its tobacco – centric identity in the latter half of the 20th century, mostly because of the ongoing construction activities during that time. These transformations altered the city’s profile, leading to the gradual fading of its tobacco identity alongside a rapid overhaul of the urban landscape.

Keywords: *tobacco, tobacco city, urban evolution, socio-economic implications, Kavala*

1. INTRODUCTION

Tobacco originated in North America, with its earliest mentions in Europe dating back to the 16th century. It was officially introduced to Europe from America, with the first tobacco crops being cultivated in Portugal, Spain and France [1]. In Greece, tobacco cultivation appears in the early 17th century, preceding the establishment of the modern Greek state. The importation of tobacco is believed to have initially occurred in Thessaloniki. Presently, Greece ranks second globally in oriental tobacco production and is one of the eight countries holding the 99% of tobacco production in the European Union, alongside Italy, Spain, Croatia, Bulgaria, Poland, Hungary and France [2]. The country boasts a rich history in tobacco cultivation.

Within Greece, Eastern Macedonia and Thrace stands out as the leading region in tobacco production, believed to be the area where its cultivation first began. It is widely regarded as one of the most significant areas globally for producing top-quality tobacco for cigarettes alongside Smyrna-Sampsouda and Bafra on the southern coast of the Black Sea [3]. The fact that tobacco cultivation and processing in Macedonia and Thrace is included in Greece's National Inventory of Intangible Cultural Heritage, under the title: "The cultivation and processing of Oriental Tobacco in Macedonia and Thrace" [4], demonstrates its cultural importance. Situated in the south-western part of Eastern Macedonia and Thrace, Kavala boasts a rich history in tobacco cultivation, production and trade.

During the 20th century, Kavala earned the titles 'Mecca of tobacco' and 'Tobacco City of the Balkans' [5], because of its strategic geographical location, favourable climate and soil conditions and its prominent seaport, which facilitated the transportation of tobacco. These factors stimulated city's economy and led to rapid population growth, industrial development, and craftsmanship, fundamentally altering its profile. During this period of prosperity, the city acquired a diverse cultural identity. These changes significantly influenced its socio – economic condition, as indicated by the altering urban environment. Kavala experienced peak prosperity during the early 20th century tobacco boom, followed by a gradual decline in the tobacco industry during the latter half of the century.

2. HISTORICAL TOBACCO TRACES

Tobacco industry first appeared in Kavala prior to the Greek War of Independence of 1821 [5]. The emergence of tobacco warehouses followed after 1864, primarily located in the coastal area of the city to capitalize on its seaport, facilitating the transportation of tobacco products to and from the harbor for international imports and exports [6]. By 1838, seven tobacco companies had been established in the city, specializing in the production, processing and trade of tobacco [7].

The growth of the tobacco industry in Kavala begun to accelerate towards the end of the 19th century, particularly from the 1860s onwards, aligning with the establishment of tobacco subsidiaries headquartered in New York, Cairo, London and other major cities [7]. Skilled workers from Turkey and Alexandria arrived in 1880s, specializing in cigarette rolling to ensure an optimal smoking experience [8]. In 1883, a tobacco tax was introduced, followed by the importation of the first cigarette production machines a year later [1]. By the end of the 19th century, tobacco had emerged as a significant crop in the city, strengthening the local economy and providing livelihoods for many residents.

2.1. The 20th century tobacco boom

The first half of the 20th century is characterised by a substantial expansion of the tobacco industry. By 1900, the largest portion of tobacco trade was dominated by Jewish – owned companies, such as the Commercial Company and Oriental Tobacco. These companies were responsible for exporting 70% of the tobacco produced in the regions of Kavala, Xanthi and Drama in Eastern Macedonia and Thrace, as well as Serres in the Central Macedonia Region [6].

Several factors contributed to the significant growth of the tobacco industry in the city, including its strategic location and port, as previously mentioned, along with the cultivation of a specific type of tobacco known as ‘Basma’, a variety of Greek oriental tobacco. Basma, as all Greek oriental types of tobacco, is renowned for its exceptional flavour and high quality, attributed to the geological composition of the soil, favourable climate conditions, and extensive expertise in its processing gained from a long tradition of cultivation [9]. This superior aromatic tobacco, garnered considerable demand in European markets.

As depicted in the table provided [Fig. 1], Kavala emerged as a leading commercial tobacco processing centre in the early 20th century. Between 1925/29 and extended until 1945/54, Kavala held the highest percentage of tobacco processing businesses, while Xanthi experienced a consistent decline. Following 1955/64, Kavala also witnessed a downturn, contrasting Thessaloniki’s trajectory. Utilizing its port, the city emerged as the primary tobacco hub for tobacco exports in Europe, solidifying its status as a pivotal centre of economic activity until 1950s.

Name of the city	1925/29	1930/39	1945/54	1955/64	1965/74	1975/84
Thessaloniki	12,3	21,8	30,7	40,6	67,1	80,3
Kavala	28,8	29,7	36,1	25,2	13,6	9,7
Xanthi	14,1	7,3	7,5	6,8	3,1	3,6
Drama	8,1	4,4	6,2	4,2	1,3	1,0
Volos	5,1	10,5	3,7	7,3	4,9	2,1
Serres	5,5	4,2	5,0	3,9	2,4	1,2
Piraeus	3,9	5,5	3,4	3,4	3,2	0,1
Agrinio	3,5	5,0	3,7	3,4	4,3	1,5
Samos	2,9	1,9	1,2	1,0	0,1	0,1
Komotini	2,8	0,9	0,8	0,7	0,3	0,2
Rest of the cities	3,0	8,8	1,7	3,5	0,3	0,3
Sum	100,0	100,0	100,0	100,0	100,0	100,0
Number of the cities	48	61	17	16	12	10

Figure 1. The primary commercial tobacco processing centres from 1925 to 1984 in Greece [10].

This phenomenon not only enhanced its tobacco revenues but also solidified its reputation as a tobacco processing centre. The economic prosperity fuelled by the tobacco trade prompted the construction of the warehouses, initially smaller during the early stages of tobacco cultivation and expanding significantly during the tobacco boom period.

2.2. Tobacco constructions

Tobacco gained popularity in Greece from the mid-18th century, with small tobacco shops being established in bustling markets and residential neighbourhoods to cater to smokers. As the cigarette industry evolved, the demand of processing, storing and selling tobacco grew. Consequently, tobacco warehouses were constructed serving as one of the most notable remnants of Kavala’s tobacco heritage. These remarkable buildings, erected during the late 19th and early 20th centuries, served as storage and processing centres for the abundant volumes of tobacco leaves harvest in the region.

In the early stages, tobacco was stored in small single – storey buildings or in the ground floor and basements of the merchant’s homes. By the end of the 19th century, two – storey tobacco warehouses with load – bearing stone construction and internal wooden beams, covered with Byzantine-tile roofs. On the first floor, tobacco leaves were placed on wooden racks to protect them from moisture, with smaller openings along the perimeter for ventilation and sun protection. The second floor was dedicated to tobacco processing, featuring larger openings for natural light [1]. Gradually, larger

warehouses were constructed due to the growth of tobacco trading. Some used international materials like stone and wood, while others incorporated neoclassical and eclectic elements. These buildings confirm the tobacco industry's prosperity and significance during its peak.

As mentioned earlier, the warehouses were initially concentrated in the coastal area, but gradually expanded throughout the entire city. Some warehouses formed clusters, often owned by the same trader and sometimes connected via small metal bridges, while others stood alone, scattered across the cityscape in various locations. In addition to the warehouses, small tobacco shops were dispersed throughout the city for the sale of cigarettes and other tobacco products.

Apart from storage, production and sales, preservation offices were established in Kavala, Volos, Thessaloniki and Agrinio in 1925. These offices were consolidated into a single administrative entity in 1942, known as the Autonomous Organization for the Protection of Greek Tobacco [11]. In 1957, it was renamed the National Tobacco Organization (EOK). The organization, established to safeguard the tobacco industry, had its headquarters on Palaiologou Street in the city centre of Kavala, originally purchased by the Swedish Tobacco Monopoly [12]. The EOK warehouse was designed by the renowned architect Leandros I. Zoidis and constructed in 1958 (completion of the first phase), with completion in 1960 (second phase) [13].

The construction of new buildings and the adaptation of existing ones for tobacco – related purposes, including warehouses, shops and organizations/services, prompted the development of new infrastructure, such as widened roads. This also facilitated the acquisition and expansion of equipment and general facilities to support business growth. These factors resulted in substantial changes in the cityscape during that era, which continued to evolve over time.

3. CITY TRANSFORMATIONS & SOCIO – ECONOMIC IMPACTS

The history of Kavala is rich with diverse cultural influences and economic developments. Particularly, from the late 19th century onwards, the tobacco trade emerged as the city's defining attribute. During the same period, smoking habits underwent changes, with traditional practices such as chewing tobacco or nasal inhalation gradually being supplanted by rolling cigarettes, while hookahs and pipes fell out of favour [14]. By the turn of the 20th century, Kavala had already established itself as a significant hub for the tobacco industry, attracting substantial migration to the city both in search of employment opportunities and as consumers seeking tobacco products. This is evidenced by the employment of 6.000 workers by three major tobacco companies in their numerous warehouses at the beginning of the 20th century [7], with the number of tobacco workers increasing to 14.000 by 1930 [15].

The flourishing tobacco industry attracted a sizable labour force, resulting in notable demographic shifts in the city. The influx of workers from various regions enriched the city's demographic diversity and cultural vitality. Employment within the tobacco sector provided steady livelihoods for numerous families, thus improving their living standards. Until the 1950s, a significant expansion was observed in the number of tobacco workers. During this period, tobacco cultivation occupied 50% of Greece's total cultivated area, providing employment for approximately 200.000 households and creating additional jobs for 18.390 tobacco employers. Kavala had the highest number of employers, exceeding even Thessaloniki, with 7.693 and 5.082 tobacco workers, respectively [16].

Under these circumstances, coinciding with the influx of migrants, the city experienced gradual expansion. Specifically, in 1923, Kavala comprised five primary districts, as depicted in the map provided [Fig. 2]. Within the old city of Kavala, there were three Muslim districts- Kadi Ahmed Efendi, Huseyin Bey and Halil Pasa-, one Christian district, Panagia region and the central area known as 'Ibrahim Pasa'. In the eastern part of the town, three Muslim districts - Hamidiye, Selimiye and Yeni Mahalle- were present. Progressing westward, the districts have a multicultural profile, designated as Gomlek Dere, Kucuk Mahale, the Jewish District and the new central areas of the city.

In the northern part of the city, the districts were the Saint Paul and Caylar. Lastly, in the western part of the city, the districts were the Saint John and even further west, Kuguk Orman.

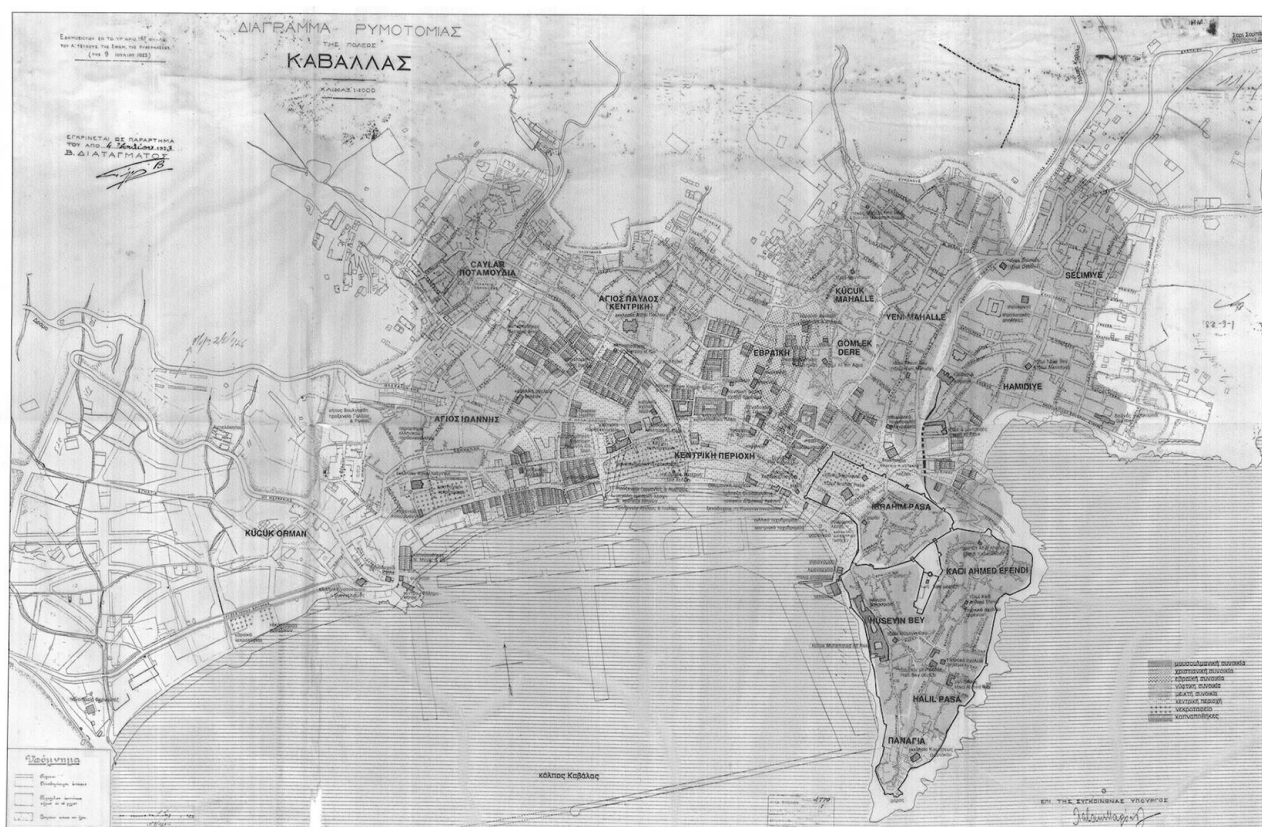


Figure 2. City Layout Plan, 1923 [17].

Based on the provided information, the cityscape during this period reflects a rich tapestry of multicultural elements. The eastern part of the city was predominantly inhabited by the Muslim community, while the northern and some of the western districts, surrounding the city centre, were populated by Christians. In the old city of Kavala, named as Panagia, there was a mix of Muslim and Christian populations, alongside a diverse central area. Moving from the western to the central part of the city, a fusion of cultures could be observed, including Jewish, Muslim and Christian inhabitants. The western part of Kavala seems to have been a Muslim district as well.

During this time, the city's population profile comprised Turks/Muslims, Jews, a few Greek Orthodox families and a small number of Armenians. Additionally, by 1910, the Bank of Athens, Bank of Thessalonica, Imperial Ottoman Bank and several independent bankers (including Benveniste M., Kolokithas M., Proropapas G. D., Herzog M. et Cie and Sarikas Zisis P.) were functioning in the city [15].

The city underwent significant changes by the establishment of the refugees and the overall development of the tobacco production that led to its economic advancement. The refugees in Eastern Macedonia and Thrace the year 1923 were 80.691 [18] while Kavala in 1928 had 56,90 % refugees of the city's overall population [19]. The first initiatives to manage the influx of refugees in the city, were launched in 1923 by the newly established Refugee Relief Fund, under the auspices of the Local Council for Refugee Welfare and Housing. During this initial phase, constrained by urgent needs and limited financial resources, the authorities opted for temporary and short-term construction solutions [20]. Consequently, a total of 1.975 houses, mosques and institutions were allocated for the resettlement of refugees [20].

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Before 1924, in the Kuguk Orman, the Hamidiye and the Selimiye neighborhoods and on exchangeable properties, a total of around 213 residencies and 253 single – room, one – storey shanties were built. These structures primarily utilized stone for foundations, wooden superstructures and roofs made of tap paper. However, following 1924, the government shifted towards a more comprehensive approach to address the refugee issue by constructing multi-storey buildings [20].

Within this context, two refugee settlements were established in the undeveloped western and eastern regions of the city, known as ‘Chilia’ and ‘Pentakosia’, reflecting the number of the families to be resettled (1000 and 500 respectively). The former was situated in the Kuguk Orman district, while the latter was located in the Hamidiye region.

Furthermore, alongside the population shifts resulting from refugee influx and tobacco labour, the broader movement of people from both Greece and abroad, mainly for investments in the tobacco industry and for tourism purposes to explore the ‘Mecca of tobacco’ and acquire the exceptional tobacco available in this multicultural city, would reshape Kavala by modifying its social composition.

During the tobacco era, the city was completely centred around tobacco at all levels, a characteristic evident in every aspect of its landscape. Residents witnessed tobacco activity throughout their daily lives, with tobacco trucks loading and unloading products at warehouses and transporting them to the port. Smoking was widespread across the city, and shops specialized in selling tobacco products flourished. Tobacco warehouses multiplied across the cityscape, driven by its significance in the local economy. Visitors arrived in the city as customers in order to purchase the finest tobacco products from the ‘Mecca of tobacco’ of that period. Additionally, various amenities such as restaurants, hammam baths, hotels, and other facilities experienced development during this time [21], primarily driven by a combination of factors including the multicultural environment, the tourist appeal arising from Kavala’s tobacco-centric identity, and its overall economic prosperity.

Therefore, the accumulation of wealth and industrial activity in Kavala, gave rise to a thriving middle class. The city’s cultural and political landscape was further complemented by the establishment of educational institutions, cultural groups and political movements. Types of tobacco clubs formed by the communities, including the Grand Commercial Club and the Tobacco Workers Club [21] and subsequently this role of the worker’s organizations led to the establishment of larger political movements. This development, in turn, caused a series of significant strikes in the city. The socio-economic profile underwent transformation, with progress facilitated by the tobacco industry contributing to a vibrant urban community.

While tobacco remained the fundamental element of Kavala’s economy, the wealth it generated enabled diversification. Entrepreneurs began investing in sectors such as shipping, commerce and subsequently tourism, thereby establishing a more resilient economic foundation for the city. This stability played a crucial role in mitigating the impacts of fluctuations in the global tobacco market. During that period, the city could be aptly described as a kinetic city rather than a static one, signifying a city characterized by motion and activity, where buildings and infrastructure supported the functions of construction and residents’ lives. Consequently, the prosperity stemming from the tobacco trade fostered urban development in Kavala, resulting in the emergence of new neighbourhoods, structures and infrastructure, ultimately contributing to the city’s expansion. The cityscape during this period evolved to accommodate a growing and economically active population.

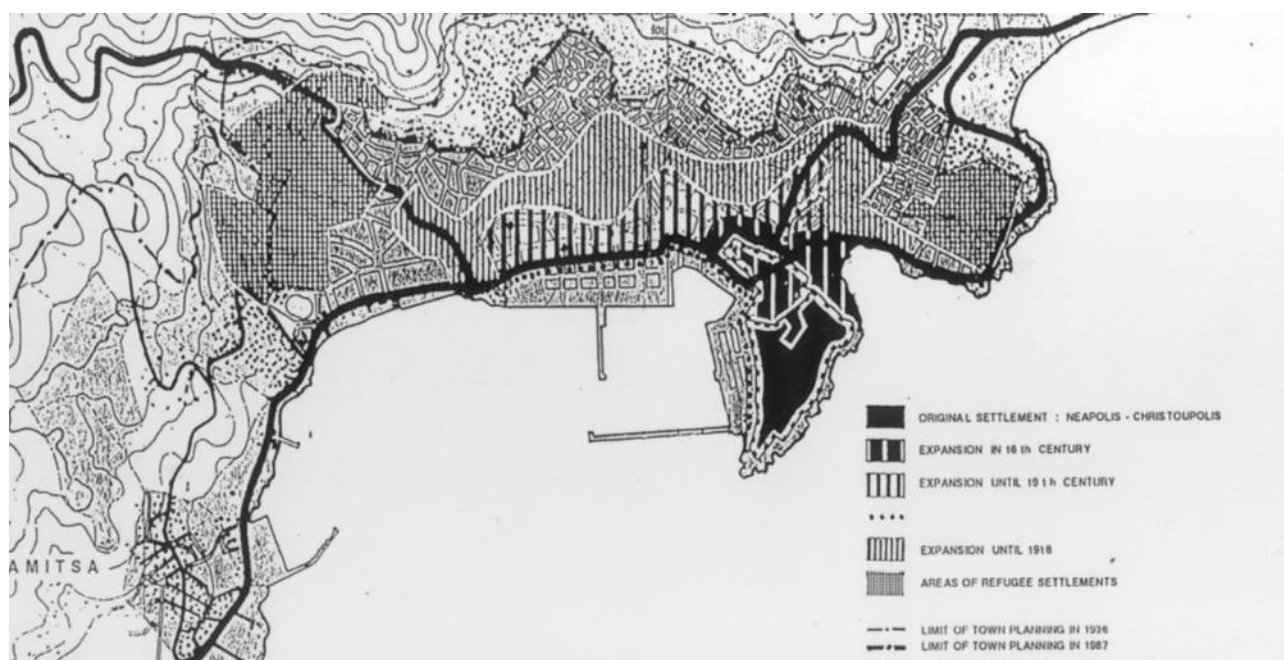


Figure 3. Evolution over time and stages of the development of Kavala [15].

The map [Fig.3] displays the evolution of Kavala’s cityscape over time. Prior to the 19th century, the city predominantly expanded around the walls of the Panagia region (now known as the old city of Kavala), with limited expansion along the central coastal area. Subsequently, until 1918, the city’s growth extended northward and slightly to the east and the west. The most significant changes occurred with the establishment of refugee settlements, as mentioned earlier, and the influx of tobacco workers which shaped Kavala closer to its current form. Substantial transformations occurred in the following decades, particularly in the 1960s and 1970s, characterized by extensive construction activities that transformed it into a ‘concrete city’.

These constructions were built using manufacturing techniques that departed from the architectural and decorative norms previously dominant in the region [22]. They profoundly impacted the city’s architectural landscape. Not only did the introduction of vertical multi – storey structures changed the general characteristics of the city by altering its skyline but it also significantly influenced the tobacco heritage and the overall profile of the city. This shift marked a transition from a tobacco – centric city to a standard Greek mid – sized city. Subsequently, a downward trend occurred, especially after the mid – 70s, as the industry shift to marble production, textiles and tourism. The last two tobacco warehouses were constructed in the 1990s, while during the same period (1992), approximately 1.500 workers remained employed in the city [15].

The changes in Kavala’s districts from the beginning of the 20th century to the present can be observed in the map below [Fig. 4], in contrast with the map that illustrates the old districts [Fig.2]. The correspondences between the neighbourhoods in 1923 and now are generally as follows (old district’s name – newer district’s name): Selimiye-Perigiali, Hamidiye – Pentakosia & Agia Barbara, Kadi Ahmed Efendi & Halil Pasa & Huseyin Bey & Panagia Region – Panagia, Ibrahim Pasa & part of the central city – Agios Nikolaos, Yeni Mahalle – Agios Athanasios & Sougelo, Kucuk Mahalle – Horafa, Complek Dere & Jewish District – Saint George, Part of the Jewish District – Saint Elias, Saint Paul and the central area of the city are the same, Caylar – Lazeika & Part of Potamoudia District, Saint John – Dexameni & Saint John, Kucuk Orman – Vyronas and the region that the city centre is located, remains the same.

The comparison between the 1923 and the present not only highlights significant changes in the city’s expansion due to the establishment of refugees, the tobacco trade and the ongoing construction in the

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1960s and 1970s, but also indicates the decline of its multicultural and tobacco identity. The renaming of districts reflects alterations in the cultural and overall profile of the city. While Panagia remains a district with the fewest modifications, along with the city centre, all other neighbourhoods have undergone resettlement.



Figure 4. The districts of Kavala today [Google earth self – processing image| 23].

The aforementioned transformations are additionally amplified by the dispersion of tobacco warehouses throughout the Kavala landscape over time, serving as significant heritage landmarks. Initially, there were 144 tobacco warehouses in the city, but today only 49 remain [12]. In the early 20th century, these warehouses were distributed throughout the city, with clusters observed in the coastal area, the city centre and the northern part of the city centre, while others were scattered across the cityscape [Fig. 5]. However, today, many of the warehouses in the coastal area and elsewhere in the urban fabric have been demolished and replaced by newer constructions.

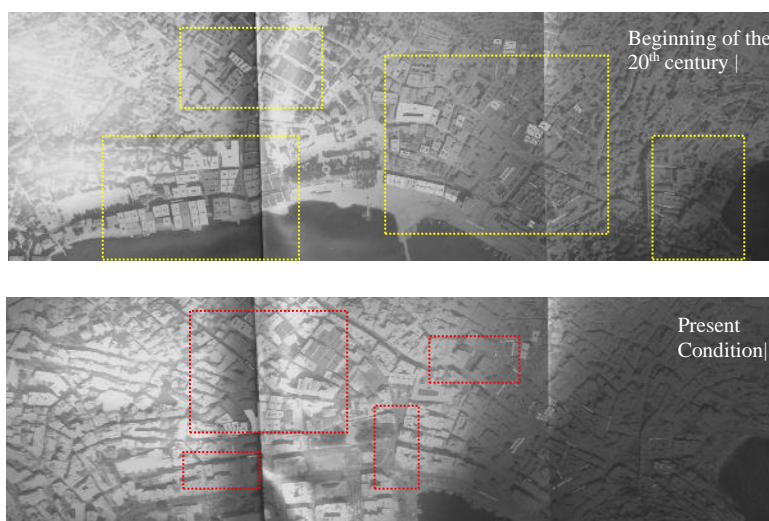


Fig. 5. Tobacco warehouses in Kavala during the beginning of 20th century compared to their current state [21]

Important tobacco buildings, primarily Tobacco Organizations, played a significant role to the city, due to their function and use. These buildings were distinct from typical storage facilities because of

their hosting administrative offices, public services and else (that are related with tobacco), attracting a different demographic profile beyond just tobacco workers. One of the most notable buildings from both past and present is the National Tobacco Organization building. It now hosts the Tobacco Museum of Kavala in the ground floor and some administrative offices in the upper floors. Located in the city's central region, its distinctive architecture and current use as a museum make it a significant landmark.

In addition, other former warehouses have been repurposed. The Reggie Shopping Mall, the Municipal Tobacco Warehouse (now a cultural venue), and some entertainment centres and bars have all found new uses. However, most of the remaining buildings have been abandoned and face demolition, reflecting the overall decline of the tobacco industry in the region. Today, only one active enterprise and its possible subsidiaries remain.

Hence, some limited efforts are being made to repurpose and restore the warehouses. The Institute of Social Movements and Tobacco History plays a crucial role in these endeavours. Established with a mission to preserve and enhance the tobacco heritage, the Institute organizes a variety of events, conferences and festivals dedicated to tobacco cultural heritage. These activities highlight the historical significance of tobacco and foster community engagement and awareness.

4. CONCLUSION

In conclusion, tobacco heritage has left its traces in Kavala, mostly through the existence of tobacco warehouses scattered throughout the cityscape. Urban transformations have had significant socio – economic impacts, reshaping the physical environment and influencing social and economic dimensions. The rejuvenation of urban areas, infrastructure development, and new economic opportunities created a vibrant environment during the tobacco era.

Kavala's tobacco history began in the 19th century, flourished in the early 20th century and declined in the latter half of the century. Expansion was driven by refugee mobility, migration of tobacco workers, construction of warehouses and international investments. However, urban changes and socio-economic shifts led to the gradual disappearance of most tobacco warehouses and a reduced influence of the tobacco industry in city's identity.

Despite this decline, Kavala's rich tobacco history remains a crucial part of its cultural heritage, while physical traces may fade. The industry's impact endures, contributing to the city's unique identity. Embracing its heritage, while adapting to economic changes, Kavala can preserve its legacy and continue to develop as a dynamic urban centre with a rich historical background.

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Preserving the Past - Building the Future: a Study of Zoidis' Tobacco Warehouses in Modern Greek Urban Environments

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Extended abstract

In the ever-evolving landscape of urban development, the preservation of architectural and industrial heritage stands as a testament to collective history and identity. Within this context, Greek cities harbour a distinctive legacy in the form of tobacco warehouses, once vibrant symbols of economic prosperity and industrial prowess. As we navigate the challenges posed by climate change, these historic structures face the dual imperatives of preservation and adaptation.

This paper delves into the development of a methodology via the intersection of architectural and industrial heritage preservation, meticulous documentation practices, and the transformative potential of urban regeneration. The research subject consists of tobacco warehouses of the Hellenic Tobacco Organization (HTO) in Eastern Macedonia and Thrace, which are attributed to the architect L. Zoidis. As a result of his studies in Berlin, L. Zoidis has developed an ideal organizational building model based on a thorough analysis of tobacco warehouse types, including the completeness of the building program, the distribution of individual uses on each floor, as well as the integration of the high-rise buildings into the urban environment. The specific model appears to have been applied with minimal variations to all twelve tobacco warehouses designed by the architect and associated with his work for the Hellenic Tobacco Organization. Three of these buildings are examined in this case study: a. that of Kavala, which is currently being studied within a Research Program of the Department of Architecture at Democritus University of Thrace, b. that of Xanthi, which has been the subject of diploma theses (Department of Architecture at DUTH) based on its location and ease of access, and c. that of Drama, as the only of these buildings that is protected and declared as historic monument. Focusing on the adaptive reuse of tobacco warehouses in these Greek cities, it explores strategies that not only safeguard the cultural significance of these structures but also contribute to sustainable urban futures. The juxtaposition of heritage preservation, thorough documentation, and innovative urban regeneration emerge as a dynamic framework for cultivating resilience in the face of contemporary challenges, ultimately weaving a narrative that harmonizes the past with the imperatives of the future.

Keywords: *tobacco warehouses, urban conservation, architectural conservation, adaptive reuse, Zoidis, Xanthi, Kavala, Drama*

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Tobacco identity of Kavala: an urban landscape in transition

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Abstract

The existence of cultural heritage can enhance a city's sense of local identity, in a period of increasing competition between cities and a "reinterpretation" of the relationship between globalization and localism.

Kavala was known as a tobacco export port since the 18th century. However, intense building activity took place after 1866, with the construction of the first tobacco warehouses outside the walls surrounding the old city, in the area that later became the city center. At the end of the 19th century, the urban image of the Ottoman Empire's cities reflected the social, economic, and spatial characteristics of its industrial identity, while the economic boom led to significant urban transformations. The economic growth that occurs with the emergence of the urban class - made up of wealthy tobacco merchants, other merchants, and professionals (Christians and Jews in the vast majority), European merchants, representatives of foreign trading houses and consuls - is accompanied by demographic growth as new populations arrive to engage in tobacco processing and the construction of new buildings.

The urban landscape is therefore identified with the tobacco physiognomy of the city, as there are about 172 tobacco warehouse buildings. Moreover, the evolution of the city's tobacco identity over time influences both its social and urban transformations.

Today, most of the buildings are abandoned, while there are scattered some that are operating with new uses, whether the shells have been restored or not. Some efforts are being made, but they are piecemeal moves rather than a comprehensive initiative. Regardless of the existing institutional framework or sophisticated and adapted restoration techniques, it is equally important that the local community should recognize the importance of tobacco warehouses to the city on multiple levels. From that of collective memory, to that of the morphology and function of the urban fabric. From that of the historical identity of the place to that of its contemporary development identity.

The issue of tobacco warehouses, like many issues of collective identity and the perspective of cities, cannot be left unchecked to the market forces, because it cannot, by its nature, assume a coordinating role for the overall perspective of a place. A policy is therefore needed that takes a strategic approach to urban development, specifies the functions and role of tobacco warehouses in the urban landscape and, lastly, extends to urban planning and urban design. This policy should be accompanied by the development of a methodology for the process of restoring and re-using buildings.

Keywords: *cultural identity, urban collective memory, city in transition, tobacco warehouses, Spatial transformations.*

1. INTRODUCTION

This paper focuses on the contribution of a city's cultural heritage to the enhancement of its local identity and image, as a sustainable mechanism for development and urban regeneration. The case of Kavala represents a Greek city with a strong architectural and cultural heritage focused on the processing and international trading of tobacco from the mid-19th to mid-20th century [1,2], offering today a unique opportunity for its exploitation to cope with the contemporary needs of a city. The exploration of the role of a city's cultural heritage would be a trigger for utilizing the results of the

present study in any similar case of a city internationally that presents similar needs and opportunities to highlight its locality.

The case of Kavala, in terms of cultural heritage, focuses on its tobacco history and identity, which today is evident in a series of buildings of particular architectural beauty. These buildings, which were once used as offices and warehouses for tobacco processing and marketing, occupy a large part of the urban fabric of the city, although most of them are now abandoned, and have the necessary symbolic size to form the core of the city's image and identity [3,4].

The sense of cultural alienation and economic competition among cities makes the dynamics of the local identity and image of a region the only counterweight to these international pressures. This conclusion is evidenced by the fact that many cities worldwide are reorganising and reconstructing their images to make themselves more appealing in order to attract tourists, conferences, sporting events, investors, etc. [5].

In particular, in the city of Kavala there are numerous industrial buildings, especially tobacco warehouses, which need to be preserved and reused in order to enhance the unique character of the city. Until the 1950s, the tobacco warehouses were the main element shaping the urban landscape of the city. They were multi-storey buildings and building complexes of a large scale and of architectural importance, with the possibility of flexibility in their interiors [6]. The modern and radical changes in tobacco processing and marketing have rendered them out of functional use, with parallel high costs of maintenance and upkeep. For this reason, combined with the inadequate institutional framework regarding the preservation of modern architectural heritage and the absence of both policies and political will in the 1970s and 1980s, many of them were demolished and replaced by modern buildings. The contemporary challenge is to adopt an integrated and sustainable management strategy of an urban landscape in transition in the context of the new European Bauhaus and the European Green Deal.

2. EVOLUTION OF THE TOBACCO IDENTITY OF THE CITY OF KAVALA

2.1 Kavala as "tobacco city"

Kavala was known as a tobacco export port since the 18th century. However, intense building activity occurred after 1866, with the construction of the first tobacco warehouses and the church of Agios Ioannis, outside the walls surrounding the old town, in the area that later became the city center. This activity coincided with Turkey's new 1864 'Roads and Building Regulations' (Tanzimat). This regulation stipulated urban planning rules for residential areas, the drawing up of new town plans and an increase in the permitted height, which had previously been limited to 7 meters for Christians. This amendment made it possible to build tobacco warehouses on a massive scale and in an area that represented the first major expansion of the town. This expansion was approved by a firman of the Sultan, but the date and other relevant information has not been found. Immediately after the approval of Kavala's expansion, tobacco warehouses, tobacco factories, company offices, bank shops and residences of tobacco merchants, bankers and diplomats began to be constructed at a rapid pace. As there were no size restrictions, the new buildings were usually large enough to provide adequate storage space for tobacco or to provide adequate working space for numerous tobacco workers. Indicative of the size is that at the beginning of the 20th century, three large tobacco companies employed 6,000 people as workforce [7].

Towards the end of the 19th century, this new part of the city presented a modern and luxurious urban landscape. Most structures were built semi-circularly around the coastal zone, with tobacco warehouses usually on the coastal zone and offices, banks and residences gradually spreading inland. These structures largely expressed the architectural style of their owners' countries of origin or of the architects who designed them. Neoclassical, eclectic, baroque and Ottoman-influenced buildings, etc., coexisted in a cosmopolitan environment [8].

The first new district to be established outside the walls was that of St. John, with an Orthodox church of the same name, Christian, Muslim and Jewish schools, as well as hotels, baths and restaurants. The present-day districts of St. Paul and St. George concentrated the poorer residences of tobacco workers, also multi-ethnic in composition (Christians, Muslims and Jews), but without basic social infrastructure [9].

With the arrival of the refugees of the Asia Minor catastrophe, the population of the city increased from about 23,000 (1920) to 39,980 (1924) and to 50,065 (1928). The refugees settled around and outside the central zone of the city, occupying the barren hills that were owned by the State. The first city plan of Kavala, which mainly focused on the central area, was drawn up in 1929 by the Russian sub-engineer Rudometov, on an area of 4,500 acres. At the same time, the construction of the new port of Kavala began with silting up and extending the onshore coastal zone. The construction of the harbor project, which began in 1929, was completed in the 1960s. From the 1920s until 1936, the tobacco processing industry, with its abundance of low-cost labor and the flourishing tobacco trade, made impressive profits, and the tobacco workers' movement also thrived [10].

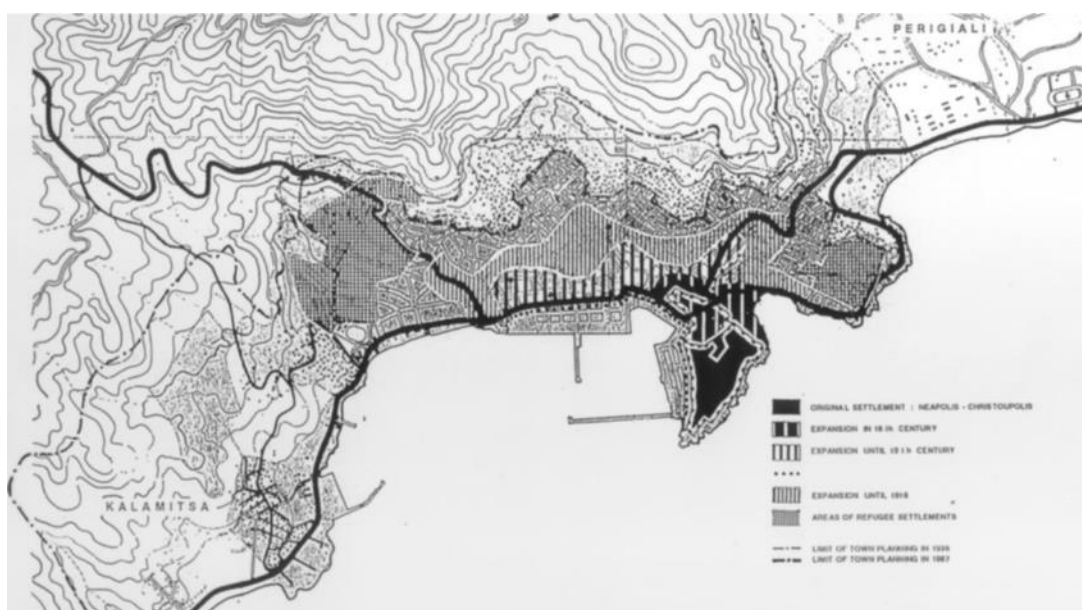


Figure 46: Gradual expansion of the city of Kavala [11]

Tobacco production and trade formed the economic and general development basis of Eastern Macedonia and Thrace from the 19th to the mid-20th century. The main export trade to Europe took place through the port of Kavala and the city was already the home of many consulates serving the trading houses. The rapid development of the tobacco trade made Kavala the first export port of Macedonia in the three years 1909 - 1912 with four times more exports than Thessaloniki [12, 13].

The commercial processing of tobacco is carried out exclusively in the tobacco warehouse complexes, which belong to the category of industrial buildings as they were constructed to accommodate the industrial production of the time. The accurate and uninterrupted processing of tobacco was inextricably linked to the premises and the specific characteristics of the tobacco warehouses and dictated the functional and morphological layout of the buildings [14].

The emergence of tobacco warehouses in the urban fabric of the city was a dominant image for several decades. However, the gradual decline in the production and trade of tobacco resulted in these buildings being left unused, constituting an important building stock, which remains unexploited in the urban landscape until today [15, 16, 17].

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2.2 Urban and social transformations in the city of Kavala during the period of prosperity

Until the middle of the 19th century, Kavala was a small town built on a peninsula, surrounded by a Byzantine wall. Its population consisted of Turks, Jews, a few Greek Orthodox families and a few Armenians. There were five districts in the city, three of which were inhabited by Muslims, one by Christian Greeks and one, which was the commercial area, inhabited by Jews. The wall was the boundary of the city beyond which, industrial construction was prohibited. Tobacco processing took place in workers' houses and small buildings, most of which were owned by Ottomans who rented them to non-Muslim workers. The houses of Muslims were differentiated from non-Muslims by allowing them to have two or even three floors, while the houses of non-Muslims were allowed to be developed on only one floor. This differentiation was in accordance with the building regulations that existed before the Tanzimat Reforms [18, 19].

At the end of the 19th century, the urban pattern of the cities of Eastern Macedonia and Thrace reflected the social, economic and spatial characteristics of its industrial identity, while economic boom led to significant urban transformations. In the 19th century, and especially in the context of the reforms and modernization of the Ottoman state, those who mainly controlled the shipping, trade and economic traffic of the Ottoman Empire, in the ports of Istanbul and other smaller ports in the periphery, were Greeks and Jews, who foresaw the future value of the tobacco product [20]. Thus, the profession of the "Tutunji", i.e. tobacco merchant, was created first in Constantinople and then in the other ports and tobacco centres.

In Eastern Macedonia and Thrace, apart from Greeks and Jews, some Ottomans and Armenians were also involved in the tobacco trade. These were the main actors of the commercial activity, who contributed significantly to the spread of the tobacco trade and its establishment in the world market, since they were not limited to the regions where they were based but expanded to many countries in Europe and in the Mediterranean. The multiculturalism of the tobacco trade in its early years of prosperity is reflected in the names of the local traders and the impressive buildings they constructed. While the first tobacco trading companies were owned by Ottomans, Armenians, Jews and Greeks, eventually there was a dynamic entry into the - until then - mainly local market by powerful companies and firms from several other European countries. It is characteristic that by 1880 all major European countries had established their consulates in the city of Kavala [21]. Until the beginning of 20th century, foreign companies that settled in the region dominated the tobacco trade and controlled exports to the global market [22]. At the same time, in 1910, the Bank of Athens, the Bank of Thessaloniki, the Imperial Ottoman Bank, and several independent bankers (Benveniste M., Kolokythas M., Protopapas GD, Herzog M. and Sarikas Zisis P.) were all operating in Kavala [23]. The economic prosperity that comes with the emergence of the urban class - consisting of wealthy tobacco merchants, other professionals (Christians and Jews in the vast majority), representatives of foreign trading houses and consuls - is accompanied by demographic growth as new populations arrive in the city to occupy themselves with the tobacco industry and the construction of new buildings. New districts were developed, extending the boundaries of the city, and new buildings were constructed, introducing to the city the flavor of western and eclectic architecture, whether they were residential, public and communal mansions or industrial and commercial buildings. The function of temporary accommodation at this time was served by the hania, the majority of which were built between 1870 and 1910. At the end of the 19th and until the beginning of the 20th century, Kavala had 20,000 inhabitants [24].

At least half of the population of the city dwellers were tobacco workers, whose families constituted the working class. The figures quoted at the beginning of the 20th century are typical. In Kavala, 14,000 people were employed, of whom approximately 6,000 worked for the three largest tobacco companies in the city (Commercial, Hertzog and ATC) [25].

Many of the workers came from the rural hinterland, who after the end of the tobacco season (which lasted from May to October) returned to their villages and worked in the fields. The tobacco workers constituted a multicultural social class, which was very much alive in the daily life of the city, despite the difficult conditions under which they carried out their labor (long working hours, wages inversely proportional to the working hours, seasonal occupation and unhealthy due to the dust, humidity and heat). Regardless of the ethnic group to which they belonged, they developed strong trade union activity and contributed significantly to the trade union movement, with common struggles for better working conditions, wages and equality as early as the end of the 19th century [26].

At the end of the 19th century, the image of the urban landscape reflected the social, economic and spatial characteristics of its industrial identity, while the economic boom led to significant urban transformations.

After the 1860s Kavala was established as the most important port for the export of tobacco in the region. Until then, processing in the small buildings within the walls could not meet the growing demand, so requests to the Sultan for more and more suitable places for tobacco storage and processing became pressing [27].

Several travelers in the area point out the striking contrast in the city images of the two areas: the parts of Kavala inside and outside the walls. The inside of the walls, inhabited mainly by Muslims, consisting of the historical part of the city, still had the image of a poor, dark, dirty and 'depressing' urban environment, with wooden houses, and narrow muddy streets. In contrast to the above, the new part of the city, outside the walls, was a modern urban area, inhabited by Christian Greeks and Jews, with stone-built structures, new architecture and obvious wealth. It hosted a variety of economic and social functions and the city's image was 'European'. The new structures reflected to a high degree the architectural standards of their owners' origins [28].



Figure 47: Panoramic view of Kavala to the east, at the end of the 19th century [29]

The western quarter is inhabited by Christian Greeks, while the eastern quarter is inhabited by Muslims. The small community of the Jewish population, which had settled in the city, was located in the area between the springs of Aghia Varvara and the commercial city center. In the southern part of the urban fabric, around the springs of Aghia Barbara, the buildings of the tobacco warehouses and the recreational areas of the city's inhabitants were situated [30].

Finally, as mentioned in a previous paragraph, the city of Kavala received many refugees (about 20,000) and almost doubled its population to 50,000 inhabitants in 1930. Most of them inhabited areas outside and around the existing urban fabric, occupying the sterile hills that were publicly owned. Others settled in four refugee neighborhoods (Pentakosia, Chilia, Byron, Dexameni), built

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partly by the Greek State and partly by the refugees themselves, and some of them were housed in the old residences of their former Ottoman owners. The city expanded rapidly and in an uncontrolled manner. Illegal construction in public spaces on the hills surrounding Kavala formed a new urban zone, the "Perigram" ("Surrounding Zone"), with an area almost equal to the "institutionalized" area of the City Plan. The growth of the city's population during this period is reflected in the population of tobacco workers, which in 1930 reached 14,000 [31].

2.3 Spatial footprint of tobacco identity in the urban fabric

The numerous tobacco warehouse complexes in the city of Kavala initially formed separate districts, in which the choice of their location was not accidental, while at the same time their contribution to the urban development of the city was catalytic. Moreover, apart from the scale, which clearly differentiates these areas from the rest of the urban fabric, the tobacco warehouse buildings introduce the European architectural standards of the time to the area. By the early 1920s, it is estimated that 156 buildings of different sizes and types existed and were in full operation in Kavala as tobacco warehouses [32].



Figure 48: Tobacco warehouses in the city of Kavala in the late 19th and in the beginning of the 20th century [33]

The process of construction and establishment of most of the tobacco warehouse complexes in Kavala lasted from 1860 until 1930. It is located in the first extensions outside the city walls, in the district of Agios Ioannis, near the beach, but also scattered outside the boundaries of the fortified core. Initially they were significantly distant from all the functions of the city, but gradually the gaps in the urban fabric were filled with supporting uses due to the needs that developed (tobacco workers' residences, tobacco merchants' urban estates, commercial uses, temporary catering facilities - hania). In these areas, it appears that a town plan was drawn up from the outset in accordance with the new Ottoman town planning regulations of 1882. A Hippodamian plan (rectangular canvas) with large building blocks and relatively wide streets, which allowed the construction of several large-scale industrial buildings. The sizes and building solutions are related to the intended functionality of the buildings in terms of product storage and processing. These areas offered abundant and affordable land, as they were located outside the urban fabric, which meant that they could allow the concentration of a number of large plants. Such concentration was a prerequisite for security conditions, but above all for effective control of smuggling [34, 35].

Another important parameter was the working conditions prevailing in these spatial units. The district of Agios Ioannis, the Central Quarter and the one of Soujolou were characterized by their proximity to the sea, but also by the fact that streams crossed them, which flowed into the sea. These unhealthy conditions for housing were favorable for the storage and processing of tobacco, as they ensured

consistently high levels of humidity. They also favored the construction of semi-subterranean rooms, which were essential for processing and storing the product. The sites also had other advantages. Some of the tobacco warehouse complexes formed the entire coastal front until the middle of the 20th century, while their concentration in the coastal area and their development around the new commercial center of the city facilitated the transport of tobacco by barges or carts to the port [36].

3. URBAN LANDSCAPE IN TRANSITION

The effort to reduce the cost of tobacco processing, combined with the evolution of technology in the industry, resulted in the gradual replacement of all traditional activities with modern facilities [37]. Following the entire mechanisation of the production line, an attempt was made to adapt the existing tobacco warehouses to the new technological requirements, given that they were very flexible in terms of typology and structure to accommodate new devices per level. After 1950, modern buildings were also constructed to meet the current demands of tobacco production, while the historic industrial buildings were used for a short period of time for the storage of tobacco bundles [38].

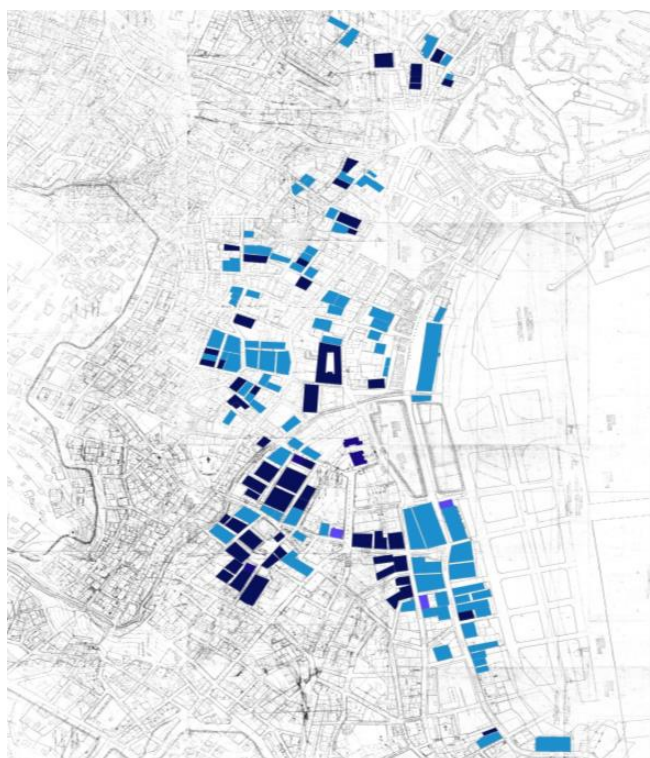


Figure 49: Extract from a topographical map of Kavala of 1939 [39]

Over time, the need for modern facilities, and especially the escalating crisis in the tobacco industry, led to most of them being underused or abandoned, while after 1974 a significant number of them were sacrificed on the altar of building capital and the rent system. The above map indicates the tobacco warehouse complexes. The surviving tobacco warehouses are marked in dark blue and those that no longer exist are marked in cyan.

As a result of this process, only 48 complexes are currently identified in Kavala, with most of them being abandoned, while at the same time, there are industrial buildings scattered throughout the city that are in operation with new uses, whether the shells have been restored or not. Even though some efforts have been made, they are fragmentary moves rather than a comprehensive initiative. Regardless of the institutional framework or the sophisticated and specialized restoration techniques, it is equally important for the local community to recognize the importance of the tobacco warehouses

for the city: from that of collective memory, to that of the morphology and function of the urban fabric [40].



Figure 50: View of abandoned tobacco warehouses [41]

The central area of the out-of-core area of the city until the 1950s retained a highly aesthetic characteristic set of urban and productive shells. The deterioration in the decades that followed has been significant and today only relatively small, discontinuous groups or individual buildings survive, many of which are listed. In some cases, inactive shells of productive activities and buildings of other civic functions have been allocated to uses that also incorporate them into the current function of the town. The historic and business center of the city is an area of special cultural character, as there are numerous historic, architectural and industrial buildings on its boundaries which require protection and enhancement. However, most of the buildings of traditional architecture have been abandoned and only in recent years there has been an attempt to restore and reuse some of them, either by the municipality or by private individuals. In addition, there are several remarkable buildings in the area that the Ministry of Culture has designated as 'Historical Monuments of Conservation' or 'Works of Art' under Law 3028/2002 [42].

These structures constitute a complex that enclosed the tobacco warehouse zone or penetrated in clusters in the central area of the city. The architecture of these buildings generally ignored the tradition of the buildings of the old town and followed western models with the manifestation of a peculiar eclecticism, influenced both by various architectural trends of the era and by historical architectural memories of the past and echoes of neoclassicism.

Aggelos IAAK



Figure 51: Villa Herzog, offices of the Tobacco Company and Villa Zsolnay, residence of the Director of the Company, Baron Wix de Zsolnay [43]

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Several buildings of this classification, such as most of the buildings on Cyprus Street, belong to public institutions and are presumably not in jeopardy. However, many of the buildings of this category scattered throughout the residential area have been demolished or are in danger of being lost due to lack of maintenance, even if they are protected by a declaration of conservation.

4. CHALLENGES AND PERSPECTIVES

The issue of tobacco warehouses, like many issues of collective identity and cities' perspectives, cannot be left uncontrolled to the forces of the market, because it cannot, by nature, adopt a coordinating role for the overall vision of a place and for the common good. Especially when real estate is reduced to the usual practices of commercial building, without any alternative strategy. It turns out, therefore, that the issue ultimately transcends urban policies and technical methodologies and reaches into contemporary aspects of urban development and urban management and governance. A management whose most important elements are the participatory processes, the civil engagement and the activation of local potential in the direction of a holistic development planning.

In any case, it is more crucial than ever that a process of overall policy redefinition should be undertaken, both for the tobacco warehouse district and for all the complexes scattered around the city. A policy that must extend from a strategic approach to urban development, to urban planning and design, and must be completed by the establishment of a methodology for the process of restoring and re-using such buildings [44].

Moreover, the existence of cultural heritage can strengthen the sense of local identity of a place, in a period of increasing competition between cities and the 'reinterpretation' of the relationship between globalization and localism ('glocalization') [45, 46, 47].

According to the land use planning of the Municipality of Kavala, 83.5% of the tobacco warehouse buildings are in areas with central function uses: 76% in the City Centre and 7.5% in areas with Local Centre use. 9% of the cases are found in Residential areas and 4.5% in Urban Green/Open Space areas. Finally, 3% falls within Cultural Functions areas. Accordingly, based on the current Urban Plan of Kavala (Government Gazette 68/D/1980) and its amendments, 21% of the buildings are urbanized and the relevant properties are subject to expropriation.

Recognizing the dynamics and the importance of the preservation of the industrial heritage and the reuse of the abundant building stock, the current Master Plan of the Municipality of Kavala, defines the Tobacco Warehouse Area around the Labor Center as an Urban Regeneration Area with guidelines for the reuse of the inactive shells of the tobacco warehouses, the safeguarding of the existing public spaces, the protection and promotion of the historical elements of the area, the upgrading of the quality of the built environment and the tackling of the deficiencies in infrastructure. This redevelopment area includes 62% of the Tobacco Warehouses cases.

5. CONCLUSIONS

In accordance with the new trends and conditions of urban development, residents, economic stakeholders and institutionalized authorities within a city should act and make decisions that regulate the urban environment. It is therefore necessary to exploit the historical, cultural and architectural heritage of a place through a modern model of urban sustainability, involving integrated urban approaches and participatory processes to enhance the image of a place and to shape its identity.

The tobacco warehouses of Kavala are the buildings that are of particular importance because they are an integral part of the tobacco identity of the city. They are also valuable because they mark the beginning of the city's architectural and urban development and because they highlight the multicultural character of the city during the 'Golden Age of Tobacco' and earlier. It is of particular interest to investigate how this diversity was 'absorbed' and integrated without changing the cultural and social heritage of the city.

The Tobacco Warehouses are partly monuments of industrial/cultural heritage and elements of the city's identity and on the other hand, they are private properties with potential for economic exploitation, making their promotion and exploitation a very complex but also multifaceted process. As the tobacco warehouses are a special architectural and historical feature of the city, which characterizes its identity, it is vital to be promoted and reused, integrating them into the urban structure and function of the city. The integration of Kavala's tobacco identity into a bottom-up model of urban regeneration will help to strengthen the dynamics and development process not only of the city in discussion, but also of any other city with an extensive cultural heritage.

The existence of this industrial cultural ensemble that can enhance the sense of local identity of the region, combined with the utilization of existing urban voids, is an important development potential to be explored, especially in view of the increasing competition among cities today.

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Public Participation in Urban Planning and Design: Virtues and Ambiguities

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Extended abstract

This paper focuses on local participatory planning processes in two cities, Kavala and Kalamata, which have varying expertise in this domain. The municipality of Kavala has had a long-term citizen participation strategy emphasizing issues of planning and urban mobility, whilst the municipality of Kalamata recently stepped up its efforts with a group of citizen-expert moderators co-drafting the city's climate neutrality contract, as part of the relevant EU Horizon mission for climate neutral and smart cities. In line with current principles and trends in urban planning, such as the introduction of the 15-minute city model and strategies of climate mitigation actions at local and neighborhood level are crucial and must involve interacting and co-creating with residents and local actors to define their needs.

Drawing from the experience of intensive local and neighborhood participation actions organized in the two cities in the period 2023-2024 as part of an EC-funded World Bank project, the present research discusses the methods employed to identify and connect key local stakeholders and to engage the local community in the participatory activity, which was targeted on specific groups (residents, entrepreneurs, students, public bodies etc.). The success of processes in both familiar and inexperienced audiences is then evaluated.

The engagement strategy of local stakeholders should take into consideration the diversity of stakeholders and the conflicts of interests, concerns, and perspectives. The engagement strategy should also focus on dialogue-oriented planning processes to ensure that the project is inclusive and participatory. The outcome of the qualitative findings, as well as a preliminary definition of emerging issues in the development of neighborhood action plans have also been studied. The central issues of significant importance were coastal (waterfront) regeneration and sustainable urban mobility and accessibility, since they are related to specific technical and policy requirements.

The results highlight the importance of participatory planning processes and consultation in urban planning and design. Another issue highlighted by this research is the high degree of social appointment of a project when local society has participated in the design or/and implementation processes. The methodological and theoretical lessons learned from these pilot case studies enhance the value of participatory planning with regards especially to (a) rapid interventions, adaptation, and mitigation actions that cities are going to undertake under climate and green transition imperatives; and (b) increasing civic engagement in strategic and public funded interventions such as those supported by EU regional policy.

The set of participatory actions discussed in this paper were carried out in the context of the World Bank Technical Assistance Facility entitled "Greece Sustainable Cities and Regions Through Integrated Territorial Investments", and funded by the European Commission's DG Regio. They aimed to support Kavala, Larisa, Heraklion, and Kalamata in using practical methods to improve strategic processes and plans, as well as design and implement projects for sustainable urban development. One of the key deliverables were Participatory Neighborhood Planning Processes in Three Medium-Sized Cities in Greece (Kavala, Heraklion, and Kalamata). The primary goal has been the support of three Greek cities in the development of neighborhood visions and action plans, the

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fostering of community participation and engagement, the development of practical strategies and approaches to enhance urban environment, as well as facilitate collaboration and coordination among various stakeholders.

Keywords: *Participatory Neighborhood Process; civic engagement; consultation; dialogue-oriented planning; local community.*

Architectural Heritage and Community Identity: The Role of Historic Refugee Settlements in Shaping Modern Greek Cities

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Extended abstract

Following the end of WWI and the dissolution of the Ottoman Empire, Greece with the aim of protecting the national minority, participated with other European powers in the occupation of territories in Asia Minor (1919-1922). After the change in the policy of the Great Powers, Greece abandoned these lands, resulting in the destruction of Asia Minor and the exchange of populations, in accordance with the Treaty of Lausanne (1923), that settled the differences in the area. The refugee flow towards Greece, which had already started before these events, was significantly increased, and concluded with the mandatory exchange of populations between Greece and Turkey. The issue of housing the displaced population, hailing from Asia Minor, Eastern Thrace, and Pontus, emerged as a major concern for the government at the time. Under the auspices of the League of Nations, permanent accommodation was provided through the Refugee Settlement Commission (RSC). Urban refugee settlements were established throughout the country introducing not only the urban planning trends of the late 19th and early 20th c., in some cases associated with the Garden City movement, but also the concept of social housing. This study explores, with the city of Xanthi as a key case study, the intricate relationship between architectural heritage, collective memory, and the urban landscape, focusing on the significant impact of historic refugee settlements on shaping the identity of modern Greek cities, and indicates the diversity of the development between large urban centers and small towns of northern Greece.

Architectural conservation forms a central issue in this research, elucidating how the preservation of these areas and their uniqueness, contributes to the safeguarding of Greece's architectural heritage. The concept of collective memory intertwined with community identity, is also addressed by identifying urban refugee settlements, as tangible manifestations of historical events and vital repositories of shared experiences, embedded with layers of cultural significance and social narratives. Through empirical evidence and embracing the Historic Urban Landscape (HUL) approach, it illustrates how the preservation of historic refugee settlements may not only maintain architectural authenticity, but also become a catalyst for community cohesion.

Legal and ethical considerations, including frameworks and regulations, are discussed to highlight the complexities and responsibilities associated with preserving historic locations and buildings outside protection zones, threatened by the phenomenon of intense urbanization, taking into consideration a) the urban patterns, b) the form and appearance of the buildings, c) the relationship between the urban area and its surroundings, d) the various functions that the area has acquired over time and e) the cultural traditions, techniques and everything that contributes to the identity of a place. Finally, the paper underscores the importance of recognizing and preserving these invaluable aspects of tangible and intangible cultural heritage, within the contemporary urban context and aims to contribute to a nuanced understanding of the inherent challenges and opportunities.

Keywords: *urban refugee settlements; urban development; collective memory; urban patterns; Xanthi*

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**“WET DREAMS” OF LANDSCAPE ADMIRATION OR
“NIGHTMARES” OF DESTRUCTION: A SESSION ON WATER-
SCAPE CULTURAL AND ENVIRONMENTAL RESILIENCE**



Changing Cities VI, Rhodes, 24 - 28 June 2024

Organized and chaired by Em. Prof. Moraitis Konstantinos & Postdoctoral Researcher Dr. Ioannidis Romanos

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Waterscape resilience and waterscape design: urban landscape porosity and the re-invention of the urban water network

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Abstract

“Composition” is a term intensively applied in architectural and space design approaches, insisting on the formation of expressive graphic systems, of “languages” that may depict space formations. In the case of the proposed intervention to the Pikrodafni stream the project refers to an extensive reform of the natural earth bas-relief, in favor of the waterscape resilience and the prevention of possible floods. In the case of a second project, which we shall also present, that of the intervention to the wetland area of the municipality of Oropos, in Attika near Athens, the proposed architectural composition principally refers to the design of an environmentally friendly network of constructions hovering over the natural bas relief. It refers to a network of wooden visiting platforms, birdwatching wooden towers and hiding walls, and reception and information structures for visitors. Nevertheless, the proposed project if ever materialized, would have no interest without the safeguard of the existing waterscape formation, without an intervention to the linear coastal zone between the wetland and the sea, which would ensure the existing waterscape resilience. In both cases, the projects to be presented attempt to form compositional design “languages”, correlating the natural earth bas-relief, and the contours of the streambed or the wetland basin, with plantation interventions and hard landscape structures, and finally with the water’s substance. It is in this context, of intervention to natural waterscape receptors that we use the metaphor of Narcissus. Ecosophic communities, compared to the hero of the ancient legend, are looking at the waterscape surfaces. There the mirroring of their own cultural capacity may be produced, an ecologically oriented reflection of culture amalgamated to the primordial substance of water.

Keywords: Waterscape resilience; waterscape design; urban landscape porosity; water networks.

1. INTRODUCTION: NARCISSUS SEDUCTIVE MIRAGE ON THE WATER, A LEGENDARY METAPHOR AND A CONTEMPORARY DESIRE

According to the ancient legend of Narcissus [1], a legend fascinating intellectuals and artists from antiquity till the period of modern surrealism (Figure 1) [2], the hero of the narration was an adolescent of incomparable beauty. Looking at his mirrored image on the water, he fell in love with it, without realizing that the object of his desire was his own self. He tried again and again to come in contact with his supposed lover, and as he continuously failed, he died, sunk in despair and sorrow. We have just referred to the illusionary conception of the water, presenting it as a substance of reference for positive imagination or deluging terror... It is in this context that we associate water through the ancient legend of Narcissus – a material surface whereon our cultural image may be mirrored in a seductive reflection or be liquefied in a destructive way. It is in this context that we shall continue our presentation, by describing our desire for landscape intervention, our desire to design waterscape entities trying to offer them positive qualities, in association with urban or peri-urban environments and fascinating visiting itineraries.

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Figure 1: “Narcissus” (on the left); painting by Michelangelo Merisi da Caravaggio (1597–1599), depicting Narcissus gazing upon the water after falling in love with his own reflection – and – “Métamorphose de Narcisse, Metamorphosis of Narcissus” (on the right); by Salvador Dali (1937).

2. NARCISSUS IN ATTICA: THE WATERSCAPE “POROSITY” OF THE ATHENIAN URBAN TERRITORY

It was in 2010 that a research program, intending to investigate the general regeneration approach of the metropolitan area of Athens and Piraeus, was set forth by the Ministry of Environment [3]. In the context of the previous program, the author of this article insisted on the concept of “porosity” as a description of the correlation between public open-air urban spaces and built urban areas. Moreover, the previous reference to the urban porosity attempted to go further and investigate the natural environmental porosity of the city, the correlation of the urban context with green spaces and furthermore with the network of rivers and streams of the metropolitan area, still perceptible or covered and effaced from the urban surface. An important mapping result was produced, a fascinating depiction of possible waterlines, of a water network invigorating the “wet dreams” of our ecological desires.

In correlation to such an approach, we decided to investigate, through our academic lessons, in the School of Architecture N.T.U.A., a paradigmatic case, the rehabilitation of the important stream of Pikrodafni (Figure 2), the third more important route of water in the territory of the basin of Athens, after Kifissos and Ilissos rivers. Our design approach tried to associate a hydrological and hydromechanical understanding, with an extended landscape architecture proposal and an urban design approach, insisting on the amelioration of the streambed through natural material remedy, and implementing furthermore the extended use of the plantation. The central idea of the approach, applied in the context of a diploma thesis in the School of Architecture N.T.U.A. [4], had to do with the didactic concept accepting that natural landscape entities could be designed and “composed”, “con-posed”, organized as compound spatial structures, according to principles of appropriate natural “function”, possessing in the same time aesthetic “compositional” value [5, 6, 7].



Figure 2: Pikrodafni stream in the context of the Athenian basin.

3. RE-HABILITATION OF THE IMPORTANT STREAM OF PIKRODAFNI, IN THE METROPOLITAN PERIPHERY OF ATHENS: AN EXAMPLE OF WATERSCAPE COMPOSITIONAL APPROACH

“Composition” is a term intensively applied in architectural and space design approaches, insisting on the formation of expressive graphic systems, of “languages” that may depict space formations. Analyzing the etymology of the term, we may moreover comment that literary it refers to the coexistence of different elements in a spatial place context. In our paradigms, compositional proposals refer to the correlation of different elements. In the case of the proposed intervention to the Pikrodafni stream the project refers to an extensive reform of the natural earth bas-relief in favor of the waterscape resilience and the prevention of possible floods.

3.1 Pikrodafni stream: hydrological intervention and the redesign of the streambed as a central compositional approach of the proposed waterscape

It was in the previous context that the design approach of the Pikrodafni stream firstly regarded the hydrological reform of the bed of the stream, as the initial condition pre-regulating the other compositional decisions. The bed was partly reorganized, trying to keep and augment its curvilinear

schematization, in a way that the length of it would be expanded and the speed of the water movement could be retarded (Figure 3).

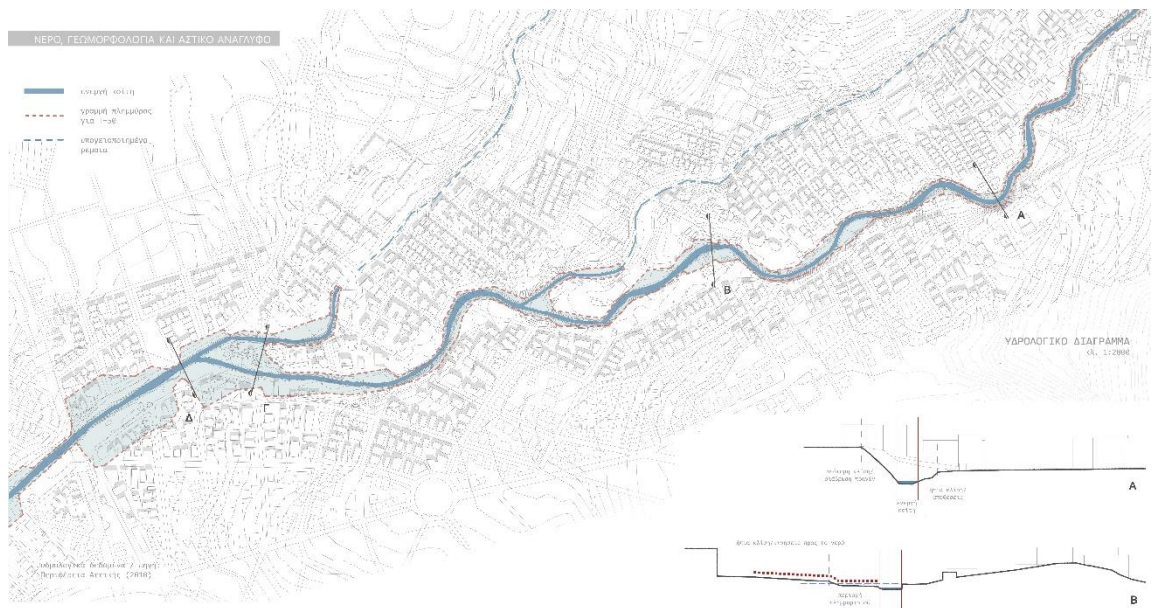


Figure 3: Pikrodafni stream; its curvilinear waterbed and the focal places (in azure color), where a possible flood could decompress.

Moreover, extended space was provided at focal places of this curvilinear bed, in such a way that a possible future flood could easily decompress without delusive results for the surrounding urban territory. In addition, the banks of the stream were proposed to be reformed naturally, through the enforcement of them with wooden implants and vegetal formations, without the use of concrete. ‘Composition’ as used in architectural and urban design, was thus oriented towards the reorganization of the natural formation of the water environment: of its hydromechanics and the need to facilitate natural interactions, between water and its surrounding earth substratum. Narcissus looked at the surface of the Pikrodafni stream. There, his own human-centered image disappeared, it was liquefied and replaced by the choice of a *More than Human* [8] orientation, towards a nature-centered symbiosis.

3.2 Pikrodafni stream: waterscape intervention in correlation to the surrounding urban scape plantation

The second central idea of landscape composition, proposed for the Pikrodafni stream, refers to the extended use of the plantation as a means for the revitalization of the zones spread on both sides of the waterbed. An enlarged “water and green corridor” was thus proposed, comprising the main waterbed, the active branches of it and the lateral planted zones, expecting to radically reform the densely built context of the city. In addition, we must explain that the plantation was used, in a way analogous to that of the composition of building or hardscape urban formations. Plantation was thus used as a composition means, which may offer different formal schemes (Figure 4), of differentiated volumes and colors and surely of differentiated natural substances [9: 256-260].



Figure 4: Pikrodafni stream; composition of its waterbed zone with the extended plantation, proposed to be reformed, areas on the lateral zones of the stream.

4. A SECOND WATERSCAPE COMPOSITIONAL APPROACH: AN INTERVENTION PROPOSAL AT THE OROPOS WETLAND, IN ATTICA GREECE

In the case of a second project, which we shall also present, that of the intervention to the wetland area of the municipality of Oropos, in Attika near Athens, the proposed architectural composition principally refers to the design of an environmentally friendly network of constructions hovering over the natural bas relief. It refers to a network of wooden visiting platforms, birdwatching wooden towers and hiding walls, and reception and information structures for visitors. Nevertheless, the proposed project if ever materialized, would have no interest without the safeguard of the existing waterscape formation, without an intervention to the linear coastal zone between the wetland and the sea and an intervention assuring the existing waterscape resilience.



Figure 5: Oropos wetland; its correlation with the built area, on the back and South Euboean Gulf on the front. A thin linear barrier partly separates the wetland basin from the sea. The red line describes the wooden corridor, created over the water to facilitate the circulation of the visitors, while the red dots on it refer to wooden premises providing reception and information complexes (at both edges of the red line), or to wooden bird-watching walls and towers (at focal points across the red line).

4.1 Oropos wetland: a valuable ecosystem on the south coast of Euboean Gulf in Attica, near Athens

Oropos wetland is located on the outskirts of Skala Oropou, a seaside town on the south coast of the South Euboean Gulf, situated near the mouth of Asopos River. It is formed as a result of the mixture of the river’s water with the sea, separated from the gulf by a thin linear barrier island. The sea is thus penetrating the interior of the wetland without, nevertheless, completely changing the aquatic substance of the river water surfacing at the coastal zone. A distinct valuable ecosystem is thus produced, a charismatic natural habitat where migratory birds may rest and nest, during their seasonal voyages over the Greek mainland. As a consequence of the previous important ecological identity, Oropos wetland was developed into a visiting place of a high international profile for bird-watching groups, facilitated for their approach by the vicinity of the place to Athens.



Figure 6: Wooden structures facilitating the reception and circulation of visitors, in Oropos wetland. 3D description of the reception and information booths for the visitors - in both images, the wooden corridors and the bird-watching wooden walls are presented.

4.2 Oropos wetland: safeguarding the wetland from the invasion of salty water and land grabbing.

It was because of the high ecological importance of Oropos wetland and its equally high esteem as a bird-watching destination that the intervention presented was decided by the municipality of Oropos, in 2010, and the corresponding project was assigned to a group of architects, civil engineers and environmentalists. The central idea of the project had to do with the safeguarding of the wetland, which was largely diminished during the last fifty years as the result of the extension of the housing

territory of Oropos municipality. In the context of a distorted idea of development, housing construction was considered as matter of higher importance than the natural resilience of the pre-existing landscape. Parts of the wetland were gradually dried out and a continuous building pressure exerted on the natural substratum of the broader territory of the mouth of the Asopos River.

We shall not extend our description on the subject of the extreme pollution of Asopos, as a result of the industrial chemical waste. We shall limit our comments on our principal object of interest, concerning the wetland itself. In this context, of the safeguard of the wetland, the project proposed an earth barrier, a mound, between the wetland and the peripheral road of the housing territory, thus repulsing the illegal pressure of land grabbing. A second proposal referred to the need for the restoration and enforcement of the thin linear barrier separating the sea from the wetland basin; otherwise, the salty sea water would largely invade its interior and destroy the hybrid ecosystemic condition, disequilibrate the degree of the higher salt tolerance, the “halotolerance” that permits to the halophytic vegetation to grow. As halophytic vegetation, or “halophytes” (a term derived from Ancient Greek ἅλας – halas, “salt” and φυτόν – phytón, “plant”), we describe the vegetation of salt-tolerant plants that cover nowadays the larger part of the wetland and create the nesting environment of the migratory birds.

4.3 Oropos wetland: composing a system of wooden structures facilitating the reception and circulation of visitors.

The final aim of the project presented was, nevertheless, the promotion of the Oropos wetland as a precious ecological paradigm that has not only to be preserved but, furthermore, to be promoted as a landscape of didactic ecosophic value. The vicinity of the wetland to the larger urban territory of Greece (the Athenian metropolitan area) could guarantee the facility of the visitors’ approach, for natives or bird-watching tourists, facilitating in addition the environmentally focused excursions of the Greek elementary and high schools. Such publicity, if rationally regulated, could assure the survival of the wetland and the advancement of Oropos as an exemplary environmentally friendly municipality, and would strengthen, in addition, the governmental interest in the preservation of the environmental reserve.

In association with the previous targets, the project proposes a system of wooden structures, organizing the visiting navigation in the interior of the marsh. Two complexes for the reception and information of the visitors were designed, at the opposite ends of the suggested itinerary. Then a wooden circulation corridor was added, connecting the two reception and information complexes. It would permit the visitors to walk, even if the water would rise above the height of the possible walkable areas. Across the corridor, at different points of it, bird-watching walls and towers were also proposed.

It is important to repeat that the principal material of all previously described constructions is wood and that all of them would be founded on wooden pegs and they would, if needed, be removed [9: 552-556].

5. CONCLUSIVE REMARK: NARCISSUS MUST BE ABSORBED BY HIS CULTURAL, WATER FANTASIES

Narcissus looked on the water surface, of Pikrodafni stream and Oropos wetland and fascinated by his ecosophic, environmentally friendly identity. His new cultural water fantasies transformed his human centred, “narcissistic”, egocentric, self-absorbed mentality towards a radical ecological behaviour. According to Félix Guattari’s *Three Ecologies* [10] scheme, ecology has to be natural, social and mental at the same time, in order to be successful. Our projects had thus to propose not solely material landscape interventions but present, moreover, didactic cultural examples: didactic examples introduced in the courses of the School of Architecture N.T.U.A., as well as in the experience of the Oropos wetland visitors.

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Figure 1: Public Domain -

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Revisiting the public perceptions of water infrastructure landscapes under contemporary landscape changes

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Extended abstract

The impacts of infrastructure projects on landscape has been an increasing concern for public opinion over the last two decades, both in Greece and globally. The main origin for this has been the renewable energy transition and in particular the integration, or lack thereof, of wind and solar photovoltaic projects on landscapes. Public opposition movements have stressed the potential effects of such works on the natural, cultural and aesthetic character of landscapes. At the same time, however, the discussed concern has led to the emergence of an important, yet formerly overlooked, characteristic of water infrastructure: the characteristic of landscape and architectural adaptability. The first observation of this was made during a comparison of renewable energy technologies in terms of their landscape impacts and in particular the comparison of wind and solar works with hydroelectric dams. Broadening this investigation it was recognized that the same characteristic of positive landscape contribution could also be identified for dams of other types, their water reservoirs and their appurtenant works. Water infrastructure is therefore highlighted as one of the few types of infrastructure that can have a measurable positive contribution to landscapes, a contribution that is all the more important in the context of the current landscape-related upheaval.

At a scientific level, the potential positive contribution of dams to the landscape is related both to the creation of artificial lakes, which are a naturalistic alteration of the landscape, but also to the amenability of dams and their accompanying works to architectural treatment. This paper analyses these characteristics of dams in technical and social terms. Particular emphasis is given in quantifying and analyzing the origins of positive landscape perceptions of water infrastructure. In this regard, we utilize geotagged data, crowdsourcing and an extensive literature review. The research also presents the comparison between the impacts of the main renewable energy projects on the landscape, which acted as the origin of the further research on water infrastructure. Measurable indicators of land use, visibility and public perception of the different technologies are analyzed to this aim, in a comparison that includes hydroelectric, wind and photovoltaic projects. After identifying the importance of hydroelectric dams, as renewable energy works, for the landscape, an overview of best international practices in their architectural design and an analysis of the relevant perspectives for Greece is also presented. Finally, the conclusions of the work are broadened to all major water infrastructure including dams, reservoirs and appurtenant hydraulic structure, meanwhile proposing ways to further utilize their landscape and architectural advantages and overall contributing to more positive landscape perceptions of infrastructure.

Keywords: *public perception; water infrastructure; landscape; renewable energy; geotagged data;*

Around the Kleisova Lagoon: A systematic approach to contextually responsive architecture

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Abstract

Addressing the issue of sensitive, integrated and contextually responsive architecture, the question of how we can utilize the potential and draw inspiration from the unique character of a specific location arises.

This paper aims to promote a project-oriented approach to context interpretation, place intervention and translation of its identity into an architectural proposal. Through an extensive analytical procedure, it intends to provide some initial answers to the question stated above via a case study focused on a developmental vision for Messolonghi. A city with a unique spirit structured around its strongest spatial feature – the surrounding lagoon.

Messolonghi is located in the Aetolia-Acarnania region of Greece and is charged with an immense international historical influence, folklore identity and environmental value. The Messolonghi lagoon complex – that has acted as a reference point for every aspect of its identity through the years – is protected under the Ramsar Convention as well as the Natura 2000 due to its great biodiversity.

The proposal aims to incorporate the 4 broader themes that shape the *genius loci* of the city – natural environment, productive identity, historical value and intellectual identity – into a single route/a circular path, while simultaneously activating the area around the Kleisova Lagoon (placement of pavilions on selected points). The main objective is a mild, sustainable, and easily reversible intervention, that attempts to improve on shortcomings and bring the spirit of the area to light, without undermining its future.

In this framework, apart from presenting a systematic approach to such a goal, the paper introduces an innovative synthetic tool – a modular system that can be restructured in order to provide suitable variations, the uniformity of the proposal and its integration into the waterscape of the lagoon.

The idea is based on the analysis of the 4 themes stated above and the interpretation of the local architectural vocabulary. Taking as a starting point the traditional timber dwelling – the “pelada” of Messolonghi, – the main elements that characterize its identity constitute the components of the system and are recomposed accordingly, to create a modern version in analogy with the original. In this endeavor, the synthetic composition and structural concept were developed simultaneously, to design a timber frame that combines references with flexibility.

The 7 typologies of pavilions that were studied (bird observatory, viewing pavilion, historical identity pavilion, auxiliary bathing facilities, accommodation pavilion, productive identity pavilion, and service station), constitute 7 possible combinations, that were considered to serve the purpose of a complete and integrated proposal. Thus, the intervention has an experimental character with adaptability and flexibility of possibilities, providing a pilot proposal for the management of the site. Such a proposal constitutes an example of a way to create sensitive architectural interventions, suitable for their context, contemporary in their design, while responding to historical and cultural precedents.

Proceedings

During a time of rising mass-production in the fields of design, a shift towards more sustainable and culturally sensitive approaches is of outmost importance for achieving a meaningful and responsive architecture that is deeply inspired and rooted in its context.

Keywords: *Messolonghi; Genius Loci; place identity; sensitive architecture; modular system*

1. INTRODUCTION

In the realm of architecture, the pursuit of sensitivity, integration, and contextual responsiveness stands as a paramount challenge. The systemic approach of spatially invasive and environmentally hostile design of the past century is starting to get replaced with practices that harmonize with the environment, respect, and honor the cultural tapestry of a place.

Within this perspective, the Latin term *genius loci* – the spirit of a place, encapsulates the unique character or essence of a specific location, shaped by its physical, cultural, and historical context. When applied to architecture, this principle may assist in harmonizing it with the existing environment, contributing to more responsive designs, deeply rooted in the fabric of their surroundings – to “*landscapes of pleasure*”.

The confluence of this philosophy with the distinctive character and energy of a waterscape, inevitably alters the area's genius loci. As mentioned in the abstract of the session, the allure of water transcends mere aesthetics, encompassing cultural and political significance across coastal landscapes and terrestrial surroundings alike. While exploring the interplay between cities and water bodies, it becomes evident that their association is not merely functional but deeply ingrained in their identity. Such an example is Messolonghi. A city charged with an immense international historical influence, folklore identity and environmental value, structured around its strongest natural spatial feature – the waterscape of the surrounding lagoon. “*You sigh, my heart, the same sigh: To live there again, Where the sea is shallow and tame, where the sea is vast and wide*” writes the notable Greek poet Kostis Palamas for the Mesolonghi – his birthplace – and the lagoon. And through his lyrics we can feel it: the lagoon is not merely IN Messolonghi, but it IS Messolonghi. It constitutes a reference point for every aspect of its identity.

In respect with the above, the structure of the diverse components comprising the city and its surrounding environment will be analyzed. The examination will highlight historical and socio-spatial features that contribute to the unique essence of the locale, with particular focus on the prominent water-centric attributes of the area. The paper will focus on the methodology of dealing with the research and design of a contextually responsive proposal in an existing, sensitive environment by presenting as a case study an architectural project managing the area around the Kleisova lagoon in Mesolonghi.



Figure 1. Drone images from the city of Messolonghi and the surrounding Lagoon (Messolonghi by Locals archives).

2. THE IDENTITY OF A PLACE

The concept of place is complex and multifaceted, encompassing both qualitative and spatial features. Understanding a place requires examining these various dimensions, which interact to create its unique identity.

Qualitative features are the non-physical, intangible aspects that contribute to a place’s identity. Such features are often subjective and shaped by human experience, cultural values, practices, and social

dynamics. They include cultural identity, historical context, social dynamics (behaviors, interactions, and community practices of residents), emotional and psychological associations, symbolism and meaning (often reflected in art, literature and media), community practices and intangible heritage (religious beliefs, spiritual practices, and culinary traditions).

Spatial features are the physical, tangible elements that define the layout, structure, and environment of a place. These features are crucial in shaping its functionality, appearance, and organization. They include the geography and natural environment, the urban and architectural design, land uses and zoning, transportation and connectivity, spatial organization and infrastructure and utilities.

Most of these features are shaped by the passage of time and the evolution of human civilization, environmental changes, technological advancements, economic development, and other factors. Consequently, the identity of a place is dynamic and constantly evolving, reflecting the continuous changes in human societies. This transformation highlights a place's adaptability and resilience to both internal and external influences.

Thus, to read a place is to interpret and deeply understand its various layers and elements, integrating both qualitative and spatial perspectives. This involves using maps and diagrams to display and analyze geographic, demographic, and qualitative data, consulting historical records and archives to understand the historical evolution of the place, and employing ethnographic methods such as observations, interviews, and surveys to gather qualitative data on residents' experiences and perspectives. Visual documentation, such as photographs and videos, captures the physical and social environment, while studying art, architecture, and literature helps to grasp the symbolic meanings and cultural expressions associated with the place.

This holistic approach, as outlined in Christian Norberg-Schulz's book "Genius Loci: Towards a Phenomenology of Architecture" (1980), defines the essence of a place through the concept of *genius loci*. It encapsulates all physical and symbolic values inherent in both nature and the human environment. By applying this type of methodology in Messolonghi, it is possible to develop a nuanced appreciation of the place, ensuring any intervention is sensitive to its unique identity and evolving nature.

3. DRAWING INSPIRATION & AREA ANALYSIS: MESOLONGHI

Messolonghi is located in the Aetolia-Acarnania region of Greece and is charged with an immense international historical influence, folklore identity and environmental value. The tranquil beauty of the wetland that surrounds it evokes a sense of peace that has served as a wellspring of inspiration and empowerment through time. Messolonghi's history bears witness to the lagoon's pivotal role, from its involvement in the Hellenic Revolutionary War of 1821 to its enduring influence on poets and artists on a national and international level.

3.1 Understanding Messolonghi – Four Themes of Inspiration

Being captivated by the unique potential and character of Messolonghi, the team's desire to bring its spirit to life again, became the project's goal. Thus, personal exploration led to the identification of the four broader themes that shape the *genius loci* of the city, to be used as a guiding tool to further analyze the area and, later, formulate the proposal. These themes are the significantly important natural environment, the distinctive productive identity, the highly significant historical value, and the intellectual identity of the site.

Concerning the natural environment, the Messolonghi Lagoon Complex is the largest in Greece. The area in its entirety is a waterscape of international importance that is included in the Natura 2000 network and protected by the Ramsar Convention. The Lagoon's unique ecosystem hosts a wide range of flora, fauna, and fish fauna.

The abundance of natural resources allowed the development of fishing and trade along with the extensive establishment of salt flats in the area. For these reasons, the ecosystem of Messolonghi

dictated the development of unique techniques, in the fields of architecture, collective fishing, and salt production. Over the centuries, the method of exploitation of the lagoon has remained unchanged with traditional fishing techniques and tools being inextricably linked and adapted to the ecology of the area. The traditional dwellings and construction techniques were also in connection to fishing – *a pilled timber hut, the “pelada” of Messolonghi acted as the residence of working fishermen.* Moreover, the abundance of salt due to the salt flats has had a direct impact on culinary tradition. Apart from the extensive consumption of salted fish, the most typical product produced in the area is the famous Messolonghi roe – the country's only PDO fishery product also known as the caviar of Greece.



Figure 2. Traditional fishing and dwelling techniques, Messolonghi roe and salt gathering (from left to right Paliouras, 2009. Mpada, 2004. Paliouras, 2009. Mpada, 2004. Artikos, 2010. Kordosis, 2022).

Even more significantly, Messolonghi holds a profound historical importance on a global scale. Even before the 19th century, due to its vicinity to the lagoons, the city possessed great naval power, that was in fact comparable to the biggest European countries in the field, and internationally recognized for its maritime trading. This relationship with water proved to be vital also in its involvement during the Greek War of Independence, when the city emerged as a powerful symbol of defiance against Ottoman rule, reaching the pinnacle of its significance. The town endured several sieges, notably in 1822-1826, where its people, despite suffering immense hardship, bravely withstood overwhelming adversities. In the final siege, their heroic sacrifice during the events of what is called today “the Exodus of Messolonghi” reverberated beyond Greek borders becoming a rallying cry for Greek independence and inspiring artists and intellectuals worldwide. To this day, Messolonghi stands as a symbol of physical and spiritual liberty, integrity and resilience.



Figure 3. Greece on the Ruins of Missolonghi by Eugene Delacroix (<https://www.eugenedelacroix.com/greece-on-the-ruins-of-missolonghi.jsp>).

Lastly, the intellectual identity of Messolonghi is simultaneously determined by the geophysical characteristics of the landscape, the dynamic presence of the fishing culture, and the historical pride that were mentioned above. The investment of accumulated wealth that came from the city’s naval power and merchant shipping in earlier centuries, led to the emergence of a social class, bringing about a remarkable intellectual movement that is strongly reflected in education and culture in general. With its heroic resistance, Messolonghi touched a large number of intellectuals around the world – such as the philhellene and English poet Lord Byron – and traveled through Greek and

international literature, securing its timelessness. Apart from being the city of immortal heroes, Messolonghi is also the city of 5 Prime Ministers and some of the country’s leading poets.

3.2 From selecting the area of intervention to site analysis

Examining the city through the lens of the four axes highlighted a concept echoed in Kostis Palamas's poem. The prominent role of water emerges as a commonality making the waterscape of the lagoon the unifying element among the various facets of Messolonghi’s identity.

In light of this realization, the decision was made to focus on the Kleisova Lagoon, the part of the lagoon complex that has an immediate connection with the city. Initially intending to concentrate solely on the the coastal segment adjacent to the lagoon – the road and the beach of Turlida – an extension of the study area was decided, to include its entire perimeter (approx. 25km) and allow for its activation and reintegration to the life of locals and visitors alike.

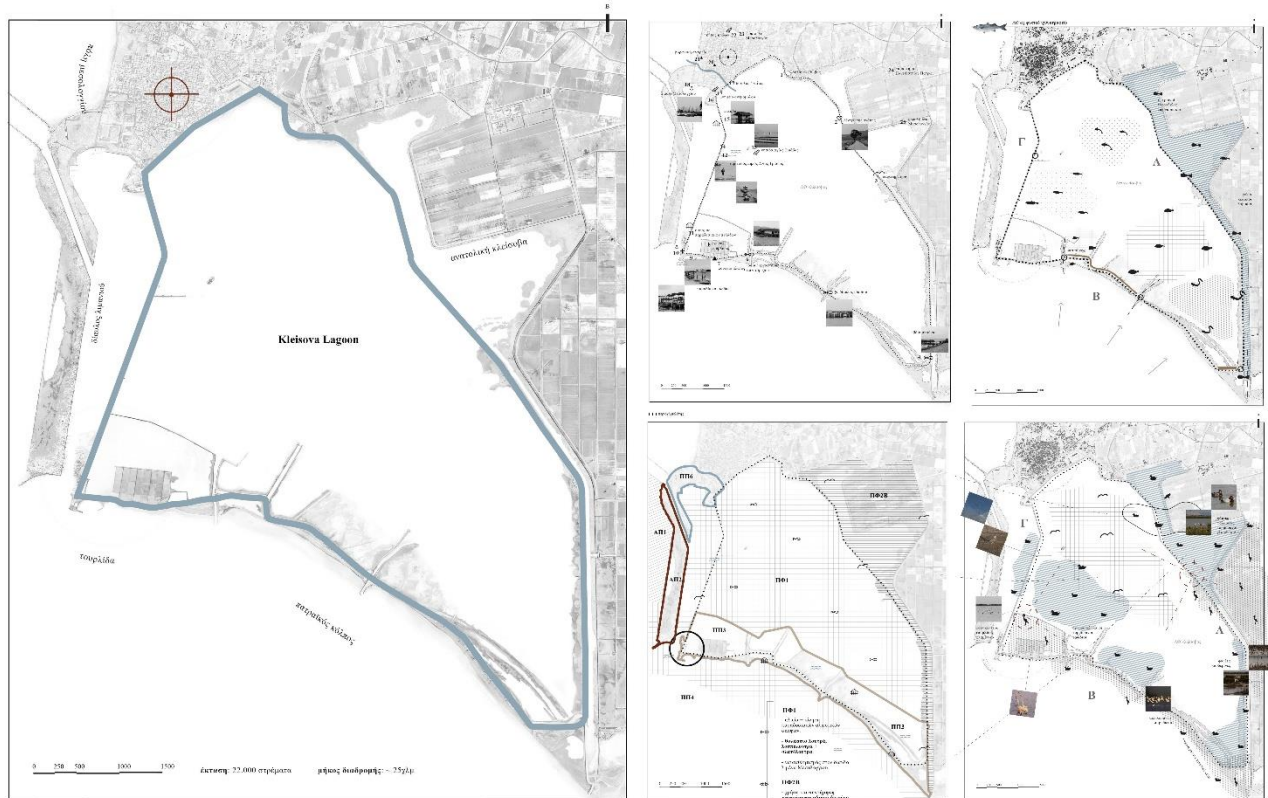


Figure 4. The area of intervention (marked with blue) and examples of area analysis through mapping (landmarks, fish fauna distribution, permissible actions, and bird fauna distribution).

Subsequently, a focused field survey was performed to identify suitable sites for an intervention proposal and understand the unique characteristics of the site. This research involved extensive mapping of various aspects such as land uses, distribution of fish, bird fauna and flora, zones of permissible actions as dictated by the environmental legislation, landmarks and prevalent activities performed in the area. As a result, the perimeter of the lagoon was separated into three distinct sections with different spatial characteristics and varying levels accessibility, traffic, and community engagement. This segmentation paved the way for tailored strategies to manage the area in accordance with its respective capacities, challenges, and opportunities.

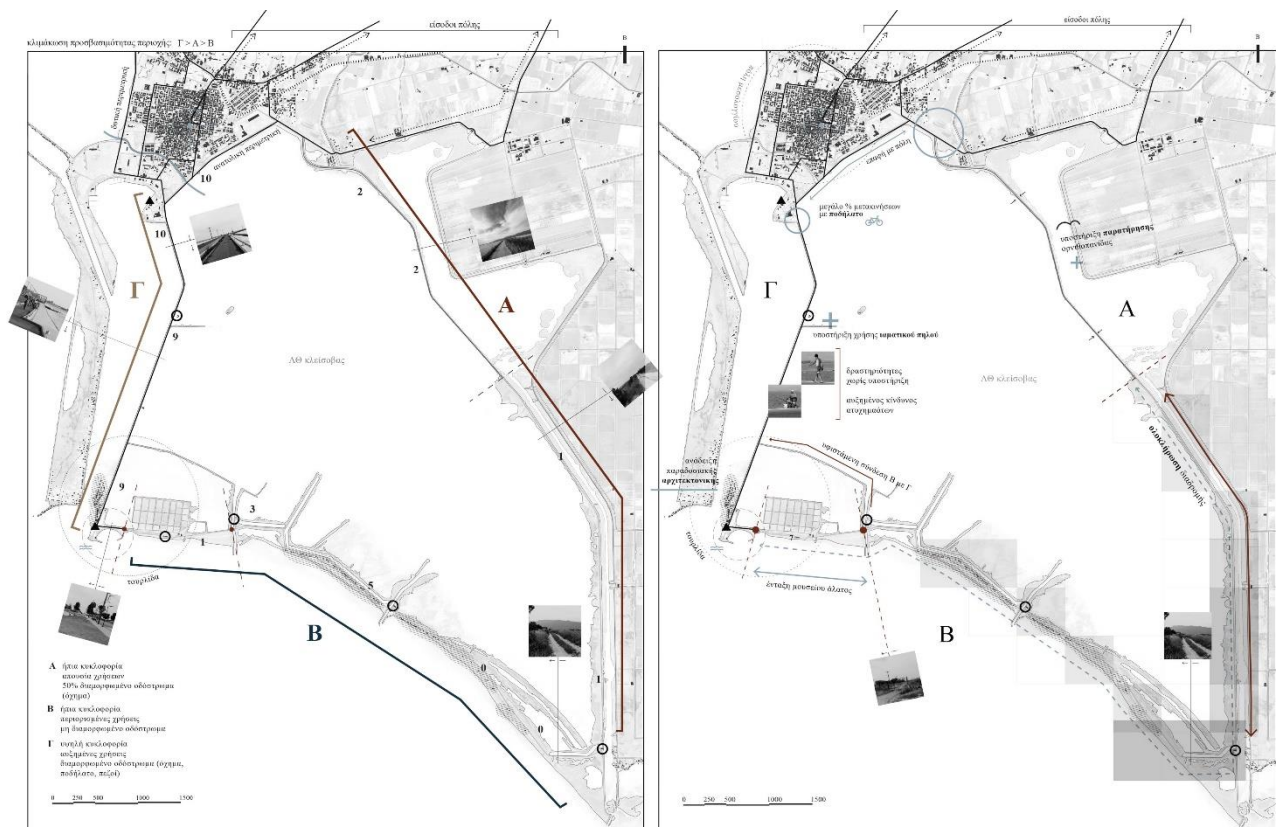


Figure 5. Map for the separation of the area into 3 sections A, B, Γ (left) and map of challenges and opportunities that will later lead to the masterplan (right).

4. ANALYSIS OF THE PROPOSAL AS A CASE STUDY

Recognizing the rich cultural and environmental heritage of Messolonghi and the ecological significance of Kleisova, the primary objective was a subtle, adaptable, and reversible intervention that addresses existing challenges while illuminating the area's unique character. In this context, the proposal aims to incorporate the 4 broader themes that shape the *genius loci* of the city (natural environment, productive identity, historical value and intellectual identity) into a single route/a circular path. By highlighting local identity, it seeks to enhance the region's appeal without compromising its long-term viability.

The two-tiered approach outlined in the proposal addresses both practical and aesthetic aspects of development. The first level focuses on improving connectivity along the perimeter road, ensuring equitable access to different parts of the area. The second level involves the strategic placement of pavilions in selected points around the lagoon, providing visitors with educational and recreational opportunities while harmonizing with the natural landscape. The designed pavilions are divided into 7 different typologies – bird observatory, viewing pavilion, historical identity pavilion, auxiliary bathing facilities, accommodation pavilion, productive identity pavilion, and service station – which, depending on the case, are repeated in different locations around the perimeter of Kleisova.

Overall, the proposal represents a holistic approach, considering both practical needs and cultural/environmental sensitivities. It seeks to leverage the unique assets of the area to create a sustainable and appealing destination for residents and visitors alike.

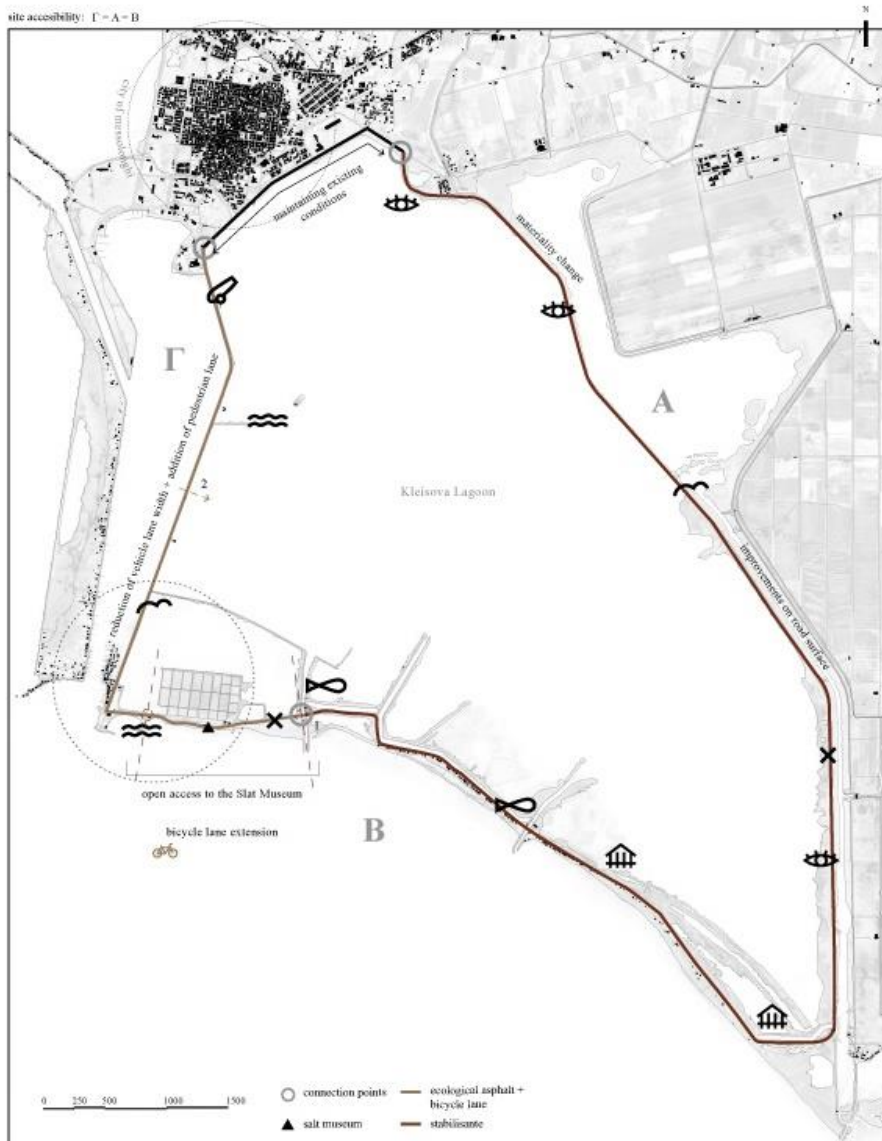


Figure 6. Masterplan of intervention.

4.1 Methodology and Context interpretation

The primary goal of the design process was to consistently refer to the findings and insights gleaned from research, allowing them to guide each decision and action. Therefore, every step taken, and choice made was based on the results of the area analysis.

Concentrating on the second level of intervention, the selection of content and functions for each pavilion was determined by considering the four themes of Messolonghi's identity, conducting literature research, interviewing and consulting local authorities.

Additionally, the specific locations for each pavilion were determined through a synthesis of all the mapping data generated during the site analysis, supplemented by individual field surveys for each designated point. For instance, the bird observatory was strategically situated in areas with a notable concentration of bird fauna (as highlighted in the bird fauna map) while also offering extensive visual coverage of the lagoon. Similarly, the history pavilion was positioned in close proximity to the town of Messolonghi and two sites of significant historical events during the revolution (as depicted in the landmarks map). As for the productive identity pavilion, its placement was guided by proximity to fish barriers and existing hatcheries, as indicated in the fish fauna map.

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For the composition of the pavilions, the concept design prioritized the development of an innovative synthetic tool – an adaptable, flexible modular system that could be restructured and recomposed to produce buildings of different shape, type and use. This approach was intended to address the distinct needs of each typology and provide suitable variations while maintaining a cohesive aesthetic along the route. Additionally, adherence to the prevailing legislative framework, which stipulates the use of lightweight construction techniques rooted in traditional regional practices, was deemed essential to ensure seamless integration with the surrounding landscape.

Having in mind the above, drawing upon references from the traditional dwelling emerged as the most fitting strategy, not only offering a structure that harmonizes with the delicate environment of the lagoon, but it responding to the local heritage.

4.2 The traditional dwelling – the *pelada* of Messolonghi

Part of Messolonghi’s rich traditions related to the fishing culture was the development of traditional dwelling techniques inextricably linked and adapted to the ecology of the area. The “*pelades*” of Messolonghi, situated around the lagoon, served as homes for fishermen plying their trade in its waters. These structures are constructed as timber huts on poles, elevated above the water on a foundation of poles (timber originally, now of concrete), in a 50x50cm grid, ~10-20cm in diameter with a total length of around 2.50m. As a measure against fluctuations in water levels due to tides, a distance of about 1.00m existed between the water level and the floor of the building. Upon these poles, beams measuring 8-10cm were positioned crosswise to support the floor. The typical roof of the *pelada* was double pitched, reaching a height of approximately 3.0m from the floor, and housed also a peripheral corridor known as the “*lotza*,” which maintained an opening allowing the fishing boat to enter the structure. The wall structure was made of timber too. Materials for construction were sourced from the surrounding environment, with chestnut or cypress wood commonly used for the structural framework, while reed, water cane, rushes, and seaweed for the filling and the covering of the walls.

Today, the *pelades* have taken the form of holiday summer homes for the locals and have been renovated to meet modern needs, while maintaining some of their traditional character. Although their number has decreased significantly compared to the past, there are still some actively used by local fishermen. Examples of modern materials incorporated in their construction is the use of concrete for the formation of the poles and the use of tin metal sheets for the covering of the roof.

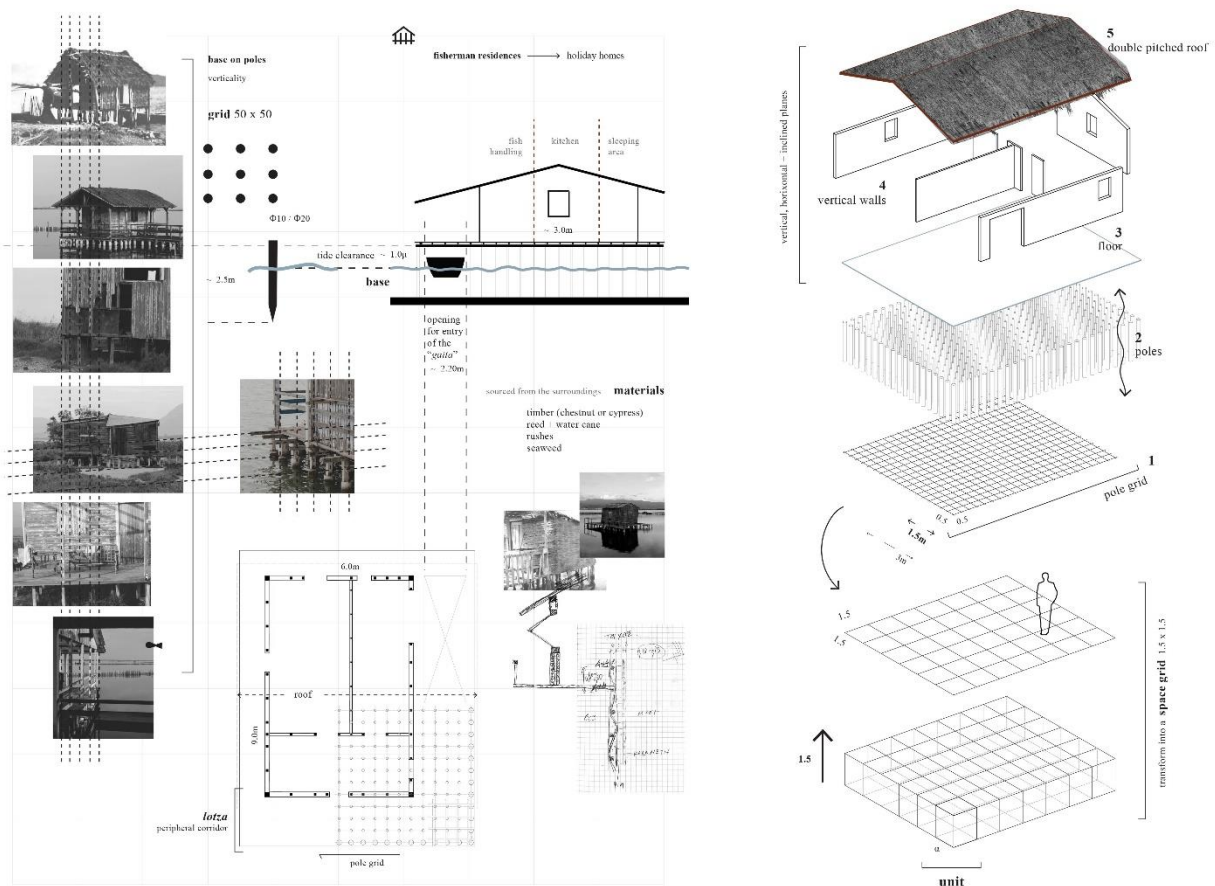


Figure 7. Analysis of the traditional *pelada* of Messolonghi and deconstruction to its defining elements to acquire the unit of the modular system.

4.3. The Modular System: an innovative synthetic tool

In an effort to interpret the local architectural vocabulary, the deconstruction of *pelada* of Messolonghi into its defining elements provided the components of the system that was searched for in concept design. Elements such as the double-pitched roof, vertical walls, floor, poles and the 50x50cm construction grid were isolated and recomposed to form a contemporary iteration, paying homage to the original *pelada* while incorporating modern touches.

Recognizing the grid of the poles as a crucial feature of the construction, it was then adapted to a habitable size of 1.5x1.5m and transformed into a space grid. This space grid serves as the fundamental unit of the system and can be multiplied to create various forms and structures tailored to specific requirements. The design vocabulary also includes vertical, horizontal, and inclined planes, which are freely positioned within the rigid space grid to accommodate diverse uses, needs, and spatial qualities.

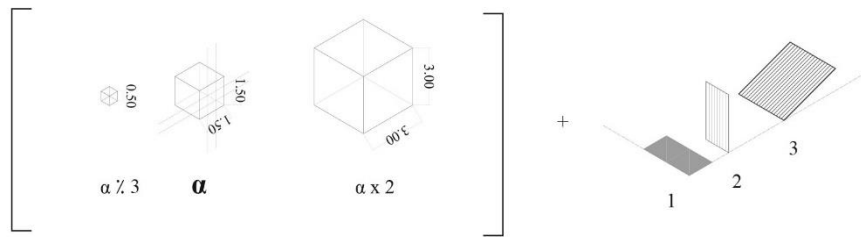


Figure 8. System Vocabulary: Unit (α), multiplication and divisions and horizontal, vertical and inclined planes

This modular approach allows for numerous compositional possibilities while ensuring cohesion among the different pavilions. The 7 typologies that emerge constitute 7 snapshots or possible combinations, that were considered to serve the purpose of a complete and integrated proposal. Thus, the intervention has an experimental character and a flexibility on possibilities, providing a pilot proposal for the management of the site.

In this endeavour, the synthetic composition and structural concept were developed simultaneously, to design a timber frame that balances historical references with adaptability, flexibility and landscape integration. Timber beams and posts materialize the space grid that derived from multiplying the base unit. The posts are extended, where necessary, becoming the poles for the foundation of the buildings, either in the ground, or the water leaving the environment almost intact, since minimal interventions are required for the proposed constructions.

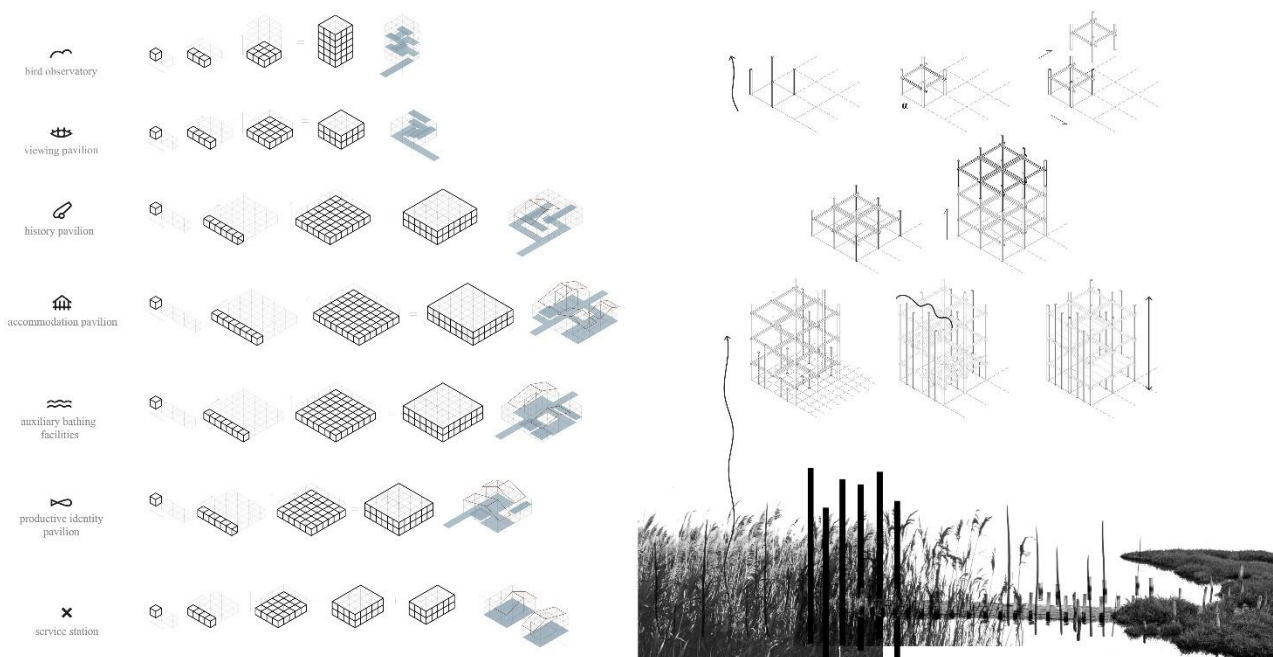


Figure 9. The Modular System: Synthetic principle (left) and constructive principle (right).

In all the proposed pavilions, there is an emphasis on the vertical axis. In forming the facades and providing support to the timber frame, a grid subdivision of 50x50cm was used. The vertical timber elements as if they were growing organically from the ground are mirroring the vegetative forms found throughout the landscape, including fishermen's dams and natural reedbeds. The natural aesthetic is further accentuated by the use of uneven timber blinds, strategically placed around the

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structures. These blinds are arranged in clusters of varying distance between the posts, offering shading and additional privacy where needed.

4.4 The pavilions

The bird observatory is developed vertically, supporting the supervision of the area from above and facilitating birdwatching. The space is organized into successive levels around the core of the structure, creating a path culminating in an upper "balcony." The subdivisions of the grid become denser on the sides of ornithological interest, forming two more "closed" facades as observation walls. The entry axis remains open, allowing for an extensive view of the landscape. An intermediate level is designed with seating, framing the view through a wooden structure. ***In the reed area, the structure is designed so that the planting extends in the interior, attempting a direct dialogue with the natural environment.***

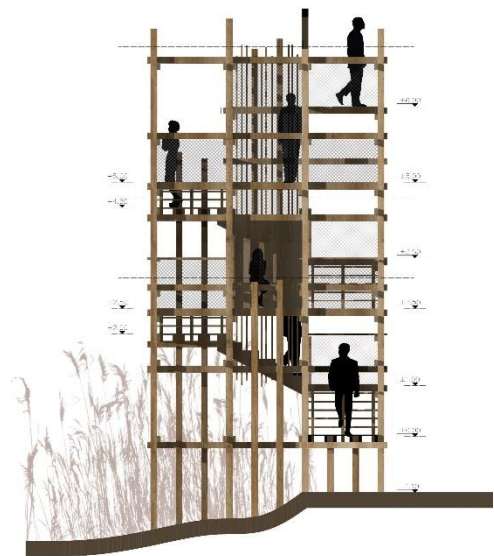


Figure 10. The bird observatory.

The viewing pavilion is designed as a stop for visitors to pause and absorb the beauty of the surrounding landscape. The incorporation of QR codes adds a layer of depth to the experience, allowing visitors to engage with literary and poetry works written or inspired by Messolonghi. The experience of reading the texts allows visitors to emotionally and globally connect with the scenery providing a transcendental sense of the landscape. Similar to the observatory, the pavilion features different levels, offering opportunities for rest and contemplation, ***enabling visitors to appreciate the landscape from multiple perspectives.***



Figure 11. The viewing pavilion.

The history pavilion is designed as a historical journey with successive levels and alternating covered and open spaces. As visitors progress through the pavilion's multiple levels, they experience a dynamic narrative, from the pre-revolution era to the Exodus of 1826 and the events that followed. The spatial layout mirrors historical context, with each level representing a different phase of Messolonghi's history. Unlike the other pavilions, it features a recessed enclosed cube symbolizing the tumultuous events during the Greek War of Independence. *At the heart of the cube lies a void, establishing a direct connection with the water and symbolizing the pivotal role it played in shaping the city's destiny.* As visitors ascend to the upper level, they reach the climax of their journey, experiencing a sense of liberation and panoramic views of the surrounding landscape. A literal "exit" from the cube, as an allegorical reference to the heroic Exodus. The descent to the final section of the pavilion explores the aftermath of historical events.

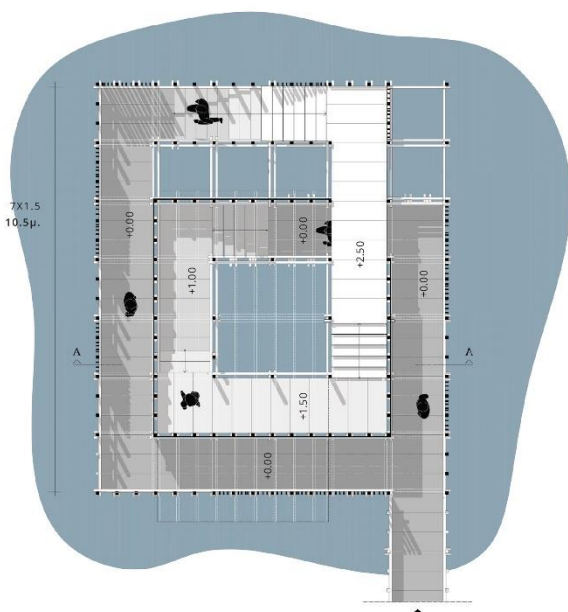


Figure 12. The history pavilion.

The accommodation pavilion supports overnight stays in a camping-style setting for nature enthusiasts, students, academics, and observers alike. The unit includes 2 sleeping areas, auxiliary

facilities, and common areas. At the entrance, it features a gap in the grid for the passage of the traditional fishing boat, yet another reference to the traditional fisherman dwelling. **At the center of the structure, an internal water core is created, providing a breath of fresh air and a connection with the aquatic element.**

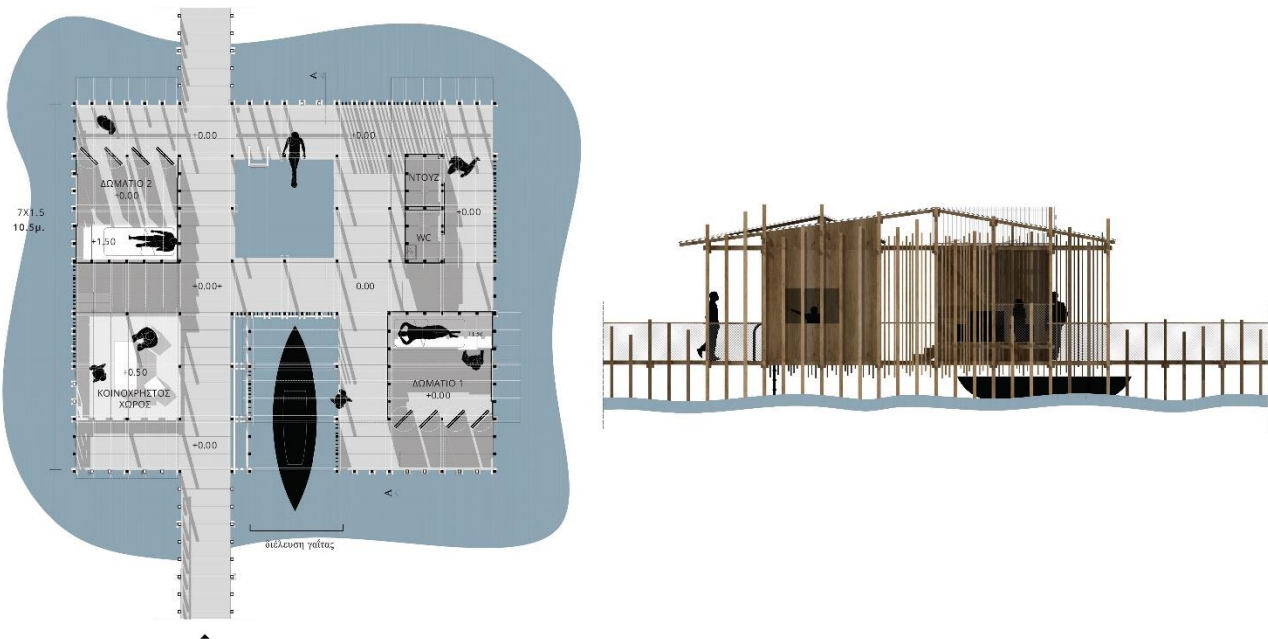


Figure 13. The accommodation pavilion.

The auxiliary bathing facilities offer basic amenities to serve beachgoers, as stated in relevant legislation. The layout of the pavilion is divided both literally and functionally by the entrance axis into two sections. On the left side, all the facilities such as toilets, changing rooms, showers, and lockers are found. Meanwhile, the right side features levels at different heights, serving as relaxation and sunbathing areas, some of which are covered by the double pitched roof, while others are not. **In the centre, there is a water core for swimmers, making the aquatic element an integral part of the pavilion.**

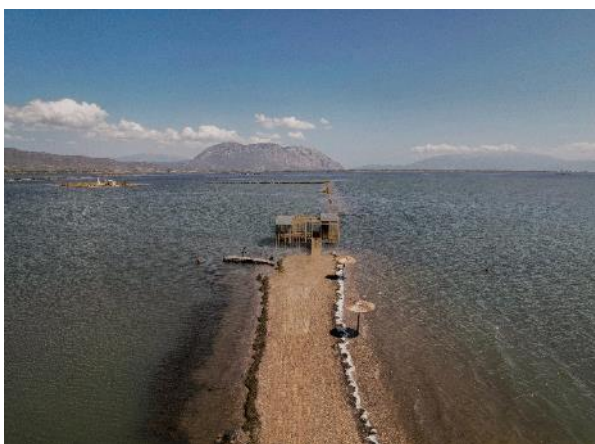


Figure 14. The auxiliary bathing facilities.



The production identity pavilion stands adjacent to the bustling activity of local fish weirs, offering insights into traditional fishing practices and the life of fishermen. Divided into two sections, it in

meant to educate visitors about both fishing techniques and the production of roe. With its open-plan layout, the pavilion encourages a seamless flow of exploration, allowing visitors to engage with informational exhibits and demonstrations. *Again, a gap in the structure pays homage to the traditional pelada.*

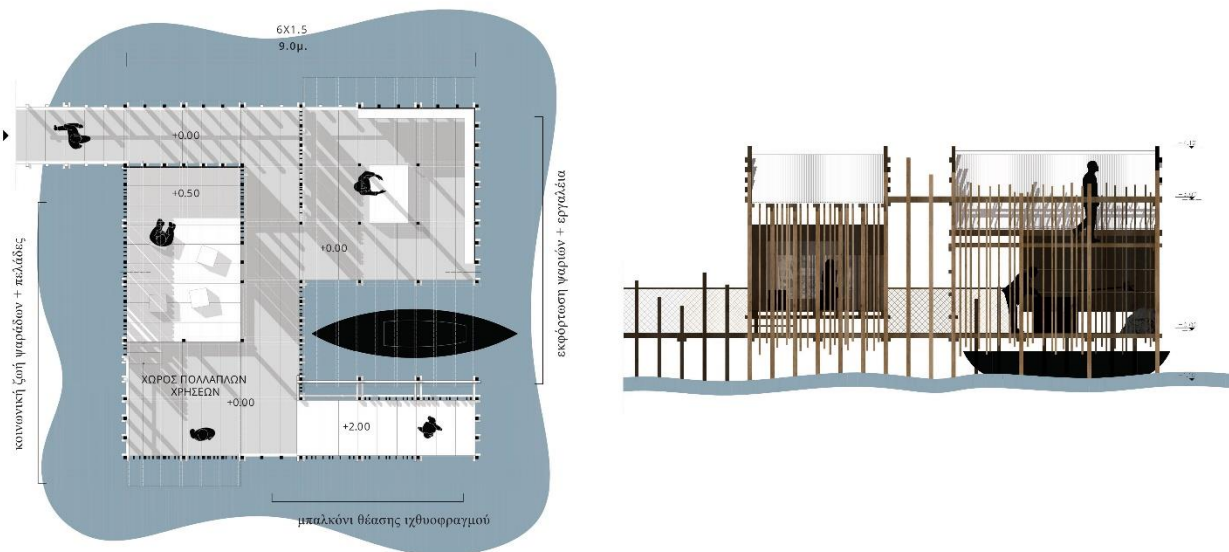


Figure 15. The production identity pavilion.

Lastly, the service station is separated in two units positioned on either side of the road. On the left side of the structure, there's a refreshment area, featuring a sheltered vending machine and outdoor seating. On the right side, restrooms facilities are located.

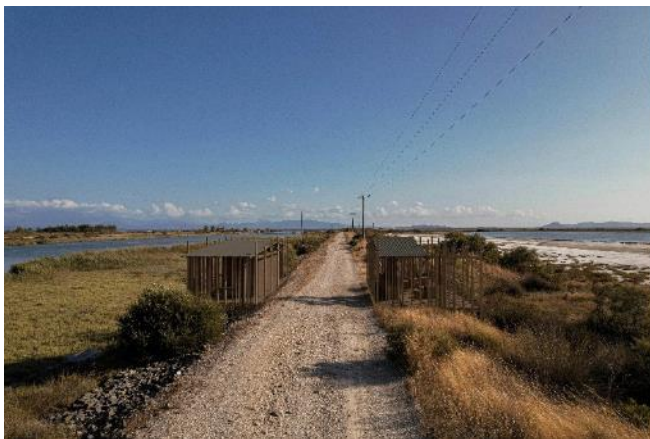


Figure 16. The service station.

4.5 Structural System

The studied typologies feature timber structures on poles that reference the traditional *pelada* while incorporating flexibility, adaptability, reversibility, and landscape integration. Timber, being a sustainable and natural material offers many advantages in terms of its environmental footprint (negative carbon dioxide emissions, minimal embodied energy, and ease of recycling and reuse). In keeping with the principles of gentle and reversible interventions, timber structures designed accordingly from the beginning, can be disassembled and reassembled, or their components can be recycled and reused in other constructions.

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In designing and selecting the specific structural system, the economy of construction was an issue of high consideration (low cost, easy and quick construction procedure). The structures obey the main principles of ADISA (Assembly for Disassembly), while the dense arrangement of the columns due to a specific grid allows the use of small cross-sections which can be easily found in the market. Metal bolts are used to connect the beams with the columns, creating a typical joint that is easy to assemble and disassemble. In all timber elements, natural durable species of wood is proposed (chestnut or cypress wood), echoing the same materials found in the *pelades*.



Figure 17. Axonometric views of the pavilion models (from left to right: bird observatory, viewing pavilion and on the bottom the auxiliary bathing facilities).

More specifically, in the vertical dimension, the pillars-poles are arranged according to a construction grid of 50 to 150 cm and at their lower part are connected to screw-shaped metal galvanized poles, specially treated for water conditions. This solution was chosen over conventional concrete poles for their reusability. Horizontally, all beams are double on the interior of the buildings, facilitating a connection to the posts without any metal plates (timber-to-timber connection with a metal bolt). On

the exterior, the beams are single in order to maintain the continuity of the vertical elements of the facade. This deliberate choice serves as a key architectural element, referencing the verticality of the surrounding landscape. The roof covering consists of galvanized tin corrugated metal sheets (a reference tying together the old and the new *pelades*), laid over plywood sheathing which is used also for the flooring. Finally, in areas of the structure requiring protection from falling, timber railings are reinforced with netting, are serving as an additional nod to the fishing tradition.

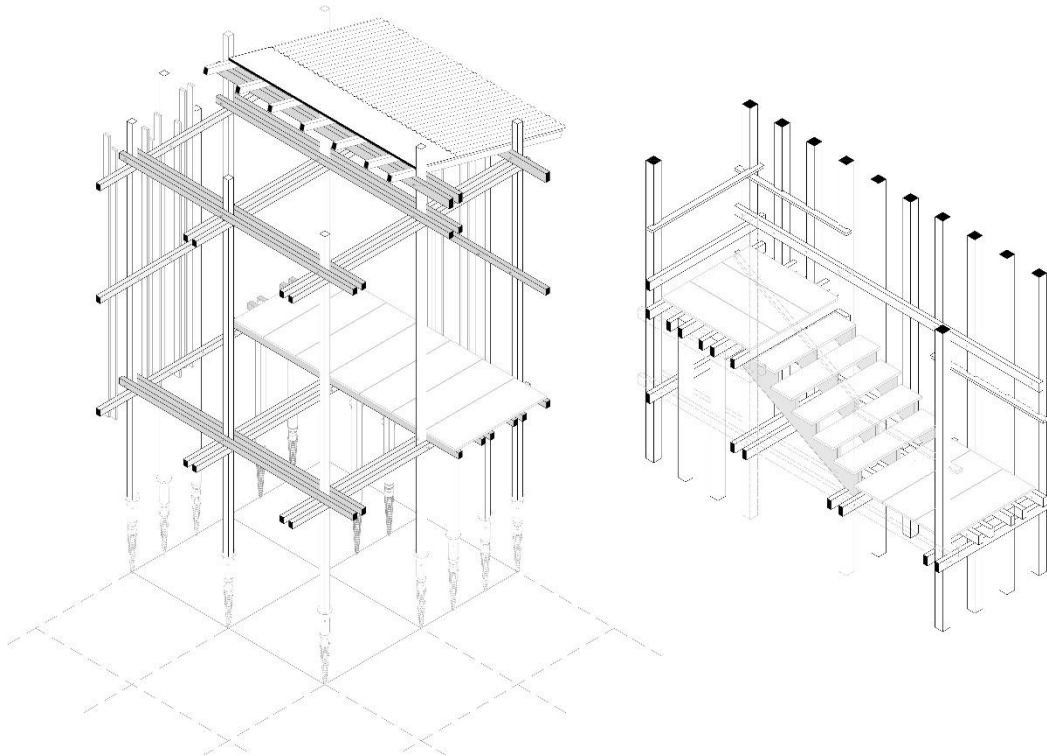


Figure 18. Typical axonometric sections of the structural system of the pavilions.

5. CONCLUSIONS

Contemporary architecture is moving away from the invasive and environmentally hostile designs of the past century towards approaches that harmonize with the environment and honour the cultural and historical context of a place. The concept of *genius loci*, or the spirit of a place, is crucial in achieving this harmony. It helps in creating architectural designs that are responsive to and integrated with the unique physical, cultural, and historical aspects of their surroundings. ***More specifically, waterscapes significantly influence the genius loci of an area. Their appeal goes beyond aesthetics, playing a vital cultural and political role in defining the identity of coastal and earthly landscapes. Messolonghi emerges as a prime example of a city where the waterscape, specifically the lagoon, is integral to its identity. The lagoon is not just a feature of the city but embodies its essence, influencing every aspect of its character.***

This paper intended to analyse the diverse components that comprise the city and its surrounding environment, focusing on historical and socio-spatial features that contribute to its unique essence.

In conclusion, the paper underscores the importance of contextually responsive architecture by proposing a project-oriented approach to the methodology of reading, interpreting, and intervening in the identity of a specific location. Through a detailed analysis and case study in Messolonghi, the proposal integrates physical, productive, historical, and intellectual themes into a sustainable and reversible intervention that respects and enhances the local spirit. The innovative modular system introduced provides a flexible and uniform solution that harmonizes modern design with traditional

architectural elements. By creating seven typologies of pavilions, the proposal offers an experimental and versatile approach to site management.

This work exemplifies the potential of sensitive architectural interventions that are sustainable, culturally attuned, and deeply rooted in their unique contexts, encouraging a shift away from mass-production towards more meaningful and responsive design practices.

An additional conclusive comment: Neither architectural function and construction, nor symbolic architectural references may be neutral to the landscape context, to their natural environment and to their cultural landscape references as well.

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Landscapes of Wetness and Body Fluids

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Abstract

Contemporary ecological theories reinforce the philosophical context of the twenty-first century with the Anthropocene theory, in which man is defined as the most important influencing factor of territorial transformations. The human-nature dichotomy is critically analysed as the formations of aquatic and terrestrial landscapes are interpreted as an extension of corporeal anthropogenic actions (Crutzen, 2007). The current study attempts to investigate the forces exerted on aquatic landscapes alongside the reading of corporeal expressions of eroticism as interrelated phenomena shaping dynamic cultural and territorial assemblages.

The research proceeds from the analysis of the narrative of Cretan folklore that refers to the metaphysical parameters of the creation of Lake Kournas in the prefecture of Chania, Crete. Attributes of erotic desire and bodily freedom are interwoven with the expansion of territorial boundaries, as a natural quality that characterizes water flows, in an attempt to meta-narrate the myth through conceptual approaches to landscape, body and eroticism.

The second section introduces the issue of the restriction of seascapes-ecosystems as a consequence of the expansive practices of the development of modernity alongside the limitation of sexual expression. Instrumented by the concept of double-articulation, de-territorialization - re-territorialization, a comparison is made between the characteristics underlying deep sea mining practices and the rational formalization of erotic desire. The ocean depths are undefined, unexplored landscapes, as amorphous as the space produced by the attraction between bodies, the space that tends to be shaped by erotic desire.

Keywords: *aquatic landscapes; corporeal expressions; eroticism; erotic desire; double-articulation; deep sea mining;*

1. INTRODUCTION

The narratives of Greek folklore, as well as mythology, incorporate a variety of cultural and territorial coordinates as well as multidimensional approximations of geological transformations. As an assemblage of metaphors, myth constitutes a mutable space of constant conceptualization, raising questions about the boundaries set by symbolic systems.

2. RE-SHAPING KOURNA'S LAKE MYTH

The verbal narrative related to Lake Kournas describes the adulthood period of a resident of the settlement, during which she turns into an object of erotic desire. Helping her father out with the farming labour, the narrative climaxes as he approaches her sexually and threateningly one day while she was brushing her hair. In her attempt to escape, she invokes to water deities to transform her into liquid, shouting "Voula and Voulolimna, and I haunt the lake." Her hair is transformed into meandering river flows, the material boundaries of her body are ripped open, the waters that pour inexhaustibly from within flood the valley and crush the settlement, composing the body of the lake. The viciousness of this bodily transformation constitutes a metaphor for the assertion of somatic freedom intertwined with the urge to redefine erotic desire. The thresholds of the female body of the myth are interpreted as the contours of erotic desire shaped by the social context of the time. At the

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same time, water, as the ruling force of this liberation, acts as a unifying factor of the inorganic and organic forms of the landscape. The clearly defined agricultural lands and buildings of the settlement are transformed into a dynamically shifting landscape capable of embodying the complexity of its coordinates, a landscape in constant motion. The merging of water with the body softens the edges of the skin, revealing its capacity to expand and connect with other bodies,

“Skin is our border with the world, but it is a leaking boundary. [...] Our bodies do not end with our skin, just as islands do not end with the outer perimeter of the land.” (Johnson, 2022: 5)

The recontextualization of the myth creates grounds for reconsidering issues that arise in the present geological era, which are related to the limitation of aquatic landscapes.

3. READING FLOWS, FROM OCEANIC TO EROTIC SPACE

In the post-industrial period (after the 19th century) geological changes are characterised by a Great Acceleration (Crutzen, 2007), as the needs of human habitation increase. A wide range of cartography, depicts waterscapes as an inversion of the terrestrial terrain, with a lack of mobility. Rivers, lakes and seas are presented as forms completely controlled by contours, engravings inscribed as other urban planning grid lines. The one-dimensional blue entity that represents the aquatic landscapes constitutes an articulation of this 'other', a form of geopolitics whose main focus is the study of the planetary landscape as a mechanism of economic development of globalized capitalism (Latour, 2017: 40).

Ecological degradation, based on the ecosophical view of the philosopher Felix Guattari, constitutes an interconnection of three interlinked ecologies: mental, social, and environmental. In this context, the deterministic approach to territories by the practices of modernity is intertwined with the rational determinations of cultural elements, a condition that affects erotic desire as a factor in shaping subjectivity. Guattari, in collaboration with Gilles Deleuze in the text *A Thousand Plateaus*, develops the theory of the double articulation, de-territorialization - re-territorialization, as a method of analysis of multiple phenomena, biological, geological, social and psychological. Based on Deleuze Guattari's theory, capitalist practices develop through the territorialization of the entities that coexist in the planetary landscape and the social realm, constructing solid and invariable subjectivities. Territorialized geological analyses compose the vision of totally controlled geographical areas, expressing stability and order as the basic principles of globalized capitalism. At the same time, this practice produces distinct and stable social structures, which are related to erotic desire, composing roles and norms that regulate social expression. At the opposite end of this categorization, double articulation refers to a constant movement between the undoing of existing structures and their reconceptualization, creating new structures, a productive process that can be observed in all entities and systems on earth.

The endless practices of mineral extraction are rapidly highlighting the exhaustible limit of energy reserves, while the rhetoric that is being developed is constructing the argument of the expansion of depleting landscapes as an unavoidable condition of human survival. In particular, the case of Deep Sea Mining [DSM] emerges as a new "blue economy" (Childs, 2022: 1), maintaining the central pillars of the pre-existing "green economy." The key difference between the two conditions can be found in the ecosystems referred to and the way they are presented in scientific studies. DSM is applied on the seabed, a landscape distanced from human habitation. However, descriptions of this system follow a direction of technomorphism and anthropocentric storytelling by identifying it as a place where nature 'appears inactive: ready to be sliced and packed for extraction' (A. Tsing 2003: 5100). The complexity that characterises assemblages at these depths is altered through the incorporation of homogeneous categories into their descriptions. The purpose of these descriptions is to territorialize the assets of these assemblages, considering the seabed as a resource-generating industry.

«the geological vitality of the seabed and its unfamiliar attitude towards human experience open up a very specific set of challenges to the imperatives of capital accumulation.» (Childs, 2022 :1)

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Beyond anthropocentric narratives, the seabed constitutes a complex synthesis of biotic and non-biotic dynamic systems, in which the influences of urban landscapes are registered.

«Regulations for deep-sea mining require protected recovery areas to be created next to the mining areas. The environmental impact is supposed to remain local. The boundaries are clearly defined. But the impacts of mining move with water currents and sediment displacement, and the organisms are part of a larger, deeply interconnected ecosystem». (Hessler, 2022: 3)

According to Deleuze & Guattari's theory, the seabed is an assemblage, with the internal forces pushing it into constant transformations. Similar qualities are observed in the erotic space, as described by the classicist poet Anne Carson. To Carson, eros is a synergy of three entities, the lover, the beloved and the difference between them. This in-between, which she defines as absence, is the space where desire evolves. It is the space that evokes love as "postponed, defiant, obstructed, hungry, organized around a radiant absence" (Carson, 1988: 166). A space undefined and ever-changing that maintains the differences of each body encapsulated in it, while enhancing the difference of their behaviors.

The erotic desire for Carson is reinforced through multiple de- and re-territorializations, while at the same time maintaining the interlude of the double articulation, constantly producing multiple differences. This condition expands the boundaries of the erotic, allowing it to occur in encounters between human and non-human bodies, land and water, as well as on a planetary scale. The explicit definitions of erotic and oceanic space, as an outgrowth of the distancing from alterity in the post-colonial era, prevents this openness of erotic desire, as the material and immaterial meanings produced in these spaces pose a threat to the maintenance of order and homogeneity in globalized capitalism.

Returning to the reading of the Lake Kournas myth, water, in the form of bodily fluids excreted, is observed as a unifying factor with the surrounding entities of the landscape. The young girl of the narrative is becoming a lover, while the figure of the lake conveys the notion of beloved. The process of transformation of one body into another is what Carson defines as the reaching of erotic desire, a condition of mutually transgressing the boundaries between all the actors of the assemblage, but at the same time maintaining their differences. As the thinker Stephanie Hessler states in her book *Erotic Ocean*,

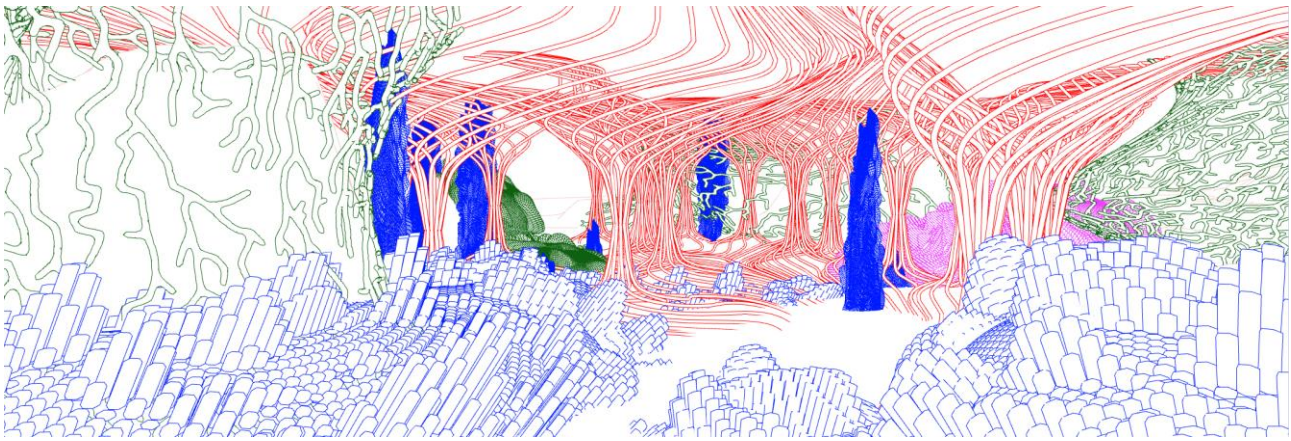
“Eros makes my desire to dissolve my boundaries, but at the same time it depends on those very boundaries and the realization that my boundaries will never be completely dissolved.”

As you can see, the survival of the human species is directly dependent on the survival of marine ecosystems. Distancing oneself from the seabed expands the ambiguity of this in-between of absence, intensifying erotic desire, what Stephani Hessler calls "oceanic eroticism".

“An oceanic eroticism can bring us closer to bodies, including bodies of water. My desire for the ocean knows that I can never fully grasp it and that its edges shift, like those of the shallow ones. But eroticism does not need to know a finite body to desire.”

It is the same erotic absence that creates a new ground of associations of human bodies with the many different entities that constitute the ocean, as opposed to the approaching of these bodies through the consumerist associations of an imperialist policy.

“Other bodies pass through me, but where I long to be one with the ocean, we remain separate. This erotic absence marks the unique relationship between me and the many bodies that make up the ocean. At the same time that I am being squeezed into it, the ocean is being squeezed into me.” (Stephanie Hessler, 2022: 7)



Katsanevakis E., (2024), *Garden of Hydro-Eroticism*, Mixed Media

3. CONCLUSION

According to the new Materialism, water and the body as materials are not inert substances, but rather spaces of vivid operations where meanings are assembled with material dynamics (Iovino, 2005: 16). Matter has agency and is imbued with meanings, thus each material formation constitutes a narrative landscape, and therefore can be subject to critical investigation of its interactions, its position in a world full of both expressive and narrative forces. The preservation of these in-between spaces, the erotic and the ocean floor, constitutes a practice that goes against the imperatives of modernity, in the attempt of a perpetual creation of differences, meanings and narratives. Such a method, applied to the study of multiple phenomena occurring in the planetary landscape, is capable of restoring the multiplicity of our associations with other bodies. To synthesize an expanded narrative of coexistence with otherness.

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Post-Industrial Wetlands: River-Port Town-Scaping at City-Edge Brownfields

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Abstract

Extending my focus on waterfront urbanization from past Changing-Cities participations, here our projectile for Chalon Sur Saône (central-eastern France) studies the objective of ‘domesticating’ an infrastructural node experientially, as to regain an environmentally operative riverside landscape. The industrial *Port Nord* site lies in close proximity to the historic urban nucleus, offering a unique case for applying broader regeneration strategies over multiple phases of intervention.

“Constructed Wetlands” explore the presence of freshwater from adjacent ponds and Saône riverbed, as well as excessive rainwater runoff from extended roof-scapes on-site. Implementing new ‘zones’ as man-made water flow networks, is prioritized here under the intention to eventually re-develop land and soil for taller vegetation while recovering ground toxicity hotspots. Main conceptual attribute is thus an incorporation and re-evaluation of organizational patterns originating from cargo handling processes into formal derivatives.

Here, infrastructural operation protocols become transposed as re-elaborated strata of intellectual potential. Most representative feature addressing this directive, the semi-elevated scheme of re-configurable cargo-containers, is re-imagined as residential shelf-system. Mobilization patterns and cross-connectivity between lake-edge and riverbank become primary elements of visual directionality. Notions of mobilization, impermanence and a furtive pledge of recovering the formerly rural site to a previous stage of natural existence, formulate urbanization dynamics. And yet, the visual manifestation of an industrial port is not simply its established and past memory on-site, but also the present – and potentially future – status. At all phases of re-development, from the least densified nascent stages already, the cargo harbor would still be fully operable, regardless if the river frontage would eventually be overtaken by housing and urbanist vibes – even if stockyards would transform from hard-paved expanses to soft-scape.

The *Port Nord* urbanization scheme was developed as an international competition scheme in collaboration with colleagues Lucas Correa (Ecuador) and Peter Glasson (USA) during their student years with my team-leadership and was recognized as pre-selected among almost one hundred entries, while this text was written by the author.

Keywords: *riverfront landscape, phased brownfield urbanization, waterfront regeneration.*

1. INTRODUCTION & PLACEMENT: ORGANIZATIONAL PROTOCOLS

This formerly European 8 competition site in central France is located at the outskirts of the historic city of Chalon sur Saône. The intervention area, *Port Nord*, is a typical central-European no-man’s-land waterfront, a derelict logistics sector appropriated by industrial activities and transportation circuits; a territory hostile to human habitation amidst a surrounding antithetical context of physical beauty. The experiential objective of domesticating and inhabiting the industrial port and regaining a riverside environment is achieved through multiple layers of intervention as outlined in this outset and analyzed minutely in following paragraphs. The main tectonic approach establishes clear associations and visual references to harbor life. All operating and re-used – currently abandoned – gantries and cranes, industrial warehouses, and silos – preserved and renovated to work as large-span enclosed venues – keep a visual lineage with the previous state of existence on-site.

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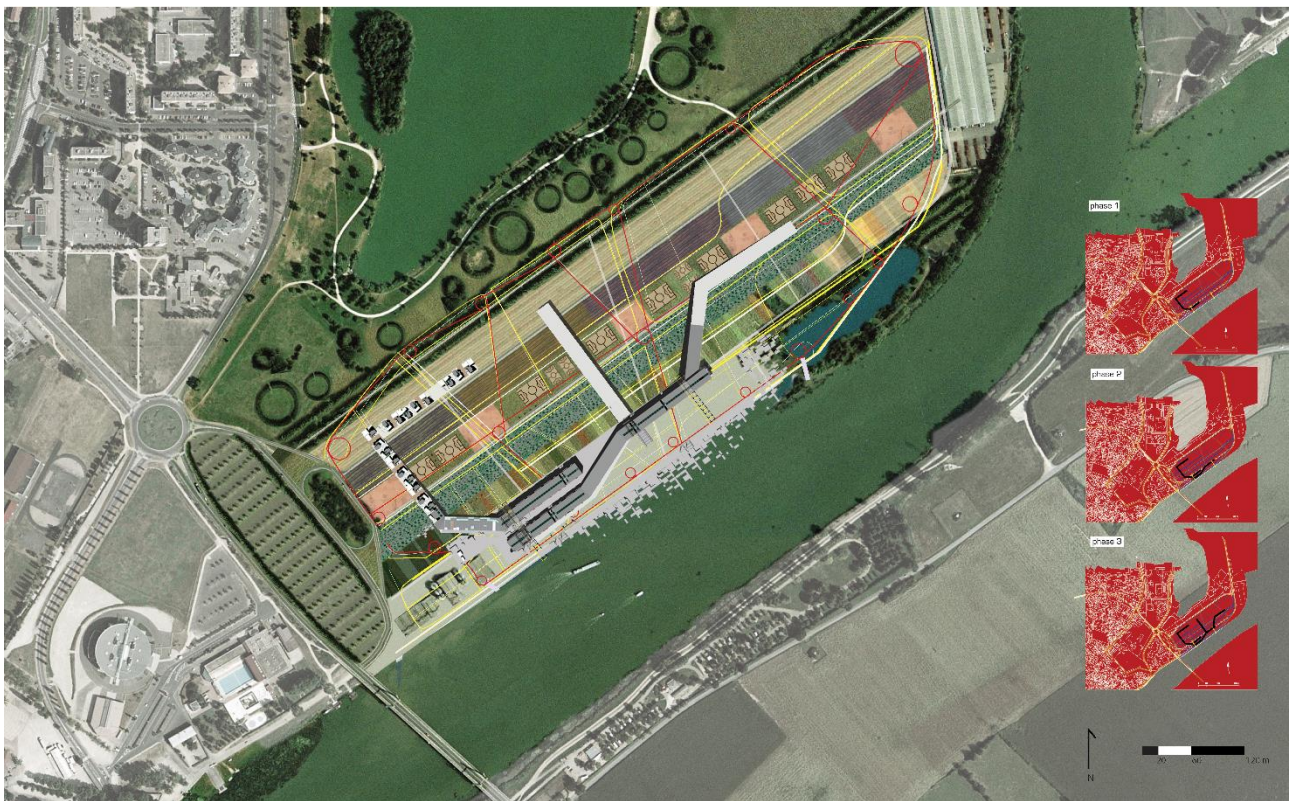


Figure 1. Chalon sur Saône, intervention area, *Port Nord*, with phased master-planning scheme.

Concrete cubical blocks become a primary landscape element allowing for a range of experiential feats: combining hard-paved river edge with elevated metallic tectonic forms generates a context for the ‘harboring flaneur’ through the seemingly randomized block-scape. The generated broken, or defragmented, river edge becomes exploratory for non-cargo activities. Offering a mutable environment for direct individual interaction with the waterfront this segmentation responds to practical issues of extreme water level fluctuation. This man-made river edge may be reborn daily in response to volumes of high-current water coverage thus allowing variable projections over the water surface. Long-term erosive sculpturing by the fast-moving waters of Saône ensures here for additional effects: varying water sounds, waves crushing onto the blocks, small boats or canoes discovering quasi-naturalistic havens safe from the current and accessible by the more adventurous pedestrians. The artificiality of this hardscape keeps clear the connotations of a harbor edge.

2. NAVIGATIONAL PATTERNS AND AQUATIC FORA

Mobilization patterns and cross-connectivity between the lake edge and the riverbank becomes a primary element of visual directionality. “Randomly” positioned cross-routes, thinned strips of landscape along straight lines connect the river to the lake, providing a sense of visual clarity and control for the newcomer [user, dweller or tourist]. Even from the ground level and at any time, and any point, there is a sense of total overview of the circulation options, the potential destination points, and the intriguing urban moments.

The series of warehouses and silos at the edge of the site towards the bridge will be preserved as to accommodate cultural events and community needs at large; such as the boat transportation node, a low-profile ferry terminal, an info center, along with a plain foyer-type space, or communal gathering spaces for athletic groups [cyclists, runners, water sports addicts, etc.], and perhaps basic services [post, bank, etc.]. There was a clear intention to avoid the implementation of “design object” buildings along the harbor lines. Such a particular design approach was judged as outdated and banal [a designer

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trying to design disparate building forms]. The choice for the re-use of the existing buildings reinforces the inhabited port effect, saving resources [financial and material] while allowing the overall urban scale proposal to read as a strategic plan rather than as a fragmentary design exercise in formal hedonism.

The notions of mobilization, of impermanence and the secret promise of recovering the site to a previous stage of natural existence, form the dynamics of the project. On one hand the attempt for an exhilarating visual imagery is obvious, on the other hand the site is treated with great sensitivity at an environmental level, dealing with aspects of sustainability and recovery that have been of great importance in the development agendas of local authorities. Chalon sur Saône has demonstrated a significant record of attention to environmental issues, and the Port Nord site becomes the ultimate epicenter sampling the future of the city.

3. ENVIRONMENTAL SAMPLING – SECTIONAL FLUX

Clarity of organization was central for site planning. Landscape horizontality is accentuated with the straightforward placement, parallel to riverbanks, of strips representing isolated aggregates. From the lake towards the river, the natural [in recovery] landscape, is progressively transformed to man-made green patterns, and then becomes a tectonic, solid, hard-scaped zone by the riverfront. A visually fascinating spectrum of landscaping types combines what one would call odd juxtapositions: corn crops, biological agriculture, communal gardens, forest strips, hedge/park zone. This uncanny coexistence of the above entities is conceptually interwoven through the soil sustainability goals. A primary landscape pattern of parallel strips of diversified vegetation densities acts as a tight environmental infrastructure, a steady and strong condition of reference, a striated plateau upon which the more point-like or line-like urban relations occur.

The current height of the concrete wharves forbids any interaction with the river water at a pedestrian level and forbids the accommodation of small boats used for transit to downtown, for small cruise-ships, or medium-size private vessels. Reflecting the concept of defragmentation / decompression, the uniform artificial plinth of the wharves is broken down into individual rectangular solid blocks organized in an orthogonal system for placement [in plan] and varying in height in section. A gradual randomized stepping configuration emerges, as a challenging landscape feature, inviting the pedestrian urbanites to walk from one block to the next, allowing contact with a water in a variety of ways: feet splashing in the water, to diving, fishing, swimming etc.

Relation of these individual platforms to the water and pedestrian contact with the river is in a state of constant flux, depending on the water level and the season. In this way, the issue of the fluctuating water level is no more an inconvenient factor of unpredictability, but transforms into a parameter of mobilization, of constant reconfiguration of the waterfront, with some blocks being for periods of time underwater and during other seasons above water.

A sense of personalization immediately emerges, as dwellers, visitors or urbanites are potentially expected to develop emotional preferences with individual segments/concrete blocks, reinforcing a sense of personal identification with the waterfront.

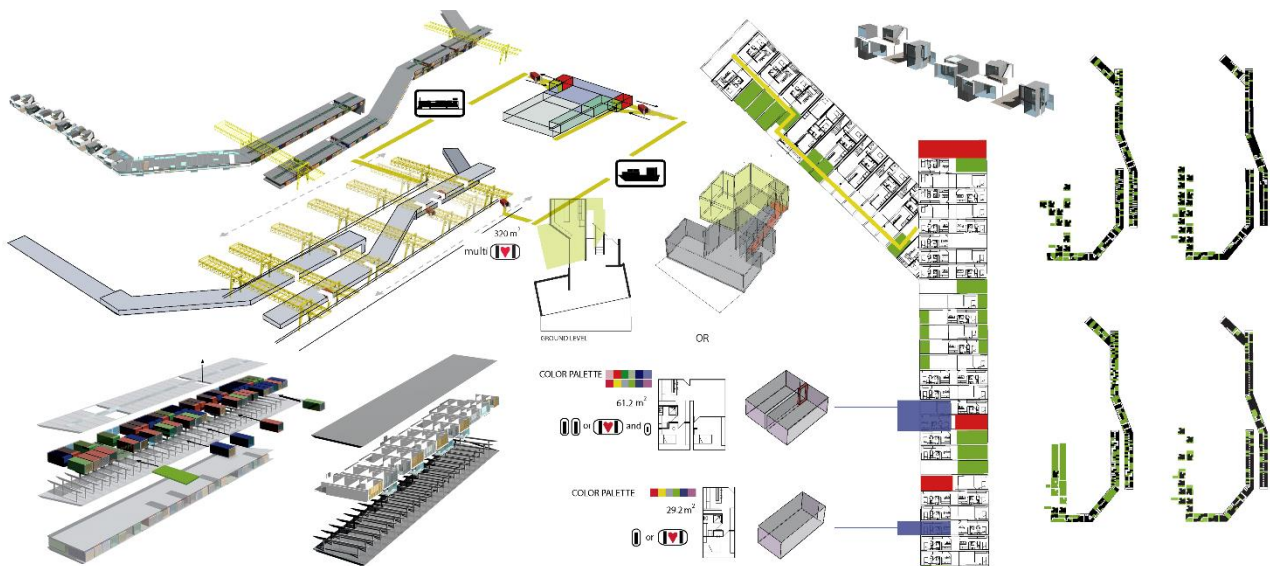


Figure 2. Movement and place-making of high dynamism are defined through surfaces or axes.

The concept of braking down wharves into segments with randomized sectional configuration relates further with the accommodation of smaller boats and medium-size vessels. By eroding the current, highly linear and austere artificial edge, individual smaller canals emerge, controlling the issue of high current of the water, and allowing smaller boats to tie up to the shore, and engage visually into the energized waterfront environment.

This multiplicity of interaction levels with the water relates to the common French strategy of having two riverfront conditions: a lower bank for strolling, allowing direct contact with the water, and a second upper edge, at the city level, dealing with extreme flooding scenaria. The condition is common in Paris, with a more serene and pedestrian-oriented riverbank and an upper bank, responding to the urban energies of the city.

4. MARITIME HYDRO-SCAPE: HYDRA-CITY: HYDRO-POWER

Water current high of the becomes a fascinating feature, promising on one hand a constantly active water edge, with waves eating up the solid blocks, generating an environment that addresses all senses: sound [water hitting the concrete blocks], smell [moisture and evaporating water], vision [a lively artificial beach condition]. Because of the high current, water can circulate and renew within deeper canals/patches/recesses that eat up into the land generating more isolated water hubs.

The new urban amalgam is generated by merging the concept of the paved urban plaza with the waterfront condition. This landscape is expected to act as a very desirable destination allowing a number of sports activities to find departure/arrival hubs. From water ski, rowing, or even surfing to swimming, fishing, diving, the urban zone is expected to trigger the interests of everyone by focusing on physical activity beyond age barriers. Diverse zones for everyone are included: bathing/swimming for the elderly, extreme sports for the youngsters, and for the family-oriented a water educational locus allowing the kids to familiarize themselves with water experience.

A potential incorporation of hydraulic energy-producing devices becomes a more practical way of utilizing the high current. This strategy responds to the high-levels of environmental consciousness of the city, and belongs to the sampling of environmental strategies that animates the site, promoting an educational agenda that focuses on urban ecology. [introducing more energy production strategies on-site].



Figure 3. Cranes and stepping blocks emanate a sense of stage-like theatricality, an urban forum.

5. CONTEXTUALIZED PHASING VS. ADAPTIVE TYPOLOGIZING

It is expected that the proposal will operate well even with the lowest of building density. In effect, the landscape and site concepts could work even with no new buildings. Beyond this assumption, a number of density patterns have been considered through a timeline.

Phase A: The existing gantry is used as a suspension device for an ultra-long housing strip, elevated from the ground, and supported on pilotis in one end, while turning vertically to merge into the ground at the other end. Beyond the pilotis the strip extends across the site, reaching the flood-plane, where it turns again parallel to the riverbanks, defining a dispersed development. The housing strip structure, typologies and attributes are defined separately in individual paragraphs.

Phase B: A new gantry is installed on-site, regaining the status of an operating cargo port. The primary function of the gantry is to move, relocate and position housing units along linear elevated strips that develop along the river frontage. A C-shaped waterfront development defines the site, expecting further infill growth.

Phase C: More perpendicular strips of housing develop, not associated with gantries at this stage. The typology of the habitable elevated strip becomes a primary tectonic feature of the site. These are potentially overlapping with the earlier strips, and merge with the ground. The trusses turn vertically to stop on the ground in many cases. In parallel to the continuous strengthening and growth of the streets, it is expected that a second urban zone will grow in parallel to the river, focusing on services, always associated with the immediately adjacent landscaped strips, and conforming to the transverse connectors. The potential of the urban boulevard gains strength at this third stage where businesses and professional space starts to be at higher demand.

The existing gantry is utilized as a bridging structural device that supports single-storied strips of housing through suspension. The existing gantry is expected to stay out of its original use and will be permanently attached to the ground. Through simple structural reconfigurations, the gantry will serve as main structural member of the underlying yet airborne housing strips. This incorporation of the harbor infrastructure into the housing scheme accentuates the attention and the overall focus on maritime identity, on post-industrial housing prototypes concepts.

Through the utilization of the existing gantry we were able to implement an abstract concept that would otherwise seem unrealizable: a hovering, elongated, segmented strip with slight kinks along its length in section and in plan, finds now an ideal support element: the gantry, re-emerging as an external structural skeleton is clearly of different [utilitarian] nature than the slick housing strip, therefore does not impose the problem of spoiling the linearity of the airborne housing bar.

Simply put, the same exact infrastructure that was fully dedicated to logistics in a non-habitational enclave, the industrial port, reflecting insofar notions of blunt utilization of environmental resources, can now fully service the direct needs of human habitation in a highly vibrant environment. The

container port infrastructure offers this way a lot more than a simply symbolic presence connoting the past. It embodies a sense of energetic continuity with the history of Port Nord even if there is a clear transformation of the organizational basis and of the functions incorporated.



Figure 4. Ground horizontality and elevated steel ribbons generate a certain sense of enclosure.

6. RIVERFRONT PROMENADE ACCESSIBILITY ARCHETYPES

The structural system accommodating housing strips is absolutely straightforward. A common vierendeel [4-meter-tall rectangular cage] truss allows, in cross-section, its horizontal members to extend on either side, cantilevering outwards. This truss spans from the gantry to support points connected to the ground on either end. Linear members composing the vierendeel truss are welded rectangular-section steel tubes. The horizontal surfaces of the truss are clad in steel plate, similarly to the decking concept of a boat. It is expected that the truss will be constructed in nearby shipyards and will be moved and finally welded on-site. The final cross-section is a hybrid prototype utilizing the strengths of a vierendeel truss and the lateral rigidity of a sandwich structure. The symmetrical cantilever on either side of the cross-section allows three zones to occur: thinner linear bands on either end of the structure can be utilized as circulation corridors or as private semi-outdoor shaded zone on the opposite side, the equivalent of balconies or verandas. The central zone is wider and acts as the main spatial entity that accommodates the housing units. In effect, there is a constant flux in the configuration of these spaces, and not an imposed linear holistic order. In that sense, any kind of mixture of public-use and private spaces, pulled and pushed asymmetrically in cross-section, are welcome in this configuration. It is expected that this integral organization will be in a state of constant flux responding to probabilities and statistics of real estate dynamics.

The most accentuated [visually] structural node for the elongated strips is clearly the gantry juncture, however, the other support points are equally intriguing and responsive at an urban scale. On its end, the steel-plated strip folds vertically and merges with the ground, providing a vertical circulation node. This is a major access point and simultaneously a pin-point for development and visual reference on the ground level. Towards the other side, the steel-plated strip turns in section and in plan, becoming a ramping feature, accommodating a stepping housing configuration [refer to housing analysis]. At the end of the ramp, the strip becomes again parallel to the ground [horizontal in section] and is supported by a forest of randomized columns, forming a linearly developing piloti. The pilotis become major landscape features, as the strongest shaded surfaces, accommodating functions that range from parking to ephemeral markets, to pick-nick spots etc.

Sets of outdoor stairs are embedded within the section of the gantry vertical lattice frame supports as fire egress. Occupants can be moved onto the roof of the housing strip, outdoors, and may use the ramping surfaces to evacuate the structure. The cross-sectional exposure on both sides and the linearity of the strips helps to identify and resolve fire emergencies before a larger portion of the structure gets affected.

Greatest component of the fire egress system is that the moving [new] gantry is by default the most powerful component for the resolution of fire emergency cases. The gantry serves as a giant fire extinguisher moving along the frontage of the strip and operating in all [x,y,z] axes, exactly in the same way it circulates housing units or products. Through catwalk corridors embedded within the horizontal portion of the filigree frame, and stairs within the vertical sides of the steel portal, people can be moved from any portion of the housing strips to the ground.

The ramping portions of the housing strips have a very gentle slope of 2.5% allowing convenient cargo, elderly and disabled circulation. All ages and health groups have equal rights of access and above all, equal experiential patterns of mobility. The full length of all housing strips is fully accessible by people on wheelchairs. Elevators are offered at the ends of the strips for circulation at a faster pace.

7. PROGRAMMATIC MOBILIZATION + APART-MENTALITY

Housing strips mutate progressively covering a full spectrum of housing typologies: prefabricated removable units fit for social housing allocated to persons or families of lower income for limited periods of time -therefore reconfigurable; permanently embedded units along the second segment of the strips [the ramping portion]; a rowhouse sector that stands on pilotis -establishing a first contact with the ground; a progressively semi-detached system that brakes perpendicularly the continuity of the long strip introducing voids; a detached housing zone responding to the boundaries of the original strip; then finally a morphed, complex series of buildings celebrating formalism; arriving progressively through height increase to a potentially commercial entity -of detached taller buildings. If the first reference to the industrial container port [the previous function] is evidenced through the incorporation of the existing crane to the structural concept then the second reference goes full speed: a new, fully operable crane is actually introduced, receiving prefabricated units by boat or railway [fully customizable during production] similar to shipping containers. The units are inserted by the gantry onto the elevated housing strips [the shelving system]. The units enjoy a very privileged elevated overview of the river and a variety of public use spaces on the strip. The concept is one of a linear arrangement that almost randomly fluctuates in section and varies in occupant density for different periods. This arrangement, detached from the ground, enjoys the advantages of an apartment tower configuration becoming an organizational device for a number of typologically differentiated housing entities.

A clear distinction between renter vs. Bbuyers and their relation to the site is articulated through the arrangement of highly mobile housing units away from the natural ground, and in distance from the detached housing. The nature of this forefront housing arrangement and the mobilized container strips allow for short-term occupancy by tourists and other non-permanent groups. The distinction between social housing and hotel-style accommodation merges here into one entity, allowing for intricate dynamics between members of radically differentiated social and economic standing. The wealthier leisure visitors, tourists and jet-set nomads mingle with the socially assisted locals, re-negotiating social barriers.

8. SHIPPING LANDSCAPE: BOULEVARDS, STRIP GRADATION & SLOPING CONDOS

The shipping container form appears as a series of types and becomes the prototype for enclosed spaces developed on-site. A system of distributed semi-mobile vendors [refreshments, light food and café bars] is accommodated in reformed containers servicing visitors, athletes, dwellers, tourists, right in the outdoors. There is a level of elitism that characterizes a great number of shipping container projects in the recent age, however our project is differentiated in a straightforward way: the notion of the industrial port is not simply a past memory but is at the same time the presence. The industrial port is still fully operable, regardless if the river frontage has been overtaken by housing: containers

can still be unloaded from the ships and delivered to trucks, even if the stockyards have transformed from hard-paved expansions to a green landscape.

Knowing that there would be high demand for the high-view apartments, a second, less frontal section of the strips is occupied by structures of a beach-house feel. Housing structures are permanently embedded into the mega structure characterized by the hybrid vierendeel system and feature more luxurious interiors. Combining aspects of outdoor and leisurely living, the tilted rowhouses feature private patios and open atria-courts. The composite welded steel roof plate is punctured to allow for sunlight to enter through. The puncturing occurs between the main structural ribs, not affecting the structural coherence of the cyclopean girder.

Similarly, the puncturing occurs on the floor plate, with small rooms occurring on a lower level, hanging below the main structure. Such bays of upward and downward protrusion are set side by side, reforming the rigid archetypal form of the container parallelepiped and exploring the sectional properties of the slope. The sectional complexity becomes a celebrated feature, suggesting the consequent further dissolution of the solid linear forms.

Beyond the ferrous gantries, the metal mega-strips find their second structural support zone on pilotis that keep the vierendeel truss approximately 4 meters above ground for a linear segment. The loads are transferred to the ground through a randomized forest of columns. This means that the upper plate of the structure becomes redundant. Progressively the roof plate is punctured away and the new structural system is “a plate on stilts”, holding a more diverse series of housing units on top. The continuity starts to erode in a sectional manner too, therefore gaps can be seen in the rowhouses series [because of the missing roof slab].

At the pilotis end, the rowhouse system brakes further and finally the detached housing takes over as a deposited series of fragments, remnants of the deteriorating steel strips on-ground. This becomes the normative pattern that allows more solid relations to occur with the adjacent spaces, enabling the development of urbanized streets and normative urbanism. The car streets front these housing and mixed-use sectors. This is the city-as-we-know-it sector that can allow for significant growth during consecutive development phases. The on-ground building lines mutate from the more conventional single-family maisonettes to more challenging building shapes that defy the already dissolved steel strip layout. As the building density and proximity lessens, a progressive change of function is anticipated, with the building typologies morphing progressively into gradually taller, volumetrically simplified structures for commercial use, offices, stores.

Two parallel roads [for private vehicle use] are introduced along the site, merging only at the two ends of the Port Nord study site, generating a clear axis of street-side urban growth. This growth is anticipated in consecutive development phases. The traffic flow smoothly merges with the newly introduced North-South axis road that connects to the north end beyond the lake. The width of the road and the conditions established at the Port Nord site formulate possibilities for intense street-side activity, fostering the evolution of an urban boulevard rather than a mere connection road or a motorway.

Main accomplishment of the urban plan is the definition of an exciting destination zone triggering movement along the north-south axis, generating a flow of people coming from the north towards the site and an uninhibited, flawless connection to the city center through multiple means of transportation: from the ferry transit, to private car routes, to cycling and pedestrian or horse-riding networks, buses, or small train [tram or trains on wheels] networks. In this sense, ensuring that the two ends of the north-south axis are strongly defined, residential in the north and leisure, landscape/mixed-use in the south [our site], the potential of progressive densification of the in-between strip can be strong, particularly because the landscape characteristics of the north-south strip of land between Saône and the lake reservoir will appear equally strong.

9. CONSTRUCTED WETLANDS: SOIL RECOVERY AND DECOMPRESSION

The industrial use of the site almost confirms the existence of soil pollution at a certain degree and perhaps toxicity hotspots. This is only a speculation relating to the nature of the cargo circulated on-site in the past. The strategic brief of the proposal includes a certain number of strategies tackling such environmental issues.

The site has been heavily paved for extended periods of time, and this fact translates into poor soil quality after demolition. The process of recovering and decompressing the densely packed soil is gradual, if implemented through natural [slower] processes. The easy solution of bringing in new soil is regarded as essentially anti-sustainable, as this soil would need to be scraped from another natural site [disturbed at a great degree] and transferred egotistically into the Port Nord site. This was not a desirable option. Instead, the slow process of regaining the soil quality could include the cultivation of low vegetation that in progressive years would enrich the soil ingredients. A series of strategies is analyzed here.

Water presence, from both river and lake, and ample water run from extended roof slopes offer the possibility to implement a zone for artificially developed wetlands, with the intention to develop eventually land that can be used for larger vegetation.

In relation to the potential creation of constructed wetlands and perhaps in a more simplistic and immediately effective vision for the site, the project suggests the creation of a demonstration site for water cleansing processes. Water can be progressively filtered and directed to the river through a series of retaining ponds. The visual effect of the process is embodied into the landscape concept.

The potential use of corn crops on-site as a demonstration feature for the production of biofuel, [ethanol as an alternative energy source allowing a certain off-grid energy capability] offers visually a desirable landscape effect. Rural life enters the urban environment in close proximity with high-density off-ground development.

For immediate development, only a small portion of the site is planned to accept new and healthy soil so that faster-pace landscape effects start to emerge. For the greater portion of the site the strategy is to recover the existing soil, as a statement of true dedication to the locality and to non-commodified understandings of quality of life. The promise of showcasing organic agriculture on-site, and the scenario of self-sustainable food resources becomes another striking landscape feature.

Acknowledging the possibility of polluted or intoxicated soil on-site, we propose the enclosure of toxic hotspots in paved areas. This strategy prevents in a rough way the transmission of pollutants to neighboring soil and water through encapsulation. This is a short-term effect enabling the immediate use of the site. At a later stage the method can be re-examined to give way to more sustainable recovery strategies. These areas are paved and enclosed with concrete at a great depth vertically and horizontally. For our landscape proposal, these are potential areas for the creation of small artificial mounds using the randomized stepping pattern of concrete blocks that is [as aforementioned] also implemented on the riverfront. These spots are expected to function as primary destination areas for several leisure activities, pick nicks, readings, sunbathing, etc. enjoying a more elevated view of adjacent natural features.

It is expected that demolition waste will be recycled, cleansed from pollutants, and potentially recovered for use on-site. The large surfaces of concrete paving, the existing buildings and structures, can be re-used for the development of the artificial mounds as aforementioned.

The constructed edge of the water remains largely tectonic with hardscapes allowing increased public pedestrian circulation. The zone close to the water remains largely open with no building footprints. A very thin circulation tower leads to the elevated housing enclave. This tower along with the pilotis of the steel airborne housing strips, are the primary visual elements. The colossal portals of the gantries and cranes define framed views. The hardscaped river-side walk is at a great extend shaded by the large volume of housing hovering above.

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10. HARBORING CAR-BAN-ITIES: CITY-CENTER CONNECTIVITY

As demonstrated in the city-scale diagrams and partially in the site plan, a network of roads is reinforced to support mobility patterns towards the Port Nord site. Ranging from car traffic to public transit systems, boat transportation and linear sports networks, the connection promise between our site and the city is strengthened. Of particular interest is the proposal to continue the waterfront roads from the Chalon City Center under the motorway bridge, and into our site, creating a reformed roundabout that closes the loop of primary circulation from the city.

This title is a leptic play between Ban-ning the Car [Car-Ban-ity] and the word Urbanity. The competition brief states strongly the intention to reduce the use of the car and promote alternative networks and patterns of mobility. The proposal clearly gives attention to the moderated inclusion of automotive circulation, avoiding utopian chimeras and ensuring a coherently and densely organized network of alternative urban or landscape elements to organize the living experience. The common cliché of setting street pattern design as the foremost regulatory tool for urban planning is here rejected. Urban design is not traffic engineering, and the experiential qualities focus instead on uncommon sets of relations between the natural or the man-made landscape.

A stretched round-about configuration would hug the site of the soon-to-be-built bowling center. This in-between zone screens partially the rough automotive bridge, by extending the parking facilities of the bowling center, becoming the primary automotive drop-off area. This feature suggests the use of other means of transportation through a series of closely spaced individual destinations, and above all, reinforces walking along and across the riverside promenade.

Large and singular car parking areas worsen the visual effect of countless automobiles dominating the landscape. We propose a main drop-off center close to the bowling center, however; there is provision for a tight network of smaller parking areas, or side-street parking, potentially to be implemented in following stages of urban growth. The creation of green transportation interchange nodes, with bicycle parking, car parking, bus or tram stops, combining with small retail options and café or brasseries, ensures a network of lively point-like areas of relative concentricity. These nodes are located at the piloti areas supporting the large steel housing wings. For the first phase of the development, this intricate small retail network can be adequately compensated by a light and mutable network of vendors using container like units.

Territorial planning around water: a path to the development of living spaces

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Extended abstract

This paper seeks to assess both the importance and the feasibility of one of the main aims of the national development plan (NDP) of our actual Colombian government, which is *The territorial planning around water* as an strategy to face climate change and, warranty the life conditions not only of vulnerable communities but of the whole population urban and rural. For such an aim, the NDP states that: It seeks a change in territorial planning and development, where the protection of environmental determinants and areas of special interest to guarantee the right to food are central objectives [...] (Law 2294/2023, art. 3).

Water, it's well known, is one of the most important sources of life. For the UN, a person would need between 20 to 50 liters of water as a daily base consumption. It is estimated that worldwide 1.1 billion people don't have access to drinking water and nearly 1.7 billion are not able to access to essential sanitation services and facilities. Such a situation leads to several diseases as diarrhoea in developing countries, one of the main causes of child mortality.

In Colombia, there is in average an availability of 43.000 m³ of water per person per year. That means 7.6 times higher than the global average. However, only 73% of population at national level have access to managed water supply and only 40% in rural areas.

Whilst worldwide urban population has reached 56% of total population, in Colombia, urban population represents 77,1%. It is worthy to remember, that water source for urban areas depends on aquifer reserves resting in the countryside. So, the relationship between how water resources are managing, how the environment where such sources are located are protected and, how urban and territorial planning as whole is undertaken in order to ensure that water supply can be sustained and accessible are maybe the main challenges that societies face even more given that change climate is underway.

Climate change demands building up resilience cities based on “the conservation, protection of the environment and ecosystems, the water cycle, natural resources, prevention of threats and disaster risks, climate change management and food sovereignty” as mentioned in the NDP (art. 10). In that sense, urban planning must seek to create spaces that guarantee human life as well the life of every species.

Keywords: *climate change; water managing; resilience cities; territorial planning, Colombia*

Ancient harbor of Lechaion-Redefining the place

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Extended abstract

‘... Ἐφύραν Ὠκεανοῦ θυγατέρα οἰκῆσαι πρῶτον ἐν τῇ γῆ ταύτῃ...’ (Pausanias Description of Greece: Corinth' (1.1)) ...Ephyra, daughter of Oceanus first inhabited this land....

Everything originated from the sea and Corinth, the city of two seas, the Corinthian and Saronic gulf, owes its genesis to the sea. Its two ports, Lechaion and Kenchrees, played a decisive role in this exogenous dynamic. Lechaion, as the port on the Corinthian gulf, with its west orientation and being axially connected to the city, was its most important port.

Architectural design that harvests its tools from place itself, by analyzing and experiencing it and is born out of it, offering the sophisticated effect of architecture on it, has been the aim of the present paper.

Especially, this paper aims to promote a project-oriented approach to context interpretation, place intervention and translation of its identity into an architectural proposal. Through an extensive analytical procedure, it intends to provide some initial answers to the question stated above, via a case study focused on the archaeological site of Lechaion Ancient Harbor which is, at the same time, an important water landscape ecosystem, which in now days act as a biotope.

The fact that in its present state, the ancient port of Lechaion comprises of a fenced space, to which the public doesn't have access, introduces the question whether the ancient port can become a "place" today, i.e. part of the social and cultural life of the city, but also an international archaeological destination, part of the network of important archaeological sites of the wider area of Corinth, also important spatial organization for the history of the Mediterranean, considering the acropolis (Acrocorinth), the city (Ancient Corinth) and the two ports of the ancient city of Corinth (Lechaion and Kenchrees).

In order to answer the question, it was considered important to search for the principles that constituted the ancient port as a "place" in the past.

Specifically, the redefinition of place proposed, is based on a process of deep understanding and investigation of all the elements of the historical and archaeological tracing that constituted it.

Also, reference was made to the abandonment of the port in recent years and its evolution into a place where this time its appropriation did not concern people but birds and the ecosystem that developed as a whole. Thus, the analysis of the elements of the habitat followed, examining the second status of Lechaion as a place today, as a biotope.

The study of the historical reports about Lechaion, the archaeological findings and the theories of the various local researchers through time, constitute the tracking method in order to create a comprehensive perception of the location, formulate personal speculations through cartographic observation and synthesize through the set of documents the historical course of the port from prehistoric times to the building of the new city of Corinth.

In this case, the aim was to compose an experiential experience of the place of how it was in the past, in a context of synthesis of traces and elements that determined its formation intangible and material, but also an environmental walk of correlation with the natural landscape and the life of the ecosystem. All those data, as well as its current appropriation by birds as habitats, gives birth to architectural creation from the small scale of basic decisions on the organization of the greater area, to the urban scale of the ancient port, at the scale of landscape design, by plotting the route, the local planning and

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the birth of the unit as the architectural jargon of composition in all planning scales, for small semi open-air structures and for building units.

The composition is based on three typologies, the stasis, the node and the observatory, which create the routes proposed, some points of interest, were selected as parts of this route that come to complement its design and the experience of touring the ancient harbor.

Also, the materials used are consistent with respect to the ecosystem and the natural palette of the landscape, the use of planting as an element that was spatially analyzed and shaped the architectural solution proposed was decisive.

Listening to the landscape, deeply understanding the way in which the place was formed, walking mentally and perceptibly on the traces of the past and giving value to the life that appropriates it in the present are the pillars of an architecture that can regenerate a place, redefine it in the present for the future, while carrying its spirit, what characterizes it and makes it unique compared to any other place in the world.

This kind of approach can play a significant role in creating sensitive architectural interventions, suitable for their context, contemporary in their design, while responding to historical precedents.

It can establish a methodological tool, as a link between the fields of architecture, nature and archaeology, which in more ways than one has a lot in common.

In a time of increased awareness on issues of sustainability and heritage, the preservation of architectural landmarks of historical significance and of the biotopes which are protecting the environmental balance of our planet is of major importance.

Keywords: *Ancient harbor of Lechaion, Ancient Corinth heritage; environment; place integration; Genius Loci; place identity; sensitive architecture;*

**CULTURAL HERITAGE AS A CONTRIBUTOR TO
TERRITORIAL/URBAN RESILIENCE**



Changing Cities VI, Rhodes, 24 - 28 June 2024

Organized and chaired by Prof. Stella Sofia Kyvelou

Prof. Stella Sofia Kyvelou, Department of Economic and Regional Development, Panteion University,
Greece

Sociocultural Values in Maritime Spatial Planning: a novel approach for defining socio-culturally significant areas on the coastal/insular space

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Extended abstract

In Greece, marine and coastal ecosystems in coastal and insular areas' are unique and imbued with significant sociocultural values. These ecosystems support recreational activities essential for the well-being and cultural identity of local communities and, thereby **necessitating a comprehensive method for their assessment and conservation**. Traditional approaches to valuing ecosystem services have primarily focused on biophysical and economic aspects, often overlooking communities' profound sociocultural connections with their natural surroundings. Recognizing this gap, our study introduces a novel methodology that holistically integrates the sociocultural values alongside the physical and biological contributions of coastal and insular areas' coastal and marine ecosystems. The paper investigates two pilot cases: (a) the island cluster of South Dodecanese islands/eastern Crete and (b) the coastal area of west Pagasitikos Gulf in Magnesia, introducing a specific methodology for coastal and maritime planning of cultural heritage. The main objective is to create a valuable tool for identifying and mapping various distinctive clusters of cultural heritage, designing data, and using user-friendly geo-technology tools to facilitate local-scale, detailed analyses of recreational ecosystem services.

This approach is pivotal for MSP, which seeks to balance various interests and uses of marine spaces in sustainable ways that benefit all stakeholders. By incorporating sociocultural values, our method enriches the MSP process, ensuring that decisions reflect the multifaceted nature of ecosystem services and their importance to local communities. Integrating socio-cultural values represents a significant advancement in ecosystem service assessment, offering a more nuanced understanding of the benefits of these natural environments. This is particularly relevant for coastal and insular areas, where the cultural heritage and natural landscapes are closely intertwined, and sustainable management practices are critical for preserving this unique interconnection. To further enhance the efficacy and impact of our approach, we propose the establishment of a community of practice for each case study area and then on a national level. This initiative aims to gather a network of local stakeholders, experts, and practitioners who share a commitment to the sustainable management and conservation of these ecosystems. Through regular interactions and knowledge exchange, these communities of practice will foster collaborative learning, enable the sharing of innovative solutions, and enhance the collective ability to address conservation challenges. This inclusion amplifies the study's practical applications and reinforces the significance of engaging local communities recognizing that the sociocultural values of ecosystems are best understood and preserved through the active involvement of those who live closest to them.

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Our contribution to the field of MSP through this practical tool for evaluating recreational ecosystem services emphasizes the critical role of sociocultural factors. It aids in informed decision-making for sustainable management and highlights the necessity to preserve coastal regions' unique sociocultural and natural heritage. The methodology has the potential to be adapted and applied in other contexts, offering a valuable resource for the conservation and sustainable development of coastal ecosystems. This expanded overview underscores the importance of our study's innovative approach in advancing the conservation and sustainable management of coastal ecosystems, focusing on the rich sociocultural and natural heritage of coastal and insular areas.

Keywords: *Ecosystem Services, Cultural Ecosystem Services, Maritime Spatial Planning (MSP), Sociocultural Values, Coastal and Marine Ecosystems, Coastal and insular areas, Dodecanese.*

Disclaimer: This research is based on the project carried out by Panteion University of Social and Political Sciences entitled “Developing an observation network for MCH/UCH in Greece” (HER-SEA) granted by the Hellenic Foundation for Research and Innovation, grant number A.II. 44180/13.02.2022.

Strategic Planning and Participative Social Management of Clusters of Coastal and Maritime Cultural Heritage; The case of West Pagasitic Gulf, Greece

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Extended Abstract

Coastal and maritime cultural heritage in Greece often appears as under-exploited pieces of heritage due to basic weaknesses such as

1. dispersed locations of cultural heritage sites with low level of accessibility for both visitors and local communities;
2. non-involvement of local society and professional associations related to tourism, in the decision making and management of cultural heritage;
3. the absence of a decentralized local governance model and monitoring mechanisms for cultural heritage, as well as overlapping of responsibilities among authorities in terms of both planning and management for heritage enhancement.

This paper deals with strategic planning and social management of zones of coastal and maritime cultural heritage, both built and non-material, that are characterised by dispersed and non-accessible cultural sites, thus, remaining mainly unexploited for tourism development and non-integrated into residents' everyday life. The research focuses on

1. *how the creation of local social networks and societal participation processes* in decision making and management of cultural heritage, and

2. *smart solutions by means of strategic spatial and maritime planning and soft projects*, that may fundamentally reinforce the enhancement of dispersed cultural heritage sites by creating integrated large cultural clusters and networks of cultural sites; and in these ways, promoting tourism and economic development of the area in agreement with stakeholders in the local society. The paper presents the research outcome on the significant zone of coastal and maritime cultural heritage in West Parasitic Gulf, Magnesia, Greece. More specifically, it portrays (i) the creation of a social network for cultural heritage management in West Pagasitic; (ii) a strategic plan with proposed soft projects connecting the dispersed cultural sites in West Pagasitic as well as minor hard projects for integrating cultural heritage into the residents' everyday life; and (iii) the consultation processes adopted in the research as well as the Participatory Lab realised for the evaluation of the proposed projects by social stakeholders.

This research is part of the ongoing research project "*Developing an Observation Network for Maritime Cultural Heritage (MCH/UCH) in Greece*" - acronym HER-Sea -financed by ELIDEK, and realised with the collaboration of three academic institutions: Panteion University as Leader, University of Thessaly and University of The Aegean as partners. HER-Sea investigates two pilot research zones: (a) south Dodecanese islands/eastern Crete and (b) west Parasitic Gulf.

Keywords: *coastal and maritime cultural heritage, cultural clusters, strategic planning, networks of cultural sites, social networks, Participatory Lab, West Pagasitic Gulf, Magnesia, Greece.*

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Soundscapes as part of the cultural capital of cities and territories: making cities healthy and attractive

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Abstract

The article considers soundscapes as part of the territorial (including cultural) capital of a city or territory. It highlights, through a territorial approach, the role of soundscapes for shaping the evolving contemporary urbanism, going beyond the attenuation of ambient noise and beyond quietness, considering the quality of the sound environment as a key factor of the attractiveness of a city or neighborhood. Several examples of cities and neighborhoods (eco-neighborhoods) that have incorporated sound design into a global vision of urban quality, often including conservation and promotion of their cultural capital, are presented. The article links soundscapes with the concept of the frugal city, which goes beyond a sustainable city, supporting a dynamic and active approach in producing sound-related satisfactions to serve citizens. Through this research, it is evident that soundscapes, as intangible cultural assets, can play a significant role in dynamic and innovative urban strategies. These strategies are based on providing various satisfactions to citizens while minimizing the use of material resources. This allows society to create a sense of place and positive spatial imaginaries, enabling creativity and frugality simultaneously, with promising prospects for the entire economy.

Keywords: *Soundscapes; territorial capital; cultural capital; intangible cultural heritage; attractiveness; sustainability; frugality*

1. Introduction

Cities and territories are undergoing constant transformation due to population growth leading to rapid urbanization and urban sprawl [1]. Despite the global efforts towards circular economy [2], nature-based solutions [3], smart city initiatives [4], the adoption of the Agenda for Sustainable Development (17 SDGs) [5] and especially Goal 11 [6] towards inclusive, safe, resilient, and sustainable cities, several environmental pressures continue to impact the quality of life for urban residents [7]. Environmental noise in urban areas may be thought as a byproduct of growth [8] as various activities related to the pursuit of economic gain—such as commerce, construction, and infrastructure maintenance—often result in this auditory disturbance. The effects of noise on physical and mental health of individuals [9] should not be overlooked and territorial strategies towards its management are crucial [10–12].

Paradoxically, a noisy environment is sometimes synonymous with a highly productive, economically rising society that promotes progress, including industrial and recreational activities, at the expense of quietness and liveliness. In this case, quietness is misunderstood as the result of a dormant way of living in an economically declining society [13]. In reality, environmental noise is

considered an important factor and one of the main causes of urban deprivation and economic decline, affecting property values in certain residential areas [14].

A large part of European population suffers daily from too high and unacceptable noise levels [15]. Noise can seriously affect the quality of life and lead to annoyance, sleep disorders and adverse health effects [9]. By extension, the social and economic impacts are also serious, regarding productivity as well as the property values of the affected areas. Analyses of environmental inequalities show that across the whole urban territory, income is a robust interpreter for noise exposure [16]. Several studies have also observed positive associations between road-traffic noise and deprivation [17,18]. Dale et al. [19] identified a clear deficiency of environmental equity on the Island of Montreal. Their research indicated that disadvantaged groups bear a double burden of higher exposure to noise and low-income status. Their findings showed that noise exposure was strongly correlated with socio-economic indicators, such as median household income, percentage of people who live in non-affordable housing -spending over 30% of their income on housing-, percentage of people below the low-income line and with a social deprivation index combining several socio-economic variables. Similar outcomes are identified by Nega et al. [20] associating noise levels and household income, median household value, the proportion of non-white residents, and the percentage of young population. Another research outcome is the positive association between depressed mood and high road traffic noise exposure in residential settings which is besides happening for all urban citizens independently from ethnic minority or socioeconomic status [21].

An additional effect of environmental noise is the decline of land and property values. In Switzerland, it was found that almost 60% of the calculated costs of noise (more than 1 billion Swiss francs per year) correspond to losses of property value, caused primarily by the dominant traffic noise. Buildings exposed to excessive noise levels have lower rent or sale prices compared with those located in quiet areas. To this end, methods have been developed (e.g by the Zurich Cantonal Bank, ZKB) to accurately calculate the depreciation of real estate properties for rent or sale, caused by noise. The ZKB study indicates that the effects on property values differ based on the type of noise and the type of property. Noise has a greater impact on the segment of property than on the rental sector, and rail noise causes higher price drops in the rental segment compared to traffic noise. According to the same study, each decibel above the threshold of 40 dB at night or 50 dB during the day is reflected in the following price drop (Table 1).

Table 1. Impacts of noise on property values, Source: Zurich Cantonal Bank

	Location	Property
Road traffic	-0.19%	-0.59%
Rail traffic	-0.26%	-0.47%
Air traffic	-0.11%	No dat

Under the novel standardization of the soundscape [22], sounds are considered to be a resource and not a waste [23]. Moscoso et al. 2018 [24] proved that soundscapes directly influence human wellbeing and highlight the necessity for further research about the kind of sounds that promote a healthier environment. However, the quality of the sound environment can now become a factor in assessing the living conditions of urban populations. It is even recognized, especially through the concept of « soundscape » as an asset in terms of attractiveness of a city or region [25]. If noise reduction can represent a cost, the quality of the sound environment or in other words a high-quality soundscape can represent a value. Consequently, a strategy to enhance urban living and create satisfactions can be centered on providing positive soundscapes. This approach could challenge the

foundational assumption of political economy that suggests satisfaction is primarily driven by wealth creation.

The goal of this research article is two-fold: first, to examine soundscape from a human perspective and the related concept of “quiet areas”, using the case-study of the city of Mytilene, in Greece. Secondly, to go beyond quietness, exploring the quality of soundscape as a *territorial asset*, often part of the intangible cultural heritage of a city or region and shaping factor of a continuously evolving sustainable and emotional urbanism.

2. Materials and Methods

In order to reach the above goals, the following steps were followed: An inventory of cities and neighborhoods that have managed to make themselves attractive and regain positive cultural and economic dynamics through the improvement of the sound environment. Identification of projects that have explored holistic ways to include sound planning and soundscapes in urban planning.

3. Results

3.1. Experiences of neighborhoods, cities and territories

Many cities worked methodically utilizing sound as a musical satisfaction which can be translated into "soundscape", thus achieving attractiveness and regaining positive cultural and economic dynamics. For example, in the city of Porto (Portugal) the project **Porto Sonoro** involved the creation of a digital database dedicated to collecting, organizing and transforming urban sounds. The project aimed at reflecting the sound identity of the city through the articulation of documentary, analytical and social objectives with artistic transformations of sound contents [26]. Another example of the potential impact of positive soundscapes in urban planning is the sound event realized in real time in Brighton called "**Sounding Brighton**" during which it has been documented that the crowds in the streets were comforted and altered their behavior once they were exposed to musical sounds of outstanding artistic value, during a “white night”. The project [27] has attempted to evaluate how ambient soundscapes could act as a remedy to the culture "Saturday night for drinking" observed on the most dangerous streets of the city of Brighton. Additionally, the FP7 **SONORUS** project funded by the EC [28] explored holistic ways to include sound in urban planning, revealing also the need to raise awareness and carry out training of the future “urban sound planner”.

The evidence on the negative effects of noise on human and environmental health are increasing [29,30] highlighting the need to manage this pressure. Amongst the efforts of dealing with this pollutant was the publication of END (Environmental Noise Directive) [31]. Apart from the prompt to create strategic noise maps, a solution to the noise problem was the introduction of quiet areas in agglomerations. Urban quiet areas are defined as “*areas delimited by the competent authority that are not exposed to a specific noise indicator value set by the member state*”. Numerous efforts have been conducted in order to identify urban quiet areas. Notably, the **QUADMAP project** (QUIet Areas Definition and Management in Action Plans) [11] offered a methodology to identify them utilizing a set of objective and subjective metrics. Other efforts incorporated additional acoustical aspects of the sound environment by including the acoustic biodiversity indices in the list of quiet area criteria. Particularly, the **SALVE project** proposed a method to identify urban quiet areas in Germany utilizing criteria for human health and the promotion of healthy acoustic environments [32,33]. Finally, using a mixed method approach, the quiet areas of Mytilene (Lesvos Island, Greece) have been identified [34]. The realization that the concept of quietness regards issues beyond the increased noise levels [8,35] has led to the establishment of the soundscape approach that focuses on the description of the sound environment using soundscape descriptors rather than a strict quantification using decibels [36]. The recently published ISO standard on soundscape assessment focuses on the perceived affective quality of sound environments focusing on the perceptual aspects of pleasantness and eventfulness [22]. Nevertheless, the need to apply an engineering approach in sound planning in

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order to allow the predictiveness of soundscapes, led to the **SSID project** [37] aiming towards the establishment of soundscape indices. The specific novel initiative has altered the way that sound environments are being assessed.

It is evident that the above projects portray different views on issues of noise, quietness, satisfaction, and environmental health. It is undeniable that these different approaches aim towards healthy urban sound environments, but in some cases the co-benefit of environmental sustainability is absent and considered to be a missed opportunity [13]. In table 2 the contribution of the selected projects on the basic sound planning criteria: music satisfaction, noise mitigation, perceived affective quality and environmental sustainability are reported.

Table 2. Selected project contribution on sound planning criteria

Project	Music satisfaction	Noise mitigation	Perceived affective quality	Environmental sustainability
Porto Sonoro	✓			
Sounding Brighton	✓			
SONORUS	✓		✓	
QUADMAP		✓	✓	
SALVE		✓	✓	✓
SSID		✓	✓	

It is thus evident that sound planning, and design has a role to play in urban planning. Rather than considering negative aspects in terms of noise annoyance, planners and sound artists should positively contribute to improving the sound environment of the city giving equal importance to all sound planning criteria. Furthermore, the sound environment is dynamic and is not characterized by inertia; it can be altered, improved, shaped, re-created and designed, so as to provide satisfaction to the citizens.

3.2 Soundscapes as part of cultural capital of cities and territories

The sounds are part of the ingredients of towns and territories, their sensory landscape and their identity. They are urban or territorial markers, like the landscape. The relationship between soundscape, intangible heritage and attractiveness was however largely unexplored, so far. However, in recent years heritage and identity character of ambiances and urban soundscapes begins to become acknowledged.

An example is undoubtedly the inscription of the Jemaa El-Fna square on the Representative List of the Intangible Cultural Heritage of Humanity in 2008 [38], which introduced or encouraged a new registry of heritage based on the consideration of oral expressions as they are unfolded in the urban space. This place, situated at the entrance of the Medina, represents a unique concentration of popular Moroccan cultural traditions performed through musical, religious and artistic expressions. The triangular square, which is delimited by restaurants, stands and public buildings, provides everyday commercial events and various entertainment rituals and is a meeting point for the local population, tourists and visitors. Through day and night, a variety of services are offered, such as dental care, traditional medicine, fortune-telling, preaching, and henna tattooing; water-carrying, fruit and traditional food may be bought. In addition, one can enjoy many performances by storytellers, poets, snake-charmers, Berber musicians (mazighen), Gnaoua dancers and senthir (hajouj) players. The oral expressions would be continually renewed by bards (imayazen), who used to travel through Berber territories. They continue to combine speech and gesture to teach, entertain and charm the audience.

Adapting their art to contemporary contexts, they now improvise on an outline of an ancient text, making their recital accessible to a wider audience. While Jemaa el-Fna Square enjoys great popularity, the cultural practices may suffer acculturation, also caused by widespread tourism.

Another example is safeguarding of cowbells in Portugal that have contributed to the creation of soundscapes in the Portuguese countryside, a sort of "voice of fields" throughout 2000 years. The Portuguese cowbell is an idiophone percussion instrument that creates a characteristic sound landscape in the countryside. From the operational point of view, the neighborhood scale [39] seems particularly relevant to take into account these expectations. In this context, eco-neighborhoods, in which the issues of well-being, health and attractiveness are central, present particularly exciting opportunities.

Besides, one of the most recent definitions set for "soundscape" is the compilation of biological, geophysical and anthropogenic sounds that derive from a landscape, and which vary over space and time, echoing important ecosystem processes and human activities [40]. Other considerations of Soundscapes view them as a group of immaterial resources that are ecologically, culturally and economically valuable [41]. Research on the visual qualities of a landscape demonstrates the strong connections between sense of place and sound. In cultural landscapes, the soundscape is the result of mutual progress between human culture and natural processes [42]. Sounds are considered essential factors of place making. Therefore, cultural soundscapes should be protected and preserved as cultural heritage.

4. Discussion

What is important in the design of any strategy for the development of territorial attractiveness is the combination of the two aspects of territorial attractiveness, namely of supply and demand through the development of the assets of the region in relation to the quantities requested as part of an integrated spatial strategy that will support: (a) the emergence of different forms of territorial capital through tangible and intangible interventions; b) enhancing the institutional partners and various stakeholders in the region, for example by using territorial marketing policies (place marketing) designed for a specific audience. It is widely acknowledged that during this crisis period, it is necessary to recognize the importance of territorial capital as part of a strategy to mobilize and exploit regional assets in relation to specific audiences.

Thanks to the concept of the "soundscape" invented by Schafer, numerous research has been conducted, thus creating an important space for interdisciplinary and multidisciplinary meetings and exchanges. Several disciplines are concerned: sound ecology, acoustics, psychology, musicology, sociology, geography, architecture, urbanism, etc. These strong multidisciplinary and transdisciplinary were also apparent at the international event "ECHOPOLIS 2013" entitled "Sounds, noise and music to reinvent the city and the eco-neighborhoods" which set itself the goal of educating planners and developers about the concept of soundscape and its role in spatial planning.

In contemporary times, the landscape has evolved in a concept that evokes the sensitive relationship of society to its living environment; it is no longer merely a support or a view. Similarly, the soundscape should no longer be reduced to its remarkable aspect to be protected or its musical essence, but it must be recognized through its societal and economic dimensions [43].

5. Conclusions

The position of the authorities in the field of environmental noise has been, so far, to reduce the sound levels of the main sources of noise and to set limits that should not be exceeded in some areas affected by strong noise to reduce the exposure of residents. Nevertheless, to answer primarily to citizens and to the challenges linked with attractiveness of cities and territories in times of economic and urban crisis, planners should go beyond the quantitative aspect of noise, integrate the issue of sound quality

in any urban or territorial development project and consider noise not as "waste" but as a local "resource" (see COST Action TD0804) and the soundscape as a decisive value of local wealth.

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Spatial Imagery and Territorial Resilience

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Abstract

Imagination is an uncontrollable and essential aspect of life, as Andrei Tarkovsky aptly emphasizes. From the time of the Oracle of Delphi to Plato's ideal cities, our imagination has allowed us to envision the future of our urban environments. Although it has been viewed both as a source of deception and a powerful catalyst for change, imagination remains central to our understanding of reality. This article delves into the role of imagination and spatial imaginaries in design, drawing insights from seminal works in the field.

The concept of the social imaginary, rooted in the philosophies of Hegel and Durkheim, has recently been applied to understanding contemporary societies. Popularized in the 1950s by Charles Wright Mills and Cornelius Castoriadis, the social imaginary refers to the collective consciousness that shapes social structures and practices.

The core idea is that integrating imaginative and cultural elements into urban planning can significantly enhance the resilience of cities. By merging cultural heritage with social imaginaries, societies can create environments that are both sustainable and resilient. This study provides a perspective on developing dynamic and cohesive urban landscapes by leveraging imagination, cultural heritage, and social construction

Keywords: *symbolic construction, social organization, imaginary systems, urban resilience, territorial resilience, cultural heritage, urban planning, social imaginary meanings.*

1. INTRODUCTION

The concept of territorial resilience is of paramount importance today due to the numerous challenges that cities and regions face, such as environmental disasters, social inequalities, and cultural changes. This study explores the role of imagination and symbolic structures in strengthening the resilience of cities and regions by combining theoretical frameworks and practical observations. It specifically focuses on the theories of social imagination by Cornelius Castoriadis and cultural heritage by Pierre Bourdieu, emphasizing imagination as a catalyst for innovation and cultural heritage as a foundation for social cohesion [7-4].

Castoriadis' concept of social imagination refers to the capacity of societies to create and transform institutional and cultural realities. This idea is vital for understanding social change and for developing new forms of social organization that can address contemporary challenges [7]. Bourdieu's analysis of cultural heritage includes the material and intangible cultural assets passed down through generations, which shape the identity and values of a society [4].

This study presents initial findings from a literature review on notable cities such as Barcelona, Kyoto, and New York, illustrating how the integration of imaginative and symbolic elements in urban planning can foster resilient and adaptive urban environments. From Plato's era to the present,

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imagination has played a crucial role in envisioning and shaping cities [13-7]. Symbolic structures and cultural heritage contribute to social stability and identity, enhancing the resilience of cities [9-4].

In conclusion, the combined application of these theories proposes a holistic approach to urban design. Resilience can be achieved through the strategic use of cultural and imaginative elements, creating sustainable urban environments that reflect the collective human spirit and aspirations. This approach offers a comprehensive perspective for developing dynamic and resilient cities.

2. METHODOLOGY

The process of verifying the hypothesis that integrating imaginary, symbolic structures, and cultural elements into urban planning enhances the resilience of cities involves several stages. First, the hypothesis is formulated, and a comprehensive literature review is conducted on seminal works in sociology, anthropology, philosophy, and urban planning. Next, the concepts of imagination, cultural heritage, and resilience are analyzed, contrasting their characteristics as design tools. Following this, theoretical outcomes are examined in real-world cities, identifying their impacts on the social and spatial fabric. Finally, the hypothesis is either confirmed or refuted based on the findings.

3. LOGICAL ANALYSIS OF KEY CONCEPTS

3.1. Imagination and Social Imagination

Imagination is a fundamental human trait that enables individuals to envision and create new realities. Philosophers like Aristotle have long examined the role of imagination in human thought and cultural development [3]. According to Aristotle, imagination is a function of the soul that links sensory perception with intellect. This understanding is crucial for exploring how imagination enhances urban resilience through symbolic and imaginary structures in city planning [17].

Aristotle distinguished between two types of imagination: aesthetic and logical. Aesthetic imagination relates to the senses and influences memory and dreams, while logical imagination connects to intellect and decision-making. Imagination motivates people towards specific actions by making objects appear desirable or pleasurable.

Cornelius Castoriadis expands this discussion with the concept of social imagination, describing it as the collective ability of societies to create and reshape their institutional and cultural realities [7]. Social imagination is the source of creating institutions and social forms, enabling societal autonomy [7]. For example, the establishment of democratic institutions can be seen as a product of social imagination.

Castoriadis's notion of social imagination provides a theoretical framework for understanding the role of imagination and symbolic structures in society [7]. A society's capacity to imagine and create new social organizations is critical for its survival and adaptation to new challenges [7].

Benedict Anderson's concept of "imagined communities" adds another layer to the understanding of imagination. In his work "Imagined Communities," Anderson explores how communities are formed through shared imaginary constructs, such as national identities [1]. These imagined communities allow individuals to feel connected to others through common narratives [1]. For instance, national holidays and symbols can foster a sense of unity among citizens.

Spatial images, or the perceptions and representations of space, play a crucial role in shaping these imagined communities [19]. Tools like maps, censuses, and museums help reinforce national identities [1]. This analysis has important implications for understanding spatial images and territorial resilience [19]

Charles Taylor, in his analysis of modern social imaginations, highlights the importance of collective images and meanings in the functioning of contemporary societies [32]. Social imaginations are

shaped and perpetuated through interaction and shared understanding among individuals within a society [32].

In summary, these theories emphasize the significance of imagination and social imagination in shaping and enhancing the resilience of societies [3]. Imagination is a collective tool that allows societies to create and recreate their realities, adapt to challenges, and achieve sustainability and resilience [32]. For instance, envisioning sustainable urban environments can lead to innovative solutions to climate change.

3.2. Cultural Heritage and Symbolic Structures

Cultural heritage and symbolic structures are crucial for understanding and enhancing the social cohesion and resilience of communities. Cultural heritage includes both tangible and intangible assets passed down through generations, shaping the identity and values of a society. Pierre Bourdieu, in "Distinction: A Social Critique of the Judgement of Taste," explores cultural capital, highlighting that cultural heritage not only preserves tradition but also acts as a means of social distinction and power. Cultural capital consists of knowledge, education, skills, and cultural practices held by individuals and groups, playing a key role in shaping social order and mobility [4].

Bourdieu's theory emphasizes how cultural capital, which encompasses the knowledge, skills, and practices acquired through socialization, influences social mobility and success [4]. This theory is linked to spatial images and territorial resilience, providing insight into how social and cultural structures affect community resilience.

Cultural capital is defined by Bourdieu as a collection of symbolic and material resources acquired through social inheritance that shape individuals' dispositions to understand and attribute meaning to the world [4]. Spatial images, or representations of space, are directly influenced by cultural capital. For example, maps, architectural works, and urban landscapes function as symbols that reinforce social cohesion and community identity.

Cultural representations of a city or region through art or media can enhance the sense of belonging and create a shared vision for the community. This shared vision, based on cultural traditions and common values, strengthens social cohesion and territorial resilience.

Territorial resilience refers to the ability of an area to withstand and recover from crises and changes while maintaining its social structure and identity [1]. Cultural capital is crucial in this process, as cultural values and social practices embedded in spatial images help build resilient communities. Education is vital in this regard, as it enables individuals to acquire the cultural capital needed to understand and address the challenges facing their space and community. A community's ability to adapt and recover from crises depends significantly on the education and social mobility of its members.

Consider cities like Barcelona, renowned for its architectural monuments, and New York, celebrated for its multiculturalism. These cities invest in education and promote cultural heritage, thereby enhancing their resilience. They create environments where residents feel connected and supportive of the community, improving their ability to handle changes.

Bourdieu's theory of cultural capital provides a valuable framework for understanding the mechanisms that shape social structure and community resilience. By reinforcing cultural values and social cohesion, communities can effectively confront challenges and preserve their identity. Integrating these elements strategically into urban planning can lead to sustainable and resilient environments that reflect the collective aspirations and cultural heritage of societies.

3.3. Urban and Territorial Resilience

Urban and territorial resilience refers to the ability of cities and regions to adapt, recover, and thrive despite facing challenges and disruptions. This concept goes beyond just natural disasters to include social, economic, and cultural aspects.

Jane Jacobs, in her influential book "The Death and Life of Great American Cities," argues that the vitality of cities depends on the dynamism and diversity of their communities. She highlights the importance of "eyes on the street" and vibrant neighborhoods, asserting that social interaction and local self-management are crucial for urban resilience. When different land uses coexist and residents actively participate, it strengthens social cohesion and enhances communities' ability to tackle challenges [16].

David Harvey, in "Social Justice and the City," introduces the idea of the right to the city. He argues that urban resilience must include social justice and equal access to urban resources. According to Harvey, cities should be designed with social inclusion and economic equality in mind, ensuring all residents can participate in and benefit from urban development. For instance, accessible public transportation and affordable housing can significantly contribute to urban resilience by promoting social equity [14].

Jacobs also stresses the importance of "mixed-use" development, where various activities occur in the same area, fostering economic and social vitality. This variety helps prevent monotony and social isolation, thereby strengthening the city's resilience. These ideas are linked to "spatial resilience," where thoughtful design and management of urban spaces encourage social cohesion and adaptability to changes.

Harvey examines how the spatial organization of cities affects and is affected by social processes. He suggests that the layout of urban spaces can either exacerbate or alleviate social inequalities. Spatial awareness is crucial in shaping social justice, and integrating sociological and geographical analyses is essential for understanding urban issues.

C.S. Holling's concept of ecosystem resilience offers a theoretical framework that can be applied to urban resilience. He defines resilience as the capacity of a system to absorb disturbances and maintain its core functions and structures [15]. For cities, this means being able to absorb and adapt to various changes, whether environmental, economic, or social.

Holling's concept of ecological resilience emphasizes the importance of diversity and heterogeneity in a system. Diversity allows a system to adapt to different situations and recover from disturbances. This principle can be applied to cities, where diverse economic activities, social diversity, and varied infrastructure enhance resilience. For example, a city with a mix of industries is less likely to suffer economically if one sector declines.

Consider the examples of Barcelona and New York. Barcelona invests in education and celebrates its architectural heritage, while New York thrives on its multiculturalism. These cities create environments where residents feel connected and supportive of their community, improving their ability to cope with changes and challenges.

In summary, urban and territorial resilience requires an interdisciplinary approach that combines social sciences, economics, architecture, and ecology. By strategically integrating these elements, cities can create sustainable, resilient environments capable of adapting and thriving despite the modern world's challenges. This comprehensive approach ensures that cities not only survive but also flourish, benefiting all their residents.

4. CATEGORIZATION AND CLASSIFICATION OF THE BIBLIOGRAPHY

4.1. Historical Development of Imagination in Urban Planning

Imagination in urban planning has profoundly influenced the way societies envision and manage their urban spaces, tracing back through human history and philosophical thought. From antiquity to modern urban design, imagination has been pivotal in shaping cities and communities.

One of the earliest instances of imagination in urban planning is found in Plato's "Republic." Here, Plato envisions an ideal city-state where justice, harmony, and happiness are achieved through a meticulously structured social and political organization [25]. His vision extends beyond the mere layout of an ideal state to a comprehensive framework for human relations and societal structures. During the Renaissance, imagination became a central element in urban design once again. Thomas More's "Utopia" presents a visionary society with advanced ideas on social justice and urban management. These utopian concepts significantly influenced Renaissance urban planners and architects, who employed imagination to design cities that embodied principles of harmony, aesthetics, and functionality [22].

The 19th and 20th centuries saw imagination in urban planning take on new dimensions with the advent of industrialization and technological advancement. Architects like Le Corbusier and Frank Lloyd Wright introduced futuristic visions of cities as machines for improving human life [18].

In "Ville Radieuse," Le Corbusier envisions cities characterized by towering buildings, expansive streets, and green spaces designed to promote the health and well-being of their inhabitants. These visionary ideas profoundly influenced modern urban planning and city development throughout the 20th century.

In contemporary urban planning, imagination continues to be a crucial component, now approached with greater interdisciplinarity. Cornelius Castoriadis' concept of "social imagination" emphasizes the collective capacity to create and recreate institutional and cultural realities, facilitating societal adaptation and transformation [7]. This notion underscores the importance of collective imagination in shaping social and urban structures.

The evolving perceptions of imagination and social imagination reflect the changing priorities and needs of societies over time. From Plato's ideal city-state to Le Corbusier's futuristic visions and Castoriadis' social imagination, the role of imagination has continuously adapted to address the challenges and opportunities of each era.

Today, urban planning integrates cultural heritage, social justice, and sustainability. This comprehensive approach allows for the creation of resilient and sustainable cities that reflect the collective aspirations of their inhabitants. Modern cities like Copenhagen and Amsterdam exemplify this integration, with urban policies that promote environmental sustainability and social cohesion. In conclusion, the historical development of imagination in urban planning illustrates how societies have harnessed imagination to envision and create improved urban spaces. As a powerful agent of change and adaptation, imagination remains essential for developing resilient and sustainable cities capable of meeting contemporary challenges.

4.2. Theories of Social Organization and Symbolic Structures

Symbolic structures, encompassing symbols, rituals, myths, and cultural narratives, are foundational to social cohesion and resilience. Émile Durkheim, in his seminal work "The Elementary Forms of Religious Life," posits that symbolic structures forge shared values and beliefs, uniting individuals into a cohesive community. This collective consciousness fosters a profound sense of belonging.

Pierre Bourdieu, in "Distinction: A Social Critique of the Judgement of Taste," examines how cultural capital shapes social organization and power dynamics, often perpetuating social inequalities. To enhance urban resilience, it is imperative to ensure the equitable distribution of cultural capital, thereby promoting social inclusion.

Clifford Geertz, in "The Interpretation of Cultures," highlights the role of cultural narratives and symbols in shaping societal understanding and reinforcing social cohesion through shared perceptions and values.

Incorporating cultural elements into urban design, such as monuments, squares, and public spaces, significantly enhances the social cohesion and resilience of cities. Cultural heritage, including

historical buildings and traditional neighborhoods, plays a crucial role in preserving collective memory and reinforcing local identity.

Examples such as the restoration of historic city centers and the development of public parks that celebrate cultural diversity demonstrate how urban design can foster social justice and equitable resource access. These public spaces act as communal assets, promoting social interaction and a sense of community.

The complexity of integrating cultural elements into urban environments necessitates collaboration among architects, urban planners, sociologists, and anthropologists. Community participation in the design process ensures that symbolic structures genuinely reflect the values and aspirations of residents, thereby enhancing the resilience and sustainability of urban settings.

In conclusion, the theories of Durkheim, Bourdieu, and Geertz underscore the critical importance of symbolic structures in fostering social cohesion and resilience. Urban design that thoughtfully incorporates these structures can create cities capable of withstanding modern challenges and flourishing as vibrant communities with strong identities and rich collective memories.

5. SYSTEMATIC PROCESSING AND SYNTHESIS OF LITERATURE

5.1. Synthesis of Theories

The systematic analysis and synthesis of the theories of imagination and cultural heritage reveal their deep connection to urban resilience. Imagination, as a tool for envisioning and creating, and cultural heritage, as a repository of collective memory and identity, are pivotal in shaping resilient and sustainable cities.

Connecting these theories with urban resilience in iconic cities provides a critical analysis of each theory's contributions. The theory of imagination, developed by thinkers like Cornelius Castoriadis, highlights the importance of collective imagination in shaping social and urban structures. Imagination fosters the envisioning of new possibilities and the development of innovative solutions to urban challenges. The capacity of communities to imagine diverse futures is crucial for their adaptability and resilience [7]. Additionally, social imagination supports collective action and participation, enhancing social cohesion and community spirit. In Barcelona, social imagination has led to numerous public spaces and initiatives promoting inclusivity and social cohesion. However, the theory of imagination can sometimes be seen as abstract and challenging to apply without specific frameworks and tools.

Cultural heritage provides a stable foundation for strengthening social cohesion and identity. Preserving cultural elements bridges the past and present, fostering a sense of continuity and stability essential for community resilience. Moreover, cultural heritage reinforces local identity and a sense of belonging, promoting social solidarity and collective action [21]. For instance, the preservation of historical buildings and traditional neighborhoods in Prague enhances collective memory and local identity. Nevertheless, focusing solely on cultural heritage can lead to stagnation and hinder innovation if not combined with imagination and adaptability [14].

Synthesizing the theories of imagination and cultural heritage offers a comprehensive approach to understanding and enhancing urban resilience. Imagination drives innovation and adaptability, while cultural heritage bolsters social cohesion and collective identity. Together, these theories form a robust framework for creating sustainable and resilient cities capable of meeting contemporary challenges.

By integrating the creative potential of imagination with the stabilizing force of cultural heritage, cities can foster environments that are both innovative and rooted in a strong sense of identity. This dual approach ensures that urban areas are not only able to adapt to change but also retain their unique cultural essence, thereby enhancing overall resilience.

5.2. Reading Theories in Emblematic Characteristic Cities

The synthesis of fantasy theories and cultural heritage reveals their close connection to urban resilience. Fantasy, as a means of vision and creation, and cultural heritage, as a carrier of collective memory and identity, play a crucial role in shaping resilient and sustainable cities.

Barcelona is a characteristic example of a city that has incorporated imaginative and symbolic structures into its urban design. The work of Antoni Gaudí, such as the Sagrada Família and Park Güell, contains imaginative and symbolic elements that reflect the city's cultural heritage. These works attract tourists and enhance the local identity and pride of residents, promoting social cohesion and the city's resilience [28].

The city of Kyoto has managed to maintain and incorporate traditional elements into modern urban design. Temples, gardens, and traditional wooden houses enhance the social cohesion and cultural identity of the city. These elements create a sense of continuity and stability, contributing to the city's resilience [30].

New York City has also incorporated imaginative and symbolic structures, such as Central Park, the Empire State Building, and the Brooklyn Bridge. These symbols of urban identity and cultural heritage promote social cohesion and a sense of belonging, while providing spaces for recreation and social interaction [20].

The integration of imaginative and symbolic structures in urban design has significant impacts on the resilience of cities:

Enhancing Social Cohesion: Symbolic structures and imaginative elements create common references and values for residents. This strengthens the sense of belonging and identity, making communities more cohesive and resilient to social and economic disruptions.

Promoting Cultural Identity: Integrating cultural heritage into urban design helps preserve and promote the cultural identity of a city. It enhances local pride and cultural awareness, creating a stable and cohesive social environment [21].

Economic Development and Tourism: Imaginative and symbolic structures attract tourists and investments. Tourism and cultural activities create jobs and incomes, boosting the city's economic resilience (Richards, 1996).

Psychological and Social Well-being: Symbolic structures and cultural spaces offer places for social interaction and recreation, enhancing residents' psychological and social well-being. These spaces serve as refuges in times of crisis, providing safety and stability [24].

Environmental Resilience: Green spaces, like Central Park, provide ecosystem services such as temperature reduction, air quality improvement, and water management, enhancing the city's resilience to climate change [27].

In conclusion, the integration of imaginative and symbolic structures into urban design has positive impacts on city resilience. Cities like Barcelona, Kyoto, and New York show that these structures enhance social cohesion, promote cultural identity, support economic development, and improve the psychological and social well-being of residents. These practices create resilient and sustainable cities capable of facing the challenges of the modern world.

6. CONCLUSIONS AND RECOMMENDATIONS

6.1. Verification of the Hypothesis

This study examined the relationship between imaginary and symbolic structures and urban and territorial resilience. By reviewing literature and analyzing case studies from iconic cities, we tested the hypothesis that fostering these structures can enhance urban resilience.

The literature review underscores the profound impact of imagination and cultural heritage on urban planning and resilience. The theory of imagination, notably developed by Cornelius Castoriadis, highlights the role of collective imagination in shaping social and urban frameworks. Imagination

fosters innovation and adaptability, enabling communities to envision new possibilities and develop creative solutions to urban challenges [7].

Similarly, the theory of cultural heritage, advocated by scholars like Pierre Bourdieu and Edward Said, emphasizes the importance of integrating cultural elements into urban planning. Cultural heritage enhances social cohesion and identity, providing a sense of continuity and stability that bolsters urban resilience [4-29].

Iconic cities such as Barcelona, Kyoto, New York, and Athens illustrate the successful integration of imaginary and symbolic structures into urban planning. These cities show that incorporating cultural elements can enhance social cohesion, promote cultural identity, support economic development, and improve residents' well-being [28-30-20].

Our findings confirm the hypothesis: cultivating imaginary and symbolic structures significantly enhances urban and regional resilience. Theoretical and empirical evidence demonstrates that these structures are crucial in building resilient urban environments.

Imagination and cultural heritage offer pathways to creating sustainable and resilient cities. Imagination drives innovation and adaptability, while cultural heritage fosters social cohesion and collective identity. When strategically integrated into urban planning, these elements help cities meet contemporary challenges and thrive despite adversities [26-24-27].

In summary, our hypothesis is validated, showing that fostering imaginary and symbolic structures is essential for enhancing urban resilience. This study provides valuable insights and practical recommendations for urban planners, policymakers, and communities aiming to build sustainable and resilient cities for the future.

6.2. Recommendations for Further Research

The examination of imaginary and symbolic structures in urban design and city resilience uncovers critical dimensions and gaps that necessitate further investigation. This section outlines key areas for future research.

While qualitative studies offer valuable insights, there is a significant need for the quantitative evaluation of the effects of imaginary and symbolic structures on urban resilience. Future research should prioritize the collection and analysis of quantitative data to measure their impacts on social cohesion, economic development, and environmental sustainability. For instance, studies could explore how specific urban interventions influence community bonding and economic activities over time [5].

Furthermore, it is essential to explore how these structures contribute to social justice and equity. In highly unequal cities, understanding the role of cultural initiatives in promoting social inclusion and reducing disparities is crucial. Research should investigate how cultural projects can bridge gaps between different social groups and enhance equitable access to urban resources [14].

Comparative studies across various cultural and geographical contexts can offer valuable insights into the transfer and adaptation of best practices. By examining how different cities incorporate and benefit from these structures, researchers can identify culturally sensitive strategies that enhance urban resilience. For example, comparing cities with diverse cultural backgrounds can reveal unique approaches to integrating symbolic structures into urban planning [11].

The advent of digital technology presents new opportunities to strengthen imaginary and symbolic structures. Future research could examine how virtual and augmented reality technologies promote cultural heritage and foster social cohesion. Case studies of cities utilizing these technologies can highlight innovative ways to engage communities and preserve cultural narratives [12].

Lastly, long-term studies and ongoing monitoring of the impacts of these structures are vital. Establishing robust monitoring mechanisms to track changes over time can provide invaluable data

for refining and improving urban resilience strategies. Longitudinal studies that follow the evolution of urban projects can offer deeper insights into their sustained impacts [31].

In conclusion, focusing on quantitative assessment, social justice, comparative studies, digital technology, and long-term monitoring can significantly contribute to the development of sustainable and resilient cities. By addressing these areas, future research can provide a more comprehensive understanding of how imaginary and symbolic structures influence urban resilience.

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Harnessing local resources for resilient communities: Urban heritage and creative tourism in peripheral areas

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Abstract

This article examines the significance of local resources in building resilient communities, both in urban and peripheral/rural settings. It is inspired by the work being carried out in the framework of the TOURAL project, funded by the European Union through the Horizon Europe programme.

The concept of resilience is becoming increasingly crucial as communities face growing challenges, such as natural disasters, climate change, and economic hardships. Leveraging local resources, such as urban heritage and the potential for cultural and creative tourism, can play a pivotal role in strengthening the resilience of these communities. Urban heritage encompasses the tangible and intangible elements that bear witness to the history and culture of a place. It may include monuments, historic buildings, archaeological sites, traditional arts and customs. Leveraging urban heritage can contribute to resilience in several ways:

1. **Enhancing a sense of belonging:** Connecting with urban heritage can strengthen residents' sense of belonging, leading to increased social cohesion and solidarity.
2. **Providing tangible assets:** Urban and rural heritage can serve as a source of income and employment, particularly through tourism.
3. **Offering historical knowledge:** Understanding a region's past can aid in better comprehending current challenges and developing effective strategies for the future.
4. Cultural and creative tourism focuses on experiencing the culture and creativity of a place. It may involve visiting museums, galleries, historic sites, festivals, and other cultural events. Developing cultural and creative tourism in peripheral areas can offer the following benefits:
5. **Job and income creation:** Tourism can be a significant source of income for local communities, especially in rural areas with limited economic opportunities.
6. **Preserving cultural heritage:** Tourism can contribute to the preservation of a region's cultural heritage by attracting resources for the restoration and utilization of historic monuments and sites.
7. **Promoting sustainable development:** Sustainable tourism can help protect the environment and strengthen local economies.
8. Harnessing local resources, such as urban and rural heritage and the potential for cultural and creative tourism, can significantly contribute to building resilient communities. By fostering a sense of belonging, providing tangible assets, offering historical knowledge, and promoting sustainable development, these resources can empower communities to face challenges and thrive in a rapidly changing world.

Keywords: *resilience; urban heritage; cultural & creative tourism; sustainable development; TOURAL.*

1. INTRODUCTION

Many rural and remote areas are heavily reliant on traditional agriculture, livestock farming, and forestry for their livelihoods. This overdependence often leads to a noticeable decline in the standard of living for their inhabitants. These regions are particularly vulnerable to fluctuations in economic and political conditions, while the agriculture sector itself offers limited job opportunities. This situation significantly increases the prevalence of unemployment and poverty, widening the development gap between these regions and urban areas, and exacerbating social inequalities. However, these same areas often possess untapped potential for tourism development, offering a multitude of benefits that can permeate various aspects of life. Economic growth stands as the most compelling incentive for pursuing tourism development in these regions. By harnessing their unique tourism potential, these areas can create a surge of new business opportunities and employment prospects. This, in turn, will lead to an increase in residents' income, significantly boosting the local economy. Consequently, this economic revitalization will help to reduce social inequalities, which are typically more pronounced in regions with weak economies [1].

The allure of tourism, with its promise of economic prosperity and cultural exchange, is undeniable. However, beneath the surface of this seemingly golden opportunity lies a potential quagmire of challenges that, if left unaddressed, could unravel the very fabric of the destinations it seeks to promote. The decision to embrace tourist exploitation, while presenting a tempting avenue for economic growth, must be tempered with a keen understanding of the environmental and cultural ramifications that could ensue if not carefully managed. The environmental impact of unfettered tourism cannot be overstated. The influx of visitors, each with their unique needs and habits, places an immense strain on the delicate ecosystems that form the very foundation of these destinations. Natural habitats are encroached upon, pristine landscapes scarred, and precious resources depleted to accommodate the demands of this burgeoning industry. The consequences of such exploitation are far-reaching, leading to soil erosion, water pollution, and a decline in biodiversity. The cultural fabric of these destinations is equally vulnerable to the homogenizing forces of mass tourism. As droves of visitors, often unaware of local customs and traditions, descend upon these communities, their presence can lead to a dilution of cultural identity. [2]

The authenticity of local practices and traditions may be compromised, replaced by superficial representations tailored to cater to tourist expectations. This erosion of cultural heritage can sever the deep connection between communities and their ancestral roots, threatening the very essence of what makes these destinations unique. The specter of pollution looms large as a consequence of unchecked tourist exploitation. The sheer volume of waste generated by visitors, coupled with the increased demand for energy and resources, places an unsustainable burden on the environment. Untreated wastewater, overflowing landfills, and air pollution from vehicles and industrial activities can wreak havoc on the delicate balance of these ecosystems. The pristine beauty that once drew visitors may become a distant memory, replaced by a polluted landscape that repels rather than attracts. In order to reap the economic benefits of tourism without succumbing to its detrimental effects, a paradigm shift is essential. Destinations must adopt a holistic approach to development, one that prioritizes sustainability and environmental protection [3].

This requires a concerted effort from governments, tourism agencies, local communities, and individual visitors. Governments must implement stringent regulations to minimize the environmental impact of tourism. This includes enforcing strict waste management protocols, promoting renewable energy sources, and preserving natural habitats. Tourism agencies must prioritize responsible tourism practices, educating visitors about local customs and traditions while encouraging them to minimize their environmental footprint. Local communities must play a central role in shaping the tourism narrative, ensuring that their cultural heritage is not exploited but rather celebrated [4].

This involves showcasing authentic traditions, engaging visitors in meaningful cultural exchanges, and fostering a sense of mutual respect and understanding. Individual visitors must take responsibility for their actions, making informed choices that minimize their environmental impact and respect local cultures. This includes choosing sustainable travel options, reducing waste generation, and respecting local customs and traditions. By embracing a collaborative approach that prioritizes sustainability and cultural sensitivity, destinations can navigate the double-edged sword of tourist exploitation, reaping the economic rewards while preserving the very essence that makes them unique and worth visiting. Only through responsible tourism practices can we ensure that these destinations remain havens of natural beauty and cultural richness, not just for the present but for generations to come [5].

It is therefore necessary to implement an alternative tourism model which will focus on cultural and creative tourism in remote areas which remain untapped, displaying in this way their special characteristics, without undergoing any alteration, in order to strengthen the economy as well as the sustainable development in these areas. The TOURAL project is set to address the above challenge with its multidimensional approach and its integrated development plan; aiming at the combination of regional economic development and financial resilience, while respecting all the regional characteristics and leveraging regional strengths.

2. A CULTURAL AND CREATIVE TOURISM RENAISSANCE

Cultural and creative tourism has emerged as a dynamic force within the global tourism industry, offering travelers immersive experiences that connect them to the heart and soul of a destination, its culture, arts, and heritage. This unique form of tourism fosters a multitude of benefits for both host communities and visitors [6].

For destinations, cultural and creative tourism fosters diversification within their tourism offerings, attracting new market segments of travelers. This diversification invigorates the local economy through increased visitor spending and generates new employment opportunities. It strengthens local identity and fosters a sense of pride within communities. Cultural and creative tourism also promotes social cohesion by encouraging interaction between visitors and residents, fostering a deeper understanding and appreciation for each other's cultures. Most importantly, it serves as a powerful tool for safeguarding cultural heritage by raising awareness and appreciation for traditional practices and historic sites. For visitors, cultural and creative tourism unlocks a treasure trove of unique experiences. They gain the opportunity to engage with the authentic culture of a place, immersing themselves in its rich history and traditions [7].

This engagement can take many forms, from attending vibrant artistic performances to participating in traditional workshops that allow them to learn firsthand from local artisans. Through these immersive experiences, travelers broaden their horizons, develop critical thinking skills, cultivate empathy, and build bridges of understanding with cultures distinct from their own [8].

However, developing cultural and creative tourism is not without its challenges. One of the most critical concerns is ensuring the authenticity of the experiences offered. It is imperative that these experiences are genuine and not merely contrived attractions catering solely to tourists. Achieving authenticity necessitates close collaboration with local communities and a deep respect for their cultural heritage. Inauthentic experiences risk transforming into superficial attractions that fail to capture the essence of a place and its culture, leading to disillusionment among visitors who may feel misled. Moreover, inauthentic experiences can contribute to the erosion of cultural heritage and traditions, prioritizing commercial interests over the preservation of local practices and knowledge.

To safeguard authenticity, fostering genuine connections with local communities is paramount. This involves engaging with them throughout the planning, development, and implementation of tourism initiatives. By actively involving residents in the process, their insights, perspectives, and expertise can be incorporated, ensuring that the experiences offered are rooted in their culture and traditions. Furthermore, demonstrating respect for cultural heritage is essential. This entails understanding and

appreciating the historical, artistic, and traditional significance of a place. It also involves ensuring that tourism activities do not cause harm or disrespect to cultural sites, artifacts, or practices. By prioritizing cultural sensitivity, destinations can preserve their unique heritage while simultaneously sharing it with visitors in a meaningful way [9].

Another challenge lies in ensuring the sustainable development of cultural and creative tourism. Striking a balance between promoting tourism and safeguarding the environment, cultural heritage, and the well-being of local communities is paramount.

Environmental sustainability is of utmost importance. Cultural and creative tourism initiatives must be designed and implemented in a manner that minimizes negative impacts on the environment. This includes reducing carbon emissions, conserving natural resources, and adopting eco-friendly practices. By prioritizing environmental sustainability, destinations can protect their natural beauty and ensure that future generations can continue to enjoy the unique ecosystems that attract visitors.[10]

Cultural heritage sustainability is equally crucial. Cultural and creative tourism should not come at the expense of a destination's cultural heritage. Instead, it should serve as a tool for preserving and promoting local traditions, practices, and historic sites. This requires careful planning and management of tourism activities to ensure that they do not cause damage or disrespect to cultural heritage. By safeguarding cultural heritage, destinations can protect their identity and strengthen their sense of place.

Ensuring the fair distribution of tourism development benefits to local communities is another critical aspect of sustainability. Tourism growth should not exacerbate existing inequalities or marginalize residents. Instead, it should provide opportunities for economic empowerment, job creation, and community development. This involves engaging local communities in tourism planning and decision-making processes, ensuring that they have a stake in the industry and benefit from its growth. By promoting equitable distribution of benefits, destinations can foster social cohesion and ensure that tourism contributes to sustainable community development [11].

Promoting cultural and creative tourism effectively also presents challenges. This form of tourism is often less well-known compared to traditional beach or city tourism, making it harder to reach the right target audience. Targeted communication and marketing strategies are essential to highlight the unique experiences and offerings of each destination. This includes utilizing digital platforms, collaborating with travel influencers, and engaging in niche marketing campaigns that appeal to specific traveler segments. By effectively promoting their cultural and creative assets, destinations can attract visitors seeking authentic and enriching travel experiences.

Overall, cultural and creative tourism presents a dynamic and multifaceted approach to travel, fostering economic and social benefits for both destinations and visitors. As this segment of the tourism industry continues to flourish, it offers a promising path for promoting cultural exchange, fostering understanding, and enriching the travel experience for all. Addressing the challenges that arise is essential for the healthy development of this type of tourism and for maximizing its benefits for all. Cultural and creative tourism, when approached thoughtfully and responsibly, presents a powerful force for positive change. By overcoming the challenges discussed, destinations can cultivate a thriving tourism sector that fosters economic prosperity, social cohesion, and cross-cultural understanding on a global scale [12].

3. THE TOURAL PROJECT APPROACH AND MULTIDIMENSIONAL MODEL

Scattered across the vibrant tapestry of Europe's landscapes lie vast swathes of rural and remote regions, each brimming with potential waiting to be unleashed. These areas, steeped in the traditions of agriculture, forestry, and farming that have shaped their identities for generations, now confront the pressing need to diversify their economies and forge a path towards sustainable growth. In this context, TOURAL proposes a transformative model that harnesses the potent force of cultural and

creative tourism to revitalize these very regions, by bringing to light hidden landmarks through offering immersive experiences.

TOURAL's vision is to unlock the potential of cultural and creative tourism, fostering a new kind of travel experience that goes beyond the superficial. By promoting artistic expression, traditional crafts, and vibrant cultural events, TOURAL aims to weave a new thread into the economic tapestry of these rural regions. This approach not only fosters economic diversification but also fosters a sense of pride and ownership within local communities [13].

As visitors become active participants in cultural experiences, they become stewards of these traditions, ensuring their preservation for generations to come. Furthermore, TOURAL recognizes the importance of sustainable practices. Responsible tourism, which minimizes environmental impact and celebrates the natural beauty of these regions, lies at the heart of the project. Imagine visitors exploring breathtaking landscapes on foot or bicycle, savoring locally sourced cuisine, and immersing themselves in the breathtaking biodiversity that defines these areas. This responsible approach ensures that tourism becomes a force for good, protecting the very resources that make these rural regions so special. By harnessing the power of cultural and creative tourism, TOURAL aspires to breathe new life into Europe's rural and remote areas. The project is not just about economic growth; it's about creating a future where these regions can thrive, their unique cultures celebrated, and their natural beauty preserved for all to experience.

Leveraging a comprehensive understanding of the inherent challenges and burgeoning opportunities within rural and remote regions, TOURAL champions a multifaceted approach to tourism development. This innovative framework transcends the limitations of traditional models, embracing a diverse spectrum of complementary tourism verticals and niche sectors. The project encompasses a captivating range of experiences, from underwater cultural and natural heritage exploration to the vibrant tapestry of cultural and creative tourism [14].

One pillar of TOURAL's approach is underwater cultural and natural heritage tourism. Imagine submerging oneself in the sea-waters surrounding these regions, where shipwrecks whisper tales of forgotten voyages and vibrant coral reefs teem with life. This immersive experience fosters a unique perspective on the region's historical and ecological spectrum, fostering a deeper appreciation for its past and present.

TOURAL extends its reach beyond the aquatic realm, delving into the heart of these regions to promote cultural and creative tourism. This facet of the project celebrates the artistic soul of local communities, fostering rich visitor engagement. Envision visitors acquiring the art of pottery, a tradition passed down through generations, or participating in vibrant music festivals that showcase the region's unique artistic talent. Immersion in traditional dance performances becomes a captivating journey through the region's cultural memory, fostering a profound understanding and appreciation for the distinctive cultural tapestry woven into the fabric of these places. Furthermore, TOURAL recognizes the intellectual curiosity that motivates many travelers. Cultural science tourism is embraced, offering opportunities to delve into the scientific wonders that define these regions. This could involve exploring archaeological sites that unveil the secrets of bygone eras, participating in workshops that illuminate the fascinating ecosystems, or embarking on guided tours led by local experts who share their profound knowledge of the region's natural world.

Finally, TOURAL acknowledges the growing segment of mature travelers seeking enriching experiences. The project incorporates silver tourism, catering specifically to this demographic by offering experiences tailored to their interests and needs. Imagine senior travelers exploring historical sites at a leisurely pace, participating in wellness workshops that draw inspiration from local traditions, or attending cultural events that celebrate the wisdom and heritage of these regions.

By embracing the above multi-dimensional approach, TOURAL ensures a captivating and diverse tourism landscape for revitalized rural and remote areas. It caters to a wide range of interests, fosters cultural appreciation, and celebrates the unique character of each region.

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TOURAL's sustainability of results and impact hinges on its unwavering commitment to participatory principles. By actively engaging local stakeholders, including communities, businesses, and government entities, TOURAL's tourism development approach aligns with the aspirations and needs of those who call these regions home. This collaborative approach fosters a sense of ownership and empowerment, ensuring that tourism benefits are shared equitably. Sustainability is not an afterthought in TOURAL; it is the very foundation upon which the project is built. Recognizing the delicate balance between tourism development and environmental preservation, TOURAL promotes responsible tourism practices that minimize environmental impact and protect the rich cultural heritage of rural areas.

Through its multifaceted approach, TOURAL aims to achieve a transformative impact on rural and remote areas, unlocking their potential as vibrant destinations for cultural and creative tourism. By fostering economic diversification, promoting sustainable practices, and empowering local communities, TOURAL paves the way for a renaissance of rural tourism, breathing new life into these often-overlooked gems of Europe. The expected results of TOURAL will not only revitalize rural economies and preserve cultural heritage but also serve as a model for sustainable and inclusive tourism development worldwide. As the project unfolds, it is poised to inspire and empower communities across the globe, demonstrating the transformative power of cultural and creative tourism in shaping a more resilient and equitable future.

4. TOURAL EXPECTED RESULTS

TOURAL focuses on developing innovative cultural and creative tourism experiences. These include unique offerings such as underwater heritage trails, cultural science festivals, and silver tourism packages aimed at senior travelers. Additionally, the project seeks to improve the accessibility and quality of existing tourism offerings through renovations of cultural sites, training for tourism providers, and the development of new marketing instruments. Promotion of rural and remote destinations is another critical component to attract more visitors and showcase their unique attractions.

An interactive online platform will serve as a hub for tourism stakeholders to share information, collaborate on projects, and access valuable resources. This fosters a community-driven approach to tourism development, ensuring that all parties can contribute to and benefit from shared knowledge and initiatives. For tourists, a mobile App will offer a seamless way to discover and enjoy local experiences, plan their trips, and access real-time information. This App will be designed to enhance the tourist experience by providing convenient access to a variety of activities thus ensuring up-to-date information.

The TOURAL model is designed to be replicable and sustainable, emphasizing multi-dimensionality, participation, and integration. It provides a set of guidelines and best practices for stakeholders involved in cultural and creative tourism development. In addition, to support data-driven decision-making, an AI-powered data analytics dashboard will provide valuable insights into regional tourism trends and outcomes, helping stakeholders to improve the tourism growth balance between urban and rural areas, making informed decisions that promote sustainable tourism practices.

Beyond these immediate goals, the TOURAL project aims to contribute significantly to the increased economic growth and creation of job vacancies in rural and remote areas, to strengthen local communities, and improve the quality of life. By fostering more sustainable tourism practices that respect the environment and local cultures, TOURAL sets a new standard for tourism development.

5. CONCLUSION

Cultural and creative tourism, when embraced thoughtfully and responsibly, presents a transformative force for positive change within the global tourism landscape. By effectively addressing the challenges discussed above, destinations can cultivate a thriving tourism sector that fosters not only

economic prosperity but also social cohesion, cross-cultural understanding, and environmental sustainability on a global scale.

Empowered Local Communities. Sustainable cultural and creative tourism ensures that residents are active participants in and beneficiaries of tourism development. This fosters a sense of ownership among local community members and encourages investment in cultural preservation efforts. When local communities are actively involved in planning and decision-making processes, their unique knowledge, traditions, and perspectives become the foundation for authentic and enriching tourism experiences. This, in turn, fosters a sense of pride in cultural identity and strengthens community bonds.

Economic Diversification and Resilience. Cultural and creative tourism when combined with new and diverse market segments such as underwater cultural & nature heritage tourism, cultural science and silver tourism; reduces reliance on traditional tourism models. This diversification strengthens the local economy by creating new job opportunities in areas such as cultural heritage preservation, artisanal crafts, and creative experiences. Increased visitor spending also benefits local businesses, restaurants, and accommodations, contributing to a more resilient and vibrant economic landscape.

Cultural Preservation and Transmission. Sustainable cultural and creative tourism prioritizes the responsible presentation and celebration of local traditions and heritage. By ensuring that tourism activities are respectful and sensitive, destinations promote the continuation and transmission of knowledge and practices to future generations. This can also lead to increased local appreciation for cultural heritage, fostering a deeper sense of connection to the past.

Social Cohesion, Understanding, and Global Citizenship. Cultural and creative tourism fosters genuine connections and understanding between visitors and residents. By engaging with different cultures and traditions, visitors develop empathy and a broader perspective on the world around them. This breaks down stereotypes, promotes cross-cultural dialogue, and fosters a sense of global citizenship. Breaking down barriers and building bridges of understanding between diverse cultures contributes to a more peaceful and interconnected world.

Environmental Sustainability and Long-Term Viability. A commitment to environmental sustainability ensures the long-term viability of cultural and creative tourism destinations. This involves adopting eco-friendly practices, reducing carbon emissions, conserving natural resources, and minimizing negative environmental impacts. By protecting their natural beauty and ecosystems, destinations can attract environmentally conscious travelers while safeguarding the very resources that contribute to their cultural richness and appeal.

In conclusion, cultural and creative tourism, when approached thoughtfully and responsibly, offers a transformative approach to travel that benefits not only the destinations themselves but also the individuals who visit them. By addressing the challenges and embracing the opportunities, destinations can harness the power of cultural and creative tourism to create a more inclusive, sustainable, and enriching experience for all. As cultural and creative tourism continues to evolve, it has the potential to become a cornerstone of a more interconnected, sustainable, and culturally diverse future for travel. It is a force that can bring people together, foster understanding, and promote appreciation for the rich tapestry of human cultures around the world.

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DIMENSIONS OF URBAN RESILIENCE

CHANGING CITIES



Changing Cities VI, Rhodes, 24 - 28 June 2024

Organized and chaired by Assoc. Prof. Dimelli Despina

Prof. Assoc. Prof. Dimelli Despina, School of Architecture, Technical University of Crete, Greece

The resilience of Greek public spaces

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Extended abstract

Public spaces are basic urban elements that have been shaped through the centuries with principles guided by different economic, social, political, and religious conditions. Public spaces constitute an important element of the city's system and consequently of urban resilience. The development of resilient public spaces should promote the interconnection of the public spaces physical and social dimension. The allocation of public spaces, their relation and proximity with the rest functions of the city, their accessibility, their green surfaces and other qualitative features, and their digital elements constitute critical parameters.

The current paper aims to analyze the resilience of public spaces in a typical Greek middle-sized city, the city of Chania. Based on a methodology that evaluates

- access: finding your way and getting about.
- use: what activities and opportunities the space has to offer.
- other people: how the space caters for different needs
- maintenance: how clean and cared for the space is.
- environment: how safe and comfortable the space is
- design and appearance: what the space looks like and what it's made from
- community: how important the space is to local people – you: how the space makes you feel, it analyzes the public spaces of the city with quantitative and qualitative data.

Research proceeds to the categorization of public spaces according to their resilience and proposes strategies that can strengthen their role in city's function.

Keywords: *urban resilience, public space, participatory planning, Greek cities, Chania*

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Governance for resilience. The Living Lab approach within the framework of 2ISECAP project

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Extended abstract

Contemporary urban challenges, such as those posed by climate change and the growing global population, have accelerated the discussion over the shift to urban sustainability and resilience. Technological innovation, social know-how, behavioral changes, and the effective utilization of urban space are all suggested as means to achieve this goal. In recent years, governance has emerged as a necessary component of urban sustainability and resilience. This perspective involves new forms of communication and decision-making, alliances and partnerships between public, private and social actors, and novel institutional structures, networks and representation. In this context, there is a growing recognition among scholars, policymakers, and professionals of the significance of utilizing innovative governance tools in effectively managing and transitioning towards sustainable and resilient systems. One such tool is the Living Lab (LL), which functions as a governance structure to organize, facilitate and provide an environment for exchange, cooperation and accountability in decision-making.

The objective of this paper is to provide some highlights on the overall concept of the Living Lab and its utilization as a governance tool within the project “Institutionalized Integrated Sustainable Energy and Climate Action Plans – 2ISECAP” (Horizon 2020). The project aims to address local energy transition by enhancing the performance of Sustainable Energy and Climate Action Plans’ (SECAP) development and implementation process. Six pioneering European municipalities of different sizes and types and with different socio-economic, geographical and economic settings are involved in 2ISECAP. These are: Karditsa – Greece, Leon – Spain, Ljutomer – Slovenia, Padova – Italy, Tartu – Estonia and Thun – Switzerland. Within each Municipality, a LL has been organized to support the development and enhancement of integrated sustainable energy policies. The LL concept has been chosen to serve as a platform that: i) encourages public administration of all levels to evolve from its silo-based working culture to a participatory, cross-departmental and multilevel way of working, ii) enables a citizens-driven, private party included and facilitator-based co-creation process to identify local/ regional visions and planning priorities, iii) supports the development of sustainable relationships between actors through engagement and trust creation, iv) facilitates the exchange of know-how, the spanning of knowledge and experiential learning, and promotes innovative thinking. LLs mobilise existing innovation tools or develop new ones, as examined in this paper.

Overall, it is argued that Living Labs enable the development and experimentation of innovative concepts, tools and products and help build the institutional, technical and financial capacities needed to implement plans, as well as to be flexible and adapt to change and pressures, key elements towards urban resilience.

Keywords: *Living Labs; urban governance; urban resilience; SECAP; 2ISECAP project*

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Building simply: A resilient approach to sustainable urban living amid climate change challenges

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Extended abstract

As urban overheating is becoming an increasingly pressing concern due to climate change, it is important to develop robust concepts that address thermal insulation in summer. The 'Building Simply' concept, developed at the Technical University of Munich, offers a potential solution by creating a constant indoor climate without relying on technical systems such as air conditioning. The approach includes large storage masses, a balanced window-to-room area ratio, and efficient window ventilation. Sun protection was deliberately excluded due to frequent misuse by users. The primary objective of this study was to determine whether the simplified design of the three houses, aligned with the 'Building Simply' concept, results in an acceptable temperature perception among residents. A combination of semi-structured questionnaires, guided interviews, measurements, and on-site observations was used to analyze user acceptance and identify potential resistance to resilient buildings. The summer temperatures in the houses were generally moderate, although there were instances of localized overheating in specific areas. Although temperatures were slightly above the standard comfort range, most residents found them acceptable. The impact of the environment – specifically, shade from trees or nearby buildings – had a notable impact on well-being. The lack of external solar shading was found to be effective in terms of average temperature and overall user satisfaction. Although manually operated external solar shading could improve user comfort, it was considered unnecessary for the proper functioning of the houses. Night-time ventilation is an important factor in regulating temperature, but it can be hindered by ambient noise and lack of understanding among users. The study showed that the construction is robust, with some test subjects choosing not to use regulating measures such as curtains or fans. The implementation of the 'Building Simply' concept demonstrates that a focus on resource-efficient and low-tech buildings is ecologically sensible and well-received by users. The moderate summer temperatures were perceived as pleasant by residents, affirming the success of the resilient building concept, despite localized overheating. The study highlights the impact of surroundings on resident well-being and emphasizes the importance of holistic planning that considers both the building and its surrounding infrastructure. Further research should explore broader applications of the 'Building Simply' concept in diverse urban settings, particularly in light of the escalating urban overheating problem. Investigating the scalability and adaptability of the concept to different climate zones and architectural styles would provide valuable insights. Furthermore, assessing the long-term energy efficiency and ecological impact of such constructions over extended periods is essential for validating the sustainability of the approach. Future research could explore the integration of smart technologies to improve user comfort and energy management while maintaining the low-tech nature of the concept. By addressing these aspects, the 'Building Simply' concept could make a significant contribution to the development of resilient and environmentally conscious urban spaces.

Keywords: *urban overheating; resilient building concepts; low-tech; user satisfaction; holistic planning*

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Covid-19 and culture: what sustainable territorial resilience? Examples in the city of Reims and around, France

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Extended abstract

The local cultural sector, like others, has been hard hit by Covid-19, but with particular acuity due to its non-essential status in the fight against the pandemic and that could have provoked gatherings outside homes. At the same time, the cultural sector has continued to reflect on the ecological impact of its activities.

Archives, visual arts, libraries, museums, heritage, cinemas and theatres, etc. have all come to a standstill, while digital services accessible from the home have been in great demand, accelerating their development and, in some cases, their hold on society. The first-mentioned areas of activity have received varying degrees of support depending on the country, sometimes with direct or indirect aid to artists and cultural professionals. They have also made greater use, or for the first time, of remote diffusion methods, which may continue after Covid-19. The return to cultural venues has been gradual, but with often lower attendance up to 2023 than in the year preceding Covid-19.

As far as climate change is concerned, over the last ten years or so some festivals have sought to limit carbon consumption in terms of short supply chains based on circular economy, waste management and ecological transport, for example by carpooling and the train, but overall festivals are still very polluting because of the large number of artists and audiences they welcome from all over France and the world. Cultural establishments have also recently been looking at their carbon consumption, sometimes voluntarily but also under the impetus of State and local authority subsidies.

The aim of this paper is to show the nature of the environmental, economic, social and technological changes underway in the cultural sector for sustainable territorial resilience, but also to raise the question of how to support and encourage possible changes based on studies and examples. Our research into the effects of the Covid-19 in Reims and the surrounding area, using questionnaires and interviews with cultural players, highlighted the heavy dependence of French cultural structures, artists and professionals on public subsidies and fossil energies, and suggests ways forward.

Keywords: Covid-19; culture; resilience; sustainable; territorial

Housing as a site of everyday practices of resilience: the case of Um-Al-Sharayet neighborhood-Ramallah/ Al-Bireh- Palestine

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Extended abstract

This research investigates the Post-Oslo urban developments in Ramallah / Al -Bireh in Palestine amidst major neoliberal urban restructuring and the Israeli occupation land grab and mobility control. According to Taraki, the establishment of the PA after the Oslo Accords in 1993 marks the transformation of Ramallah/Al-Bireh from small villages in the early 20th century to a central city (Taraki, 2008). Taraki explained that the imposed spatial regime that the Oslo Accords produced has enclaved the city of Ramallah/Al-Bireh, separating it from other Palestinian cities (Taraki, 2008).

Within these urban socio-political and economic transformations the Palestinians are struggling to create their own state, apparently new architectural forms and meanings appeared in response to these changes. Impressively Ramallah / Al-Bireh represents an ideal case that reflects the Israeli occupation spatial control and the neoliberal forces impacts on the city; the research is investigating Um- Al -Sharayet neighborhood which is considered a facet of post-Oslo rapid urbanization in the Palestinian urban context.

Accordingly, the study draws on ethnographic research to tackle the everyday practices of the residents in Um-Al-Sharayet neighborhood in order to understand the their experience of the neighborhood and the adaptation strategies and the tactics they developed to cope with the political, and socio-economic transformations. Based on Lefebvre various kinds of space for everyday discourse, such as street corners, market places, shopping centers and so on, are considered as organized codes which are part of the interaction between 'subjects' and their space and surroundings. These codes construct the spatial system of the space (Lefebvre, 1991 [1974], p.16). The research fieldwork combined observation and recording of field notes; interviews with residents; taking photographs; and the collection of documents, archival, and online materials. The research contributes to revealing how resilience practices are sustained in everyday housing contexts.

Keywords: *post-Oslo urban development; spatial control; everyday practices; resilience; Ramallah/Al-Bireh*

Disaster risk reduction planning for people with disabilities: case study on the city of Kalamata (Greece)

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Extended abstract

The literature suggests that individuals with disabilities, who constitute 16% of the world's population, are more vulnerable during natural hazards, climate-induced disasters and global health emergencies, as they are disproportionately affected due to various reasons. The Sendai Framework for Disaster Risk Reduction 2015-2030 acknowledges persons with disabilities as contributing stakeholders and emphasizes the need for their inclusion in all DRR policies and practices. However, emergency planning often represents this group inadequately, with limited training and awareness among emergency managers. Researchers acknowledge that disaster planning for people with disabilities is a complex and multifaceted issue that requires a “whole community” approach, involving families, clinicians and public authorities.

Given the increasing number of disasters due to climate change, the problem must be addressed as soon as possible. In Greece there have been recently legislative initiatives that prioritize the issue, although there are lot of implementation problems due to long-standing pathogenesis of Greek administration system, especially in the local level, but there is not enough research in the field.

In this research is presented the case - study of Kalamata, a city in southern Greece in DRR planning. Specifically, using the questionnaire of UNDDR, in order to understand the progress made in disability inclusion in DRR, the survey gave a numeric estimation of Kalamata's population with disabilities, and the types of disabilities present. Moreover, showed that there is an adequate knowledge of exposure to natural hazards. On the preparedness level, the survey confirmed the lack of personal preparedness plans, as well as lack of awareness in the local DRR plan. On the willingness to be involved in planning processes there was a vast majority in favor.

The basic outcome of this survey is that it is of utmost need a campaign for awareness raising of the population.

Keywords: resilient cities, disaster planning, disabilities, governance

Unraveling the Dynamics of Climate Resilience at the Neighborhood Level: An Actor-Network Theory Approach

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Extended abstract

In recent years, the imperative to enhance climate resilience at the local level has gained significant attention, with a growing recognition of the critical role of neighborhoods and frontline actors in confronting climate change impacts. This paper adopts Actor-Network Theory (ANT) framework to elucidate the complex network of actors and interactions involved in shaping climate resilience strategies, policies, implications and their outcomes at the neighborhood level. Drawing on empirical data from diverse urban neighborhoods, this study employs ANT as a methodological tool to unravel the intricate web of relationships among human and non-human actors, institutions, and socio-technical systems that influence the development and implementation of climate resilience strategies. By analysig these actor-networks, the research seeks to investigate the mechanisms, challenges, and opportunities for achieving climate resilience in neighborhood contexts.

Key components of the analysis include actor mapping, – i.e., the study systematically maps the heterogeneous array of actors involved in climate resilience efforts at the neighborhood level, ranging from residents, community organizations, and local government agencies to infrastructure systems, ecological features, and technological artifacts, their relations with each other, collaboration and cooperation. Following the identification and classification of these actors, this study highlights the diverse interests, motivations, and capacities that shape resilience outcomes. Additionally, network analysis techniques are applied to characterize the patterns of interaction, collaboration, and influence within and across actor-networks, shedding light on the flow of resources, information, and power dynamics that shape decision-making processes and governance structures related to climate resilience in neighborhoods. Emphasizing the intertwined nature of social and technical dimensions, the study investigates how socio-technical systems, such as green infrastructure, smart technologies, and community-based initiatives, mediate and shape climate resilience outcomes. By examining the roles and interactions of human and non-human actors within these systems, the research highlights the socio-technical dynamics that underpin neighborhood-level resilience strategies. The findings of this study have significant implications for policy, strategy and governance interventions aimed at enhancing climate resilience in neighborhoods, because they highlight key actors, relationships, and leverage points within actor-networks. Designs and implementations of targeted policies, programs, and interventions to foster more adaptive, inclusive, and sustainable approaches to climate resilience are suggested at neighborhood level according to the inferences of actor network analysis. By employing ANT approach, this paper contributes in advancing theoretical and methodological understandings of climate resilience at the neighborhood level, offering practical insights and recommendations for urban climate policies to foster more resilient urban neighborhoods in the face of climate change.

Keywords: *climate change, urban resilience, neighborhood level, actor-network theory, socio-technical dynamics*

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**URBAN CLIMATE, OPEN SPACES: A PATH TO URBAN
REGENERATION AND RESILIENT DESIGN**



Changing Cities VI, Rhodes, 24 - 28 June 2024

Organized and chaired by Prof. Argiro Dimoudi & Assoc. Prof. Julia Nerartzia Tzortzi

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Evaluation of outdoor comfort conditions at a University Campus

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Extended abstract

Over the past decades, the amount of people that migrate to cities has rapidly increased, in pursuit of job opportunities and variety of choices when it comes to both entertainment and cultural amenities. As a result, individuals have changed their way of life, spending more hours in indoor spaces neglecting the outdoor places and activities. Urbanization has been a central concern by a variety of health and environmental experts, raising alarming questions for issues related to thermal evaluation of outdoor spaces but also the implementation of measures to encourage their utilization. Thermal assessment in outdoor spaces, and especially those in University campuses all over the world, has been vital for maintaining not only a healthy and environmentally friendly scene for both students and university staff, but also a more sustainable way of living. Due to radically different lifestyle in the last decade, with technology covering the biggest part of an individual's, everyday life, and especially a student's everyday life, it is considered of vital importance to try to make outdoor spaces more accessible and comfortable, so that individuals have a more balanced way of living and a deeper connection to nature, and they are also able not to misuse the various energy sources currently over-exploited.

This research is based on the case study of outdoor spaces at the campus of the School of Engineering, Democritus University of Thrace, located at the city of Xanthi, North-East Greece. It focuses on the evaluation of outdoor thermal comfort and microclimatic factors that affect it. The research was carried out with site monitoring of microclimate and thermal comfort parameters and thermal comfort evaluation by users of the site.

Measurements lasted 13 days, covering mostly June 2023, during the hours of 11:00 am to 14:00 pm, when the use-density of outdoor spaces by students and staff members is usually very high during these hours. The measurements took place with a portable weather station measuring air temperature, radiant temperature, and wind speed. A survey of a total of 252 questionnaires was carried out; and questionnaires were classified according to date and time of response.

The Actual Sensation Vote (ASV) and Thermal Sensation Vote (TSV) were statistically analyzed, using T-test function, F function and Pearson correlation. The analysis pointed a very low correlation in terms of microclimatic data, with air temperature having the highest predominance. The latter appears to be the major environmental factor that most influences people's thermal sensation and comfort, since it can well predict with greater validity both indicators. In general, the assessment of the thermal comfort of the outdoor spaces was satisfactory, and in line with the conclusions of other research publications.

Keywords: *thermal sensation, outdoor thermal comfort, university campus outdoor thermal comfort*

How Does Plant Taxonomic Choice Affect Building Cooling?

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Extended Abstract

Urban green infrastructure represents a nature-based approach to mitigate urban heat islands, improve energy efficiency, and enhance human thermal comfort. All factors linked to a changing climate. Among various urban greening strategies, vertical greening systems (green walls and green façades) have gained popularity due to the densification of city landscapes, and the fact that these interventions take up little space. Vegetation on buildings cools the surface facades of the building and thus interior temperatures, reducing the reliance on energy-intensive artificial air-conditioning during summer. Plants confer a cooling effect on buildings through shading, evapotranspiration, and depending on foliar characteristics through the albedo effect (i.e., reflection of light). Selecting appropriate plant taxa would appear important in maximizing the thermal benefits of vertical greenery. However, there is limited information available on how the taxonomic choice of plants influences wall cooling. Thus, this paper investigates wall cooling capacities across different plant taxa in a temperate climate (UK). The aim of this study was to identify plant species that effectively cool the building surface across a range of ambient temperatures and investigate the correlation between wall cooling and key plant traits. Wall temperature behind 24 different taxa were monitored using thermocouples attached on individual panels, and the recorded data were compared against a control wall panel. Analysis was conducted on cooling differentials (the difference in temperature between the control panels and those behind the plants) across different summer weather conditions. Results showed that plants provided cooling capacity under all summer day-time conditions, but the cooling capacity increased as ambient temperatures rose, i.e., the differentials in temperatures were greatest under the warmest days, and when solar intensity was at its highest. On the warmest days wall panels behind plants could be 26°C cooler than wall panels without screening. Plant taxonomic choice was important in optimising the cooling effect, but notably, the taxon that provided the greatest cooling to the wall could change as ambient conditions themselves changed. As the temperature of the bare wall panel rose from 35°C to 45°C and then 55°C, the taxa that optimised cooling were *Lonicera*, *Hebe* and *Hedera*, respectively. In essence, plant genotypes that cool best under moderately warm conditions, are not necessarily the same as those that provide maximum cooling under the hottest conditions. Thus, there appear to be relations between plant traits and the conditions plants find themselves in, and their capacity to cool the environment around them. Further analysis suggested that maximising the amount of leaf area in front of the wall panel (greater shading) could partially explain the cooling effect of different plant taxa (especially under the warmest conditions), but otherwise cooling was not clearly linked to other traits such as foliage colour, leaf morphology or leaf texture. Overall, the data supports the notion that plants provide significant cooling to a building façade, but in practice, a mixed plant community may be preferred to a single-taxa ‘mono-culture’, due to this providing a greater array of cooling mechanism, across a range of different environmental conditions.

Keywords: Thermal regulation; Green walls; City Cooling; Landscape Plants; Urban Horticulture

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Green Management and Environmental Planning in Greek Forest Services

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Abstract

This study investigates the effect of Green Management on the operation of the Forestry Service (FS) and its strategic planning for the protection of the environment. The Environmental Planning as a forest strategy, is an obligation and basic mission of the Forestry Services (F.S.), as the majority of Greek Forests are public. The main purpose of the research is to highlight the knowledge of the importance of green management among FS executives, answering to the questions of the research about green management, organizational culture, employee behavior and their degree of satisfaction, as well as the creation of a positive psychological climate in the FS for the effective implementation of environmentally sustainable policies.

To conduct the research, a specially structured questionnaire was drawn up based on the literature review and was distributed to all executives of the regional and central F.S. of Greece. In total we have 232 fully answered questionnaires from all over Greek territory. The questionnaires were collected from September 2023 to February 2024. Most questionnaires were completed electronically through the Google Form platform, and some were required to be sent by post or by visiting the local F.S. The results were processed with the help of the IBM SPSS 26 statistical package.

The analysis of the results highlighted the relationship between the culture of the organization and the employee, as well as the connection between green management and job satisfaction, as the executives of F.S. seemed to accept this interaction to a very large extent.

In addition, it emerges that the behavior of employees in F.S. is largely linked to and influenced by its organizational culture which refers to employee values, beliefs and behaviours, such as: individual green values, green behavior and competence, green commitment, commitment, work performance and well-being, which mutually influence each other to a greater or lesser extent.

In addition, the individual values of the employees of F.S. have positive effects on employees' workplace, while employees' evaluation of their job characteristics is a critical factor influencing their work behavior.

Based on the results of the research, it is proven that Green Management is a fundamental strategic plan that improves the environmental performance of organizations, but also plays a vital role in improving the quality of some employees' work criteria, such as job satisfaction and psychological climate of the Forest Service of the country.

Keywords: *Green Management, Environmental Planning, Digital Transformation, Forest Service, Green GAP, Forestry Strategy*

1. INTRODUCTION

The recent interest about the worldwide environmental mindset has arisen from specific circumstances to combat climate change, [1-2].

The sustainable development requires the conservation of natural resources and the respect for human rights. Under the current situation, organizations and services also need to find ways and techniques to deal with reducing their ecological footprints and develop a relevant mindset. The successful implementation of these sustainable corporate strategies within an agency requires both strong leadership and specific processes [3-4]

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The integration of the term "green" in the strategy of services and organizations opens new ways in their development, however it is still requested [5-7].

In this way [8], the marketing, the IT and the finance combined with the core object of each organization, work together harmoniously to promote a positive joint effort and all these are coordinated by the human resources management department or by the heads of departments and services. Undoubtedly, the employee of Forest Service (FS), due to the nature of the subject matter, show or should show a special interest in environmental issues and therefore form opinions on how to deal with any environmental risks.

The European Union encourages the education and training sector as a prerequisite of Green Management to take action to contribute to the green transition and to strengthen social responsibility [9].

Afedzie et al [10] defines Green Management as the action which continuously promotes the cause of environmental management, such as the management of personal responsibility(?) for environmental activities and biodiversity conservation.

Green Management, which focuses on human resources, is based on practices related to environmental sustainability through the creation of "green" employees who can recognize and value the organization's environmental initiatives. It focuses on green selection and recruitment, green training and development, green performance, management and evaluation, green payment and reward system that expands the organization.

Organizational culture refers to values, beliefs, and behaviors of employees in the organization [11], [12]. According to the above, Green Management is defined as the implementation of practices that focus on environmental sustainability through the creation of green employees, who are able to recognize and appreciate the organization's environmental initiatives. It focuses on green selection and recruitment, green training and development, green performance, management and evaluation and of course green reward system [13].

Green Management is not only a fundamental strategic plan that improves the environmental performance of organizations, but also plays a vital role in improving the quality of some employee work criteria, such as job satisfaction [14-17]. Research shows that employees' evaluation of their job characteristics is a critical factor influencing their work behavior [18], [13]. Specifically, several job characteristics including pride, participation, recognition, self-actualization, advancement, justice, can influence the way that employees perceive their work and their satisfaction [19-24].

Therefore, organizations can use green management to effectively implement environmentally sustainable policies [25]. During recruitment and selection activities, the organization can include environmentally friendly hiring criteria, and communicate environmentally friendly commitments to applicants and give priority to applicants who have had experience in environmentally friendly activities. There will also be reward practices for green work performance. It is necessary to have training programs that develop environmental awareness, attitudes, skills and knowledge [26-28].

2. THE RESEARCH OBJECTIVE

The main purpose of this research was to investigate the perceptions and beliefs of Forest Service's executives regarding Green Management and its reflection in their Services. The central hypothesis of the research was that the majority of Forest Service's employees are still unaware of the importance of Green Management. The research questions of the survey were posed as follows:

- 1st research question: Are employee values, beliefs and behaviors, like the organizational culture of the Forest Service, related to each other and with the green management?
- 2nd research question: Are employees' behavior related to the culture of the Forest Service?
- 3rd research question: Is green management related to Forest Service employee's satisfaction?

- 4th research question: Can green management create a positive psychological climate in the Forest Service for the effective implementation of environmentally sustainable policies?

3. METHODOLOGY

A primary pilot qualitative and quantitative survey has been carried out among senior officials of the Central Forestry Departments of the Policy Implementation and Inspection of Greece (Table 1), in order to reflect the reality of the current situation and to make the final formulation of the questionnaire, so that it is comprehensible to the whole sample. This group (focus group) of the qualitative research presents common characteristics and knowledge related to the title of the present research, but they do not know each other. In this way, the detection of whether the basic concepts of Green Management are clear, was achieved.

During the next period, some questions were designed based on the Maturity Model [29-31] to collect the data required for further research. Before creating the final Likert-type questions, a platform was used to define the maturity model of the respondents of the original survey. The mendix platform (<https://www.mendix.com/>) was used to position the questions in such a way that they could be piloted by the first respondents. Most of the questions in the questionnaire were closed, of the following type: ranking, dichotomous, Likert scale, multiple choice. The Likert scale questions were structured in 5 levels, where: 1 corresponded to the upper level and is the most ambitious level, which is a trigger for long-term planning, 2 as the level of cooperation in a positive direction regarding the requested issues, 3 as the established base, 4 as the level where the services are, which are progressively starting and changing and as 5 those that are now emerging in the demands of a human resources administration in line with the green data. In several cases it was necessary to repeat the electronic sending of the questionnaire or to use multiple distribution channels.

Table 1. Forestry Services by Region that participated in the survey

District	N.	Percentage %
Thessaly	77	33.2
Stereia Ellada	36	15.5
Central Macedonia	29	12.5
Attiki	23	9.9
Peloponnese	21	9.1
Creta	16	6.9
West Macedonia	9	3.9
Epirus	8	3.4
North Aegean	6	2.6
East Macedonia - Thrace	4	1.7
Ionia Island	2	0.9
West Greece	1	0.4
TOTAL	232	100.0

Finally, the sample of the research amounted to 232 forest employees from all the Regions of the Country, with their demographic characteristics, as shown in Table 2, i.e. approximately 20% of the total population of 1.160 forest employees to whom the link of the specific questionnaire was sent by email. The survey's data collection took place in May-June 2023. There was a first phase of a pilot survey with four (4) respondents where some ambiguities were settled. After the collection of the questionnaires of the sample, the statistical processing of the research data followed with the program IBM SPSS Statistics, ver. 29 [32].

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Table 2. Profile of the surveyed

Gender	Percentage %	Education	Percentage %
Men	44.0	Bachelor	58,6
Women	56.0	Postgraduate	36,6
		Phd	4,7
Age	Percentage %	Work Experience	Percentage %
≤25	0.9	<1 year	14.2%
26-35	4.3	1-5 years	19.0%
36-45	17.2	6-10 years	10.8%
46-55	47.4	11-15 years	14.7%
55-65	27.6	16-20 years	10.8%
>65	2.6	>20 years	30.6%

4. RESULTS

In this research, as can be seen from Table 2, forestry employees who took part, work in various positions with an average of 20 years of service, while the percentage of those with more than 20 years of service amounted to 30.6% of all of them.

Regarding the basic hypothesis of the survey, which is that the majority of forest employees do not know Green Management, it is verified because the 54.6% of them stated that they do not know it. The knowledge or not about green management is independent of gender and level of education, but is related to age, as the age groups between 26-45 years know better about green management ($X^2 = 11.093$, for $\alpha < 0.05$) and thus the central hypothesis of the research is verified.

Those who know green management associate it most with practices to save from global warming and the depletion of natural resources at a rate of 45.7%, but also with digitalization at a rate of 42.2%, which it makes necessary for a green transition.

Regarding the area of human resource management of an organization, respondents answered that it is related to the factors (Table 3) of green selection and staff recruitment (2.89) and green reward system (2.83), while in a smaller degree concerns green education and development (2.19), where 1=very much and 5=not at all. These results confirm previous research [13].

Table 3. Green Management Human Resources in the organization

	N	Minimum	Maximum	Mean	Std. Deviation
Green education and development	232	1	5	2,28	1,136
Green work performance	232	1	5	2,41	1,033
Management and evaluation	232	1	5	2,47	1,027
green reward system	232	1	5	2,83	1,130
Green staff selection and recruitment	232	1	5	2,89	1,233

Most of the respondents strongly associate the implementation of Green Management in the Forest Service with personal factors, as shown in Table 4, (where: 1=very much and 5=not at all), as respondents associate green management with individual green values (2.38) and green behavior (2.43) and less with the sense of ownership (3.27).

Based on the results of the Pearson correlation (r), the two-way significance test certifies that the correlation between the following variables is positive and statistically significant at the $\alpha=0.001$ significance level, namely:

1. Individual green values are strongly positively related to green behavior ($r = 0.847^{**}$, $df=232$, $p<0.001$), that is mean, if they have in a strong level green values, they have a truly green behavior.
2. Green behavior is strongly positively related to green ability ($r =0.799^{**}$, $df=232$, $p<0.001$), that is, green behavior manifests to a greater extent the green abilities for executives' actions.
3. Green competence is strongly positively related to green commitment ($r = 0.704^{**}$, $df=232$, $p<0.001$), that is, executives' green competence shows a much greater commitment to the green actions.
4. Job satisfaction is strongly positively related to loyalty ($r =0.703^{**}$, $df=232$, $p<0.001$), i.e. when employees are satisfied with their Service, this affects their loyalty to it to a greater extent.
5. Work performance is strongly positively related to wellness ($r =0.671^{**}$, $df=232$, $p<0.001$), i.e. for greater work performance there should be greater employee well-being.

Based on the above, answers are given to the 1st research question.

Table 4. Green Management Human Resources and employee in Forest Service.

	N	Min.	Max.	Mean	Std. Deviation
Individual Green Values	232	1	5	2.38	1.062
Green Behavior	232	1	5	2.43	1.103
Positive image of the organisation	232	1	5	2.52	0.998
Green Ability	232	1	5	2.63	0.990
Job satisfaction	232	1	5	2.66	0.962
Wellness	232	1	5	2.66	1.101
Green Commitment	232	1	5	2.69	1.011
Work performance	232	1	5	2.76	0.953
Loyalty	232	1	5	2.84	0.983
A sense of ownership	232	1	5	3.27	1.061

Table 5. Pearson correlation coefficient between the factors of organizational culture of Forest Service employees and Green Management

	1	2	3	4	5	6	7	8	9	10
1. Individual Green Values	1	.847^{**}	.679 ^{**}	.519 ^{**}	.433 ^{**}	.246 ^{**}	.587 ^{**}	.477 ^{**}	.427 ^{**}	.439 ^{**}
2. Green Behavior	.847 ^{**}	1	.799^{**}	.670 ^{**}	.515 ^{**}	.240 ^{**}	.623 ^{**}	.539 ^{**}	.526 ^{**}	.498 ^{**}
3. Green Ability	.679 ^{**}	.799 ^{**}	1	.704 ^{**}	.497 ^{**}	.341 ^{**}	.581 ^{**}	.610 ^{**}	.603 ^{**}	.543 ^{**}
4. Green Commitment	.519 ^{**}	.670 ^{**}	.704^{**}	1	.606 ^{**}	.298 ^{**}	.514 ^{**}	.507 ^{**}	.578 ^{**}	.554 ^{**}
5. Positive image of the organisation	.433 ^{**}	.515 ^{**}	.497 ^{**}	.606 ^{**}	1	.271 ^{**}	.544 ^{**}	.461 ^{**}	.504 ^{**}	.397 ^{**}
6. A sense of ownership	.246 ^{**}	.240 ^{**}	.341 ^{**}	.298 ^{**}	.271 ^{**}	1	.327 ^{**}	.399 ^{**}	.402 ^{**}	.353 ^{**}
7. Job satisfaction	.587 ^{**}	.623 ^{**}	.581 ^{**}	.514 ^{**}	.544 ^{**}	.327 ^{**}	1	.703 ^{**}	.658 ^{**}	.567 ^{**}
8. Loyalty	.477 ^{**}	.539 ^{**}	.610 ^{**}	.507 ^{**}	.461 ^{**}	.399 ^{**}	.703^{**}	1	.625 ^{**}	.579 ^{**}
9. Work performance	.427 ^{**}	.526 ^{**}	.603 ^{**}	.578 ^{**}	.504 ^{**}	.402 ^{**}	.658 ^{**}	.625 ^{**}	1	.671 ^{**}
10. Wellness	.439 ^{**}	.498 ^{**}	.543 ^{**}	.554 ^{**}	.397 ^{**}	.353 ^{**}	.567 ^{**}	.579 ^{**}	.671^{**}	1

The 55.6% of Forest Service's executives of the survey agree that employee's behavior is related to Forest Service's culture (2nd research question), with 33.6% expressing a neutral opinion and 10.8% disagreeing (Fig. 1). The crosstabulation analysis showed that this opinion is independent of gender, level of education and age, but depends on the region in which they work ($X^2=76.673$, $df=42$, $a<0.05$), with the regions of Eastern Macedonia-Thrace, of Western Macedonia and Central Macedonia, expressing themselves more positively in the above question.

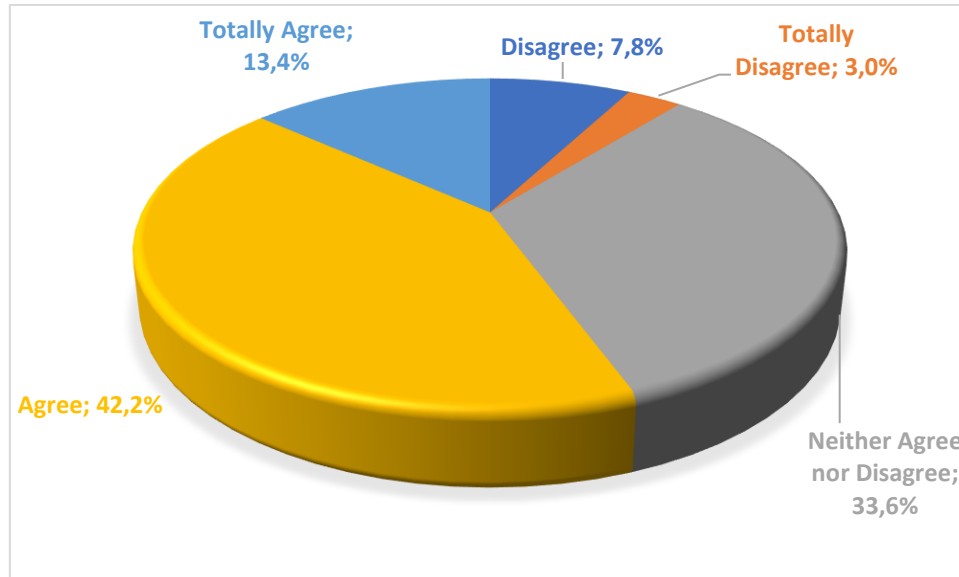


Figure 1. Employee behaviors are related to the culture of the Forest Service

Regarding the relationship between Green Management and the employee's personal culture, it is proven from the data in Table 6 that they are highly correlated (2.36). Most respondents state that there is a connection between individual values and Forest Service's values at a rate of 48.0% so it has positive effects on employees' workplace (Question 1 of Table 6), as well as what green management can affect workplace outcomes of employees through the work climate in the Forestry Service at a rate of 35.7% (Question 2 of Table 6).

Regarding the 3rd research question, it appears that green management can satisfy Forest Service's employees at a rate of 42.6% (Question 3 of Table 6), with men being more positive than women, as well as the youngsters' satisfaction (26 - 45 years old) and those with doctoral studies being more optimistic and positive. The crosstabulation analysis showed that this question is statistically independent of the respondents' characteristics.

According to question 6 of Table 6 it is shown that green management will create a positive psychological climate in the Forestry Service for the effective implementation of environmentally sustainable policies at a rate of 41.4% (4th research question). Those over the age of 45 are hopeful that this will happen as until now, based on their experience, they are disappointed with the existing climate of the Forest Service and have begun to trust the prospect of implementing green management in their Service. The X^2 test showed that this opinion is independent of gender and level of education, but is statistically significantly related to the region in which the respondents work ($X^2=70.897$, $df=44$, $a<0.01$), with the regions of Eastern Macedonia-Thrace, of Western Macedonia, Northern Aegean and Crete, to express themselves more positively in the above question.

Table 6. Green Management Human Resources and culture of organization (1=Very much..... 5=Not at all)

	N	Mean	Std. Deviation	Πάρα πολύ	Πολύ	Μέτρια	Λίγο	Καθόλου
1The congruence between individual values and the values of the Forest Service, has positive effects in the workplace of the employees.	232	2.36	0.965	12.5%	34.5%	30.2%	16.8%	6.0%
2. Green management can affect employee workplace outcomes through work climate in the Forest Service	232	2.66	0.959	7.3%	28.4%	37.9%	19.0%	7.3%
3. Green human resource management can satisfy Forest Service employees	232	2.66	0.939	11.6%	31.0%	40.5%	13.8%	3.0%
4. Practices in a green human resource management transition affect Forest Service performance through impact on employee workplace behavior	232	2.69	1.080	17.7%	44.4%	24.1%	12.1%	1.7%
5. Practices in a green human resource management transition affect Forest Service performance through impact on employee workplace behavior	232	2.77	1.027	8.2%	37.5%	38.4%	11.6%	4.3%
6. Green Management characteristics and practices determine the behavior of Forest Service employees	232	2.91	1.028	9.1%	32.3%	38.8%	12.5%	7.3%

5. CONCLUSION

From the presentation of the results, it appears that most forest officials do not know Green Management, while it is interesting that they associate it with the digitalization of the processes and organizational functions of the Forestry Service, which leads to a successful green transition that opens new paths of their development [5], [6] which is the objective of the European Green Deal.

Regarding the research hypotheses where the relationship between the culture of the organization and the culture of employee was analyzed, as well as the connection of Green Management with job satisfaction, it seems that forest employees accept this interaction to a very large extent. After all, according to previous researches [19], [18], [23], and [13], certain job characteristics can affect employees' satisfaction with their Service.

The behavior of employees in F.S., is largely connected and influenced by its organizational culture which refers to the values, beliefs, and behaviors of its employees according to the researchers [11], [12].

In addition, the individual values of the employees of F.S. have positive effects on employees' workplace, while employees' evaluation of their job characteristics is a critical factor influencing their work behavior.

Based on the results of the research, it is proven that Green Management is a fundamental strategic plan that improves the environmental performance of organizations, but also plays a vital role in improving the quality of some employees' work criteria, such as job satisfaction and psychological climate, [14], [15], [17], so it can be applied to the Forest Service of the country.

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Another key conclusion of this research is that the 84% of the staff of Forestry Services in Greece have ages between 46-65, and it is deemed imperative to renew the staff with capable people who will have the green culture needed to be able to lead F.S. in a proper green transition. Further research will be carried out in all the Forestry Services of the Country and will concern beyond Green Management and the digitization of forestry processes, with the main objective of how much these would serve the green growth but also the study of the green gap within the Forestry Service with an emphasis on the distance between the stated importance of environmental protection and actual behavior, in order to help the environment, as well as the lack of communication of goals within the Forest Service between employees and executives.

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SEA as an instrument for planning climate adaptation and mitigation in urban spaces

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Abstract

SEA (Strategic Environmental Assessment) for more than 20 years represents adequate controlling mechanism in urban planning. SEA is an instrument for evaluation of potential negative repercussions of urban development on environmental protection and human well-being and the determination of measures to prevent, minimize, mitigate, remediate or compensate harmful impacts on the environment and human health that certain activities in the environment can cause. Methodology of SEA aims to assess certain impacts that minor or major urban development could have on environmental quality and quality of life, as well as cultural and natural heritage and biodiversity. However, new environmentally-related problems have risen in the past 10 years, mainly oriented towards climate change, which represents a new unknown variable in the urban planning equation. It is of the utmost importance to observe and analyze how these climate-related circumstances reflect on urban development and how urban development affects climate change, on the other hand.

SEA has a new assignment to prepare a new set of goals and indicators that include climate-related issues and to evaluate its potential impacts on the environment.

Planning of urban development in uncertain conditions such as climate-sensitive environment must have large number of supported mechanisms. One of them is SEA, whose role is to define potential measures for overcoming climate change problems, through adaptation and mitigation guidance.

Aim of the SEA is first to identify all the goals and indicators (including those for climate adaptation and mitigation), and afterwards to evaluate urban planning solutions through MCDA (Multi Criteria Decision Analysis). Based on the expert's evaluation, SEA is proposing measures for transcending, neutralizing or decreasing all of the potential negative repercussions on the environment. Measures for climate adaptation and climate mitigation, in today's circumstances, represent the most important item in the recommendations, and the adequate placement of these measures has far-reaching consequences.

Based on the analysis of Action plans for mitigation and adaptation with SEA for two Serbian cities (Užice and Smederevo), this paper will present the importance of SEA not only as a controlling instrument, but also as a necessary pre-condition in all of the analysis conducted in urban planning.

This paper will give brief analysis and introduction of climate-related goals and indicators within SEA, process of evaluation of potential impact of urban development on those parameters, as well as proposal for measures for adaptation and mitigation. SEA can anticipate all of the planning solutions whose realization could have significant negative impact or cause serious conflicts in space in terms of climate change, and propose measures for its neutralization or reduction.

Keywords: SEA, urban planning, climate change adaptation, climate change mitigation, Serbian cities

1. INTRODUCTION

Climate change represents one of the most important challenges and huge urban development obstacles of the 21st century, profoundly impacting ecosystems, natural and cultural assets, societies, and economies on the world level. As global temperatures rise and extreme weather events become

more frequent and severe, the imperative for proactive adaptation and mitigation strategies in the urban areas intensifies. In this context, Strategic Environmental Assessment (SEA) emerges as a crucial tool and instrument for integrating environmental considerations into decision-making processes in urban planning, particularly within the framework of climate change adaptation and mitigation.

SEA, as a systematic, environmentally-based and participatory process, holds significant potential for enhancing the resilience of human and ecological systems to climate change impacts. By systematically evaluating the environmental consequences of proposed policies, plans, and programs, SEA enables stakeholders to identify and address potential risks, trade-offs, and synergies early in the decision-making process, and also enables perception of cumulative and synergetic effects of planning. Through its proactive approach, SEA facilitates the integration of climate change considerations into development initiatives, fostering more sustainable and climate-resilient urban planning solutions.

SEA is an instrument for evaluation of potential negative repercussions of urban development on environmental protection and human well-being and the determination of measures to prevent, minimise, mitigate, remediate or compensate for harmful impacts on the environment and human health that certain activities in the environment can cause. Methodology of SEA aims to assess certain impacts that minor or major urban development could have on environmental quality and quality of life, as well as cultural and natural heritage and biodiversity.

SEA makes a critical consideration of the environmental impact of all the foreseen activities, after which a decision is made whether to proceed with the implementation of those activities and under what conditions, or to abandon the planned activities.

Climate change problems have opened a new research field within standard multicriteria analysis in SEA, bringing new parameters in the environmental equation.

This paper explores the integrated role of SEA in advancing climate change adaptation and mitigation efforts, by integrating social-economic context and bio-physical segments of the environment into evaluation. Also, it represents instruments that can help to integrate the goals and principles of sustainable development in the decision-making process in urban planning, taking into account the need to avoid or limit negative impacts on the environment, health and socio-economic status of the population.

The importance of SEA is reflected in the fact that:

1. includes the aspect of sustainable development and response to climate change by addressing the causes of environmental problems at their source,
2. addresses issues and impacts of wider importance, which cannot be divided into projects, for example – cumulative, synergistic and social effects,
3. helps to check the feasibility of different variants of development concepts,
4. avoids the limitations that appear when the environmental impact assessment of an already defined project is carried out.
5. ensures the locational compatibility of the planned solutions from the environmental aspect,
6. determines the appropriate context for impact analysis of specific projects, including prior identification of issues and impacts that merit more detailed investigation, etc.

By synthesizing existing knowledge and highlighting best practices in Serbia through already adopted SEA (analysis of Action plans for mitigation and adaptation with SEA for two Serbian cities - Užice and Smederevo) [1], [2], this paper will present the importance of SEA not only as a controlling instrument, but also as a necessary pre-condition in all of the analysis conducted in urban planning. This paper will give brief analysis and introduction of climate-related goals and indicators within SEA, process of evaluation of potential impact of urban development on those parameters, as well as proposal for measures for adaptation and mitigation. SEA can anticipate all of the planning solutions

whose realization could have significant negative impact or cause serious conflicts in space in terms of climate change, and propose measures for its neutralization or reduction.

This paper also aims to inform policymakers and researchers about the potential benefits and challenges associated with integrating SEA into climate change adaptation and mitigation strategies and/or action plans [3], [4], [5]. By recognizing SEA as a critical enabler of climate resilience, more informed, inclusive, and effective approaches in urban planning could be achieved to addressing the complex challenges posed by climate change in the 21st century.

2. MATERIALS AND METHODS

In the past 15 years, CO₂ emission is rapidly increasing worldwide. Countries are striving to achieve goals set through Kyoto protocol in 1998 to the Paris Agreement in 2015 and COP 28 in Dubai, in terms of holding the increase in the global average temperature to well below 2°C above pre-industrial levels” and pursue efforts “to limit the temperature increase to 1.5°C above pre-industrial levels” [6], [7]. But the main problem is the fact that sometimes national and regional targets are not well coordinated with the international aims and goals, and are not evaluated through SEA in order to meet emission reduction obligations falling on the transport, energy, housing, agriculture, and forestry sectors [8].

Reducing the proportion and volume of greenhouse gas (GHG) emissions is crucial for mitigating the impact of human activities on climate change. GHGs, such as carbon dioxide, are the primary contributors to climate warming. Low-carbon development entails minimizing the release of carbon dioxide and other GHGs during economic advancement. Within this framework, adopting a new development model becomes imperative to address the adverse effects of carbon-based energy usage on climate warming. Such a model represents a positive progression, facilitating the transition from an era reliant on high-carbon energy to one characterized by low-carbon alternatives (Yong, et al., 2021). But, for designing and planning new urban development based on the risks of climate change has many obstacles which should be resolved by the implementation of multicriteria analysis of planning activities through SEA.

Serbia, as all of the other countries in Europe has severe problems with climate change adaptation and mitigation in the past 10 years. According to the vulnerability index developed by the University of Notre Dame, Serbia is ranked as 86. vulnerable country in the world and is the most vulnerable country in Europe [9]. This index includes a whole range of indicators, from the concentration of the urban population and preparedness for natural disasters to the availability of water and agricultural capacities. At the same time, Serbia is located in a territory called the "hot spot" of climate change: the increase in average temperature here is higher than the world average, and the incidence of extreme events such as droughts and intense precipitation is also higher. But this country, in which the ten warmest years from 1951 to the present day occurred after 2000, in which every year we record various unpleasant records in terms of temperature and precipitation, and which in the technological capacities of agriculture is in the rank of agriculturally impoverished countries such as are Afghanistan or Kenya - it is also one of the slowest in Europe when it comes to adopting basic strategic documents in the fight against climate change and its consequences [10].

However, the majority of Serbia's strategic and urban planning and design often overlooks the principles of low-carbon development and lacks effective assessment criteria and tools. Consequently, there is a deficiency in effective strategies and tools to incorporate low-carbon development objectives into the policymaking and decision-making processes, and to shift low-carbon development from mere policy into a guiding principle for social and economic endeavours.

Also, by the Paris Agreement, the Republic of Serbia has committed to reducing GHG emissions by 9.8% by 2030 compared to emissions in 1990. Serbia is also among the few countries that have emphasized the necessity of reducing risks, damages and losses from natural disasters and natural disasters. The Paris Agreement also defines requirements regarding adaptation to changed climate

conditions, financing, development and transfer of technologies for the period from 2021. It also calls for an increase in the ambition to reduce GHG emissions, which the states will submit to the secretariat of the Convention during 2020, emphasizing the establishment of a monitoring and reporting system as a key element to confirm the achievement of the goals to which the state has committed itself (in the case of the Republic of Serbia, a 9.8% reduction in emissions GHG).

In addition to the obligations that the Republic of Serbia has under the Convention and the Agreement, as a candidate country for EU membership, it also has certain obligations from the aspect of harmonizing national and EU legislation. Part of these obligations, especially in the areas leading to the reduction of GHG emissions, derives from membership in the Energy Community Agreement (EnZ). These obligations are significantly increased with the EU Green Deal, with which the EC showed a tendency to establish a carbon-neutral European continent by 2050.

Commitments from Paris agreement also obliged Serbian government to adopt strategies for the climate change mitigation and adaptation strategies and action plans on the national and local levels. Both strategies and action plans have to be followed by strategic environmental assessments.

Serbia has adopted Climate strategy/Low Carbon development strategy for period 2023-2030 with projection to 2050. with SEA in 2023 [11]. This document represents umbrella strategy for all action plans and strategies for the local self-government units in Serbia.

2.1. Pilot areas

Research into climate changes in Serbia is of particular importance considering its position between Mediterranean and continental climate conditions. A significant increase in air temperature in Serbia was observed in the 90s of the last centuries at most meteorological stations.

The duration of heat waves and their frequency are particularly important in the analysis of the risk of high temperatures and the threat to the eco-system, economy and human health. On average for the last 10 years, there were more than 20 days of heat waves in one year. An increase of more than 30 days was observed in western and central Serbia. In the period 2008-2017, the average number of extreme heat waves increased by 2-3 per year compared to the reference period, with the highest frequency of occurrence in western and southwestern Serbia, where the increase is over 4.

In Serbia, there has been an increase in the intensity of heavy rainfall, with more pronounced changes during the last decade. The number of days with very heavy precipitation has increased by 1-2 times on average. However, the frequency of more extreme weather events, days with precipitation over 40 mm, in certain parts of Serbia increased by more than 5 times compared to the reference period. During the year, the maximum daily values of eight-hour accumulated precipitation increased in most parts of the country by over 5% (in some parts even over 10%).

Having in mind all the changes in climate parameters, Serbia has started to developing local action plans for climate change adaptation and mitigation, in accordance with the national strategy.

The "Cities and Climate Change" program, implemented by the Ministry of Environmental Protection and financed by the French Development Agency, supported the Government of Serbia in its efforts for more sustainable green growth and urban development. This program, which began with the entry into force of the Law on Climate Change ("Official Gazette of RS" No. 26/2021) [11], aims to strengthen initiatives for adaptation and mitigation of climate change at the national and local level in Serbia. The first two pilot areas where action plans were developed were the city of Smederevo (climate adaptation plan) and the city of Užice (climate mitigation plan) [1], [2].

City of Smederevo is located in Podunavlje District in eastern Serbia. The is bordered by the Danube river on the north, the Velika Morava River on the east, and the Sumadija hills to the south and west. It is located at the intersection of the Pan-European Railway, the international E-75 highway Corridor 10 (connecting Budapest, Belgrade, Nis, Thessalonica, and Athens) and on the most attractive part of the Danube riverbank: the international Corridor 7. Smederevo is known as a large industrial centre. The industrial plants present in the city and its outskirts generate significant impacts on resource

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consumption (water and electricity consumption), and water and air quality. Since 2011, the air of the Smederevo agglomeration constantly belongs to the III category “excessively polluted air”, and concerns are raised about the quality of the Danube river, following excessive discharge from industrial plants directly into the watercourse. In addition to direct human impacts cause by the economic activities, Smederevo is affected to impacts of climate change and related increasing weather extremes and disasters like heated waves, droughts, high precipitation, landslides, fires, etc. For the purpose of Climate Adaptation plan of Smederevo, several analysis and predictions have been conducted, namely: future temperature and precipitation change, future change of relevant climate indices, as well as local vulnerability of population, urban services and infrastructure, social infrastructure, economy, water resources and quality, agriculture, forests, ecosystems and biodiversity. Near past climatic vulnerability was defined through all of these factors.

		VULNERABILITY						
		Temperature Change	Heat wave	Extreme cold	Drought	Precipitation Regime Change	Floods	Storms
Urban services								
Built Environment								
	Housing /Building stock	Low	Medium	Medium	Low	High	Very high	Medium
	Urban functionality	Low	Medium	Low	Low	High	Very high	Medium
Urban Infrastructure								
	Transport	Low	Low	Low	Low	Medium	High	Medium
	Electricity and heat supply	Medium	Medium	Medium	Low	Medium	Medium	Medium
	Water supply, wastewater management, drainage and flood protection	High	Very high	Very high	Medium	Very high	Very High	Medium
Social infrastructure								
		Medium	Medium	Medium	Low	Medium	Medium	Medium
Urban Green Areas								
		Medium	High	High	High	Medium	Medium	High

Table 1. Near past climatic vulnerability of Smederevo (urban parameters)

Source: [1]

On the other hand, city of Užice is located in Western Serbia, close to the border with Bosnia and Herzegovina, about 180 km southwest from Belgrade. Užice is the administrative centre of Zlatibor district, and it is a cultural, social and economic centre of south-west Serbia. The industrialization and urbanization of Užice after the Second World War increased levels of pollutant emissions from all sources and contributed to pollution and environmental degradation. The increase in air and water pollution was caused by outdated technologies in industry, poor plant maintenance, and poor quality energy sources, outdated vehicle fleet in traffic, stagnation in the development of infrastructure, extensive illegal construction, poor solid waste management and other problems. Air quality in Užice has been monitored for more than 20 years. Its specific location in Đetinja valley, surrounded by mountains on all sides is causing severe air pollution for almost 30 years. For the preparation of the Climate Change Mitigation Plan in Užice, an inventory of greenhouse gas emissions was prepared at the city level, using 2019 as the base year. This inventory complies with the Global Protocol for Community-Based Greenhouse Gas Inventories (GPC). The GPC standard was developed by C40, the World Resources Institute and ICLEI. It offers a robust framework, which ensures consistent and transparent measurement and reporting of GHG emissions at the city level, in accordance with internationally recognized GHG accounting principles.

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So far, the impact of burning fossil fuels in boiler rooms for district heating, the consumption of other fossil fuels in public buildings and the burning of natural gas in individual boiler rooms in the residential and commercial sectors located within the City has been quantified.

Sector	Total by scope (tCO ₂ e)				Total by city induced reporting level (tCO ₂ e)		Biogenic Emissions (tCO ₂ e b)
	Scope 1	Scope 2	Scope 3 included in BASIC/BASIC+	Other Scope 3	BASIC	BASIC+	
Stationary Energy Energy use (all I but I.4.4) Energy generation supplied to the GRID	44 152	127 486			171 639		72 280
	-						
Transportation All II Emissions	70 218	-	-		70 218		-
Waste Generated in the City Generated outside the city	22 452				22 452		-
	65 648						
IPPU All IV emissions	-						
AFOLU All V Emissions	-						
Sub Total	202 470	127 486	-	-	264 308	-	72 280
Total	329 956						

Table 2. GHG emissions of Užice by sector and scope

Source: [2]

2.2. MCDA analysis for Action plans – used methodology

Action plans for adaptation and mitigation in cities of Smederevo and Užice demanded realization of strategic environmental assessment, not only by the force of law, but also because SEA is a instrument for timely and systematic consideration of possible environmental impacts at the level of strategic decision-making on plans and programs, respecting the principles of sustainable development. The most common expert methods used in the practice of strategic assessment are checklists and questionnaires, matrices, multicriteria analysis, spatial analysis, SWOT analysis, Delphi method, environmental capacity assessment, cause-and-effect chain analysis, vulnerability assessment , risk assessment, etc. As a result of the application of any method, matrices and graphs appear that examine the changes in space and environment that would be implied by the implementation of the plan and the selected variants [4]. Charts and matrices are formed by establishing the relationship between plan objectives, plan solutions and strategic assessment objectives with associated indicators [4], [5].

Methodology used within these SEAs was introduced within scientific project of Institute of Architecture and Urban&Spatial planning of Serbia "Methods for strategic environmental assessment in planning the spatial development of lignite basins", and patented by the name „Methodology for SEA plans, programs and strategies on the environment - method of multi-criteria evaluation" authored by Dr. Božidar Stojanović, Dr. Boško Josimović and Dr. Tamara Maričić, registered within The Intellectual Property Office of the Republic of Serbia N° A-336/2021. In preparation of the strategic environmental assessment for the action plans of adaptation and mitigation, a model of multi-criteria qualitative expert evaluation of planning solutions (strategic goals of the Action Plan) was applied in relation to the defined special goals of the strategic assessment and associated indicators of sustainable development. The method of displaying possible impacts using graphs enables a clear insight into the positive and negative impacts of each individual planning solution, which is of particular importance in the context of the participation of interested authorities, organizations and the public. The applied methodology is based on the qualitative evaluation of the environment in the planning area, and its immediate and wider environment, which served as a basis for the valorisation of the space for further sustainable development and planning. In terms of general methodological principles, the strategic environmental assessment has identified: baseline scenario

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and assessment of the current state of the environment, qualitative and quantitative assessment of possible impacts that planned activities can have on basic environmental parameters, and in conclusion - proposal of measures for improvement of environmental parameters and monitoring measures. There are several important criteria that have to be taken into account within MCDA analysis for assessment of the plans concerning climate change adaptation and mitigation (given within table 2,3,4)

Size of impact	Label	Description
Critical	- 3	It overloads the capacity of the space
Bigger	- 2	It damages the environment to a greater extent
Smaller	- 1	It damages the environment to a lesser extent
No impact	0	No impact on the environment
Positive	+ 1	Less positive changes in the environment
Favorable	+ 2	Favorable changes in the quality of the environment
Very favorable	+ 3	Changes significantly improve the quality of life

Table 3 . Criteria for evaluating the size of the impact

Significance of influence	Label	Description
Regional	R	Possible regional impact
Municipal	C	Possible impact on the City area
Local	L	Possible influence of local character

Table 4. Criteria for evaluating the spatial scales of possible impacts

Probability	Label	Description
100%	S	Certain impact
more than 50%	V	Impact likely to be happen
less than 50%	M	Possible impact

Table 3.3 . Impact Probability Rating Scale

Based on these criteria, as well as on proposed general and specific objectives and indicators of SEA (Protection and preservation of water quality, Reduce the level of harmful substances in the air, Protection and sustainable use of agricultural land, Protection and preservation of natural assets of biodiversity and geodiversity, Protection of population and human health, Protection of cultural heritage and Socio-economic development with associated indicators), planning activities have been evaluated within MCDA – expert evaluation.

3. RESULTS

3.1. SEA Smederevo

A local climate change adaptation plan seeks to proactively prepare the city for both the negative impacts (thus reducing the adverse outcomes of climate change) and, at the same time, explore the potential opportunities that will occur as a result of changed climatic conditions. It is important to understand that successful adaptation does not mean that negative impacts caused by climate change will not occur, but that they will be less severe than in the case that no adaptation to climate change has been implemented. Since the Action plan has proposed several strategic goals (Strengthening the resilience of public health services and infrastructure to changing climatic conditions, Urban planning and construction based on the vulnerability of urban space from the harmful effects of changed climatic conditions, Protection against the harmful effects of water, Providing sufficient amounts of water, Encouraging and promoting good agricultural practices that reduce the vulnerability of agricultural production to changed climatic conditions, Encouraging and promoting good agricultural practices that reduce the vulnerability of agricultural production to changed climatic conditions, Development of urban green infrastructure, Strengthening the institutional, managerial and financial

capacities of the local self-government of Smederevo and the local community for adapting to the changed climatic conditions), the aim of the SEA was to evaluate any potential negative impact that these goals could have on the environment and climate. Evaluation was conducted through matrices that combine the impact strength with the possibilities of their occurrence as well as the probability of the impact, provided in the table 6.

Adaptation measure	The rank of influence in relation to the objectives of the SEA									Impact rationale	
	1	2	3	4	5	6	7	8	9		
Reducing the impact of heat load due to the effects of weather extremes on public health		+1LMD				+3CSD		+3CSD			This adaptation measure can show low positive possible long term impact on reducing the populations' exposure to harmful substances from the air and higher positive impact on the city level to protection and preservation of human health, quality of life and improvement of information as well as on accident protection
Strengthening existing and developing and implementing new services in the health system of Smederevo						+3CSD					Greater long-term positive impacts of the city character on the protection and preservation of human health quality of life and improvement of information

Table 6. Example of evaluation of two adaptation goals within matrix

Source: [1]

Having in mind all of the evaluated impacts of adaptation measures on the environment and elements of sustainable development, it can be concluded that the negative impacts are almost non-existent and may appear only in the area of urban design. Even in that case and for that adaptation measure, the possibility of a negative impact is very low, taking into account that during the adaptation of the buildings, all precautionary measures will be taken into account for the possible impact of the adaptation on cultural and historical assets. On the contrary, all other planned activities will have strong positive impacts of a local and/or city character on the improvement of ecological condition of the city, as well as human health and well-being. All the above statements are expected considering the concept of the Action Plan, which is based precisely on the protection of space and the preservation and improvement of the quality of the environment and citizens' health.

3.2. SEA Užice

The Climate Change Mitigation Action Plan for Užice provides the Inventory of GHG emissions for the City of Užice, with GPC methodology, emissions calculation, calculations by GHG emission sources and GHG inventory for the City of Užice. Action plans represents the method of "how the city will meet its commitment to address climate change". Action plan has identified the sectors that emit the most GHG emissions (GHG Inventory), the goal to ensure a more emission-neutral city and developed a pathway to achieving these goals through mitigation actions. Similar as the Action plan for Smederevo, this action plan has proposed mitigation goals (Energy efficiency measures in public buildings, Renewable energy, Improvement of the district heating system, Development of active mobility, Promoting recycling, Spreading public awareness) which were evaluated through proposed goals of SEA. Withing MCDA all those goals where assessed and the results were elaborated in the matrix (Table 7).

Planning solutions	The rank of influence in relation to the objectives of the SEA									Impact rationale	
	1	2	3	4	5	6	7	8	9		
Reconstruction and improvement of energy efficiency		+3LSD			+1LMD	+3LSD	-1LMD			+1LMD	Greater positive impacts of a local nature on reducing the population's exposure to harmful substances from the air are possible, as well as certain greater impacts at the local level on the protection of the population and the preservation of human health and the improvement of information about environmental protection. In addition, minor negative long-term impacts of a local type on the preservation of cultural heritage are also possible due to potential interventions on the facades of buildings.
Thermal insulation of public buildings						+3LSD	-1LMD			+3LMD	Greater long-term positive impacts of the local character on the protection and preservation of human health and smaller negative long-term impacts of the local character on the preservation of cultural heritage due to potential interventions on the facades of buildings are expected. A special contribution relates to the creation of conditions for the economic development of the entire city area

Table 7. Example of evaluation of two mitigation goals within matrix

Source: [2]

Summarizing the impact of the plan on the environment and elements of sustainable development, it can be concluded that the negative impacts are extremely few and that they occur only in activities related to the reconstruction and improvement of energy efficiency and thermal insulation of public buildings. These activities may have less negative long-term impacts of a local type on the preservation of cultural heritage due to potential interventions on the facades of buildings, which can be reduced or neutralized by careful design and installation of insulation on public buildings and compliance with the conditions of the competent institutes for the protection of cultural monuments. Climate change mitigation measures and monitoring were proposed based on the results of the evaluation of planned activities in order to improve current state of climate factors in Serbia. Measures were divided and oriented towards protection of air quality, noise, water, soil and life and health of the citizens.

4. CONCLUSION

Integrating Sustainable Environmental Assessment (SEA) into urban planning represents powerful tool for confronting climate change challenges in urban spaces. By systematically assessing environmental impacts and considering climate adaptation and mitigation measures from the planning stage, SEA facilitates the creation of resilient and sustainable cities. Through SEA, urban planners can identify opportunities to enhance green infrastructure, reduce emissions, and promote sustainable development, ultimately fostering livable and climate-resilient urban environments for present and future generations. However, effective implementation requires collaboration among stakeholders, robust data collection, and ongoing monitoring and evaluation to ensure that urban spaces truly adapt and mitigate the effects of climate change. At the local level, the development of SEA will help local authorities to: integrate climate issues and challenges in relation to their future development plans (spatial plan, socio-economic profile), gain awareness of how climate change can affect their territory, define a path that supports climate transition by focusing on either adaptation measures or mitigation measures, link this ambition with actions (soft or hard) that should be implemented in the short and medium term, and determine the priorities of actions for planning future investments at the local level. Smederevo and Užice specialized technical assistance aimed at identifying priority needs and projects for climate change adaptation and mitigation. Developing local climate action plans will not only enhance environmental quality and optimize natural resource usage but also consider the unique urban and socio-economic characteristics of these cities/municipalities. The formulation of these plans presents an opportunity for local governments in Serbia, alongside their stakeholders and communities, to take ownership in defining and implementing local strategies for climate change adaptation. It provides cities with a chance to address climate-related challenges and chart their course towards ecological and climate resilience, benefiting not only the cities themselves but society at

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large. Additionally, this effort will bolster the contribution of Serbian cities to both the national climate change agenda and the broader green agenda.

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Evaluating the microclimate and thermal comfort of two urban areas in Athens on the basis of current and future climatic conditions

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Abstract

Climate change has a significant impact on the urban built environment, in view of both the increased probability of dealing with extreme weather effects but also in terms of outdoor and indoor thermal comfort conditions as well as the energy behavior of urban building stocks. Hence, climate change may lead to a slight reduction in heating energy requirements of buildings but, as the literature indicates, it can severely exacerbate cooling energy needs, influencing peak energy demand, energy generation and energy supply. In this context, this paper reports on the initial stages of the Re.Nature Cities research project, namely the assessment of the microclimatic conditions prevailing in two urban districts in the city of Athens, on the basis of current and estimated climate change conditions. The results indicate a significant increase in air Temperature by approximately 10%, for the period 2040-2060, which stabilizes towards the end of the 21st century (2080-2099), with an average Tair rise up to 2%.

Keywords: urban microclimate; ENVI-met; dynamic microclimate simulation; vegetation; NBS.

1. INTRODUCTION

Due to the ever-growing rates of urbanization, at least 55% of the global population resides in urban areas, with the United Nations predicting that this percentage will reach 68% by 2050 (UN, 2018). In Europe, in particular, this value is expected to reach 80% within the same timeframe (EC, 2020), (UN-Habitat, n.d.). Furthermore, considering both global warming due to climate change and the development of urban heat island (UHI) effect (Kolokotsa, et al., 2022), cities suffer the most from an ever-growing rise of temperatures, especially in the summer. In the case of Europe, the Mediterranean region presents the greatest level of vulnerability due to the local climatic conditions as well as the cities' morphology. Dense construction, impervious materials, limited evapotranspiration potential due to absence of natural elements as well as the intense human activity exacerbate the impacts of climate change and intensify UHI effect (Taha, 2004), further increasing the air temperature and resulting to high energy demand for cooling. Given the fact that this energy is covered by electricity that is mostly generated by fossil fuels, the result is a high amount of greenhouse gas (GHG) emissions that have an adverse effect on the atmosphere and climate. Cities are particularly susceptible to the impacts of climate change, due to incoherent and compact spatial design, which lead to (i) a limited capacity of dense urban communities for the development of holistic mitigation strategies, (ii) poor living conditions and (iii) to increased vulnerability of cities to extreme weather events (IPCC, 2022). Nevertheless, cities present the greatest improvement potential as well; thus, local authorities are more efficient in implementing mitigation measures, especially when aligned with other bodies at national and regional level. Hence, bottom-up approaches, based on extrapolated analyses from neighborhood -, to city -, to regional - scale, enables the targeted development of holistic, tailor-cut action plans and policies, whilst ensuring their efficient

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implementation. These concepts allow for enhanced positive outcomes on a larger scale of influence, resulting in higher measured impacts. Against this background, over the past two decades, cities have been surpassing ambitions to achieve sustainability goals, while the IPCC warns that existing national contributions are insufficient (EC, n.d.). In addition, the ever-growing urbanization and climate change will continue to increase in the future, leading to severe impacts in urban areas. Hence, the dedicated analysis of existing climatic conditions and future projections in urban environments is of vital importance so as to understand and predict the impacts of climate change, enabling the design of holistic solutions for the development and monitoring of mitigation and adaptation strategies.

The impact of climate change can be assessed based on the future projection, developed by the United Nation in the Third Assessment Report (IPCC, 2001). This projection, expressed in specific forecasting scenarios, known as Representative Concentration Pathways (RCPs), outline different trajectories of greenhouse gas emissions and their potential impacts on the climate system. RCPs range from lower emission scenarios, such as RCP2.6, involving significant reductions in emissions, to moderate scenarios like RCP4.5. The latter represents a moderate emissions pathway, with greenhouse gas concentrations stabilizing by the end of the 21st century. RCPs also include higher emission scenarios like RCP8.5, where emissions continue to rise rapidly throughout the 21st century. Each RCP provides valuable insights into potential future climate conditions, supporting policymakers and researchers to better assess the range of mitigation and adaptation potential and plan sustainable strategies.

In this context, the aim of this study is to evaluate the impacts of climate change on two typical urban districts in the city of Athens, analyze the changes affecting the urban microclimate and produce data as well as conclusions that will serve as a basis for the Re.Nature Cities research project. The selection of the study areas, based on the LCZ classification, further contributes to the understanding of how urban morphology affects microclimate under different climatic conditions. Hence, the study examines the potential for implementing these results in other areas with similar morphological and climatic characteristics to better assess the impact of climate change in urban built environments.

2. MATERIALS AND METHODS

The methodology includes the assessment of the microclimate of two study areas under the current and future climatic conditions with the use of ENVI-met tool. The process involves three main steps: first, the identification of the target areas to ensure a focused analysis; secondly, the generation of the climatic data based on the areas' specific locations for the current conditions and the future projection of climate change and finally, simulations within the 3D environment of the ENVI-met microclimate model.

2.1 Microclimate assessment tool: ENVI-met

For the assessment of the microclimatic conditions of the selected areas, ENVI-met V.5 was used that simulates the interactions between the atmosphere, the surface and the vegetation. ENVI-met is a three-dimensional, non-hydrostatic, prognostic model that simulates surface-plant-air interactions based on fundamental laws of fluid dynamics and thermodynamics with a typical resolution of 0.5 m in space and 1-5 sec. in time (ENVI-met, 2024) (Bruce & Fler, 1998). ENVI-met has been validated with field experimental measurements by several researchers (Tsoka, Tsikaloudaki, & Theodosiou, Analyzing the ENVI-met microclimate model's performance and assessing cool materials and urban vegetation applications—A review, 2018); Existing deviations between measured and calculated data are a result of a) the model's simplification of specific parameters and calculations such as the static cloud coverage and wind speed, and b) user's input simplifications such as the selection of one typical tree type, SR overestimation or the obtain of weather data by nearby stations and not from the specific weather location (2021) (2023).

2.2 Study areas

The study areas are located in the city of Athens, Greece. The climate of the city is Mediterranean (Köppen climate classification: Csa), generally characterized by hot, dry summers, mild, wet winters and evenly distributed rainfall throughout the year. During the winter months, the average daily temperatures close to 9.03 °C with the coldest month being January. In summer, the mean high and low Tair values are between 31.83 °C and 21.27 °C respectively, with the recorded maximum air temperatures of the last decades rarely exceeding 40 °C. July is the warmest month of the year with Tair averages of 27.7 °C (Climate Data, 2024). The selection of the areas was made on the basis of the Local Climate Zones (LCZ) classification of Agathangelidis, Cartalis and Santamouris (2020) and the main selection criteria included the existing vegetation, the topography and the streets' orientation. The two selected areas represent typical samples of LCZ2 and LCZ3 classes, characterized by limited vegetated areas, narrow streets adjacent to a crowded highway and densely built environment with adjacent multifamily buildings. Both areas have uniform flat topography and orthogonal street and building block organization to ensure optimal adaptation to the 3D environment of the assessment tool and minimal deviations during their standardization. The existing vegetation is limited to sparse low vegetation and small to medium trees across sidewalks, with the predominant species being bitter orange trees. The investigated sites are the same size, 200x150m (30,000 m²) and represent different geometrical and morphological characteristics (i.e., building surface density, height/width ratio (H/W) of the street canyons, etc.) which correspond to the LCZ2 and LCZ3 categories. For the sake of clarity, each area is named after its classification, LCZ2 and LCZ3 (see Figures 1, 2)

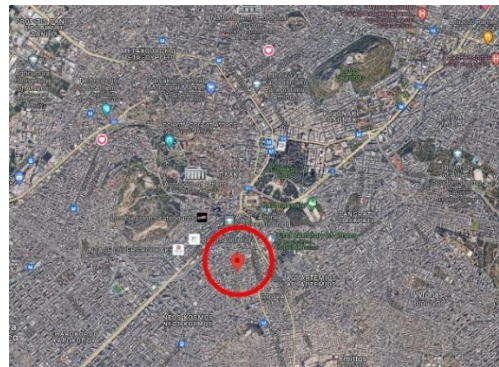


Figure 52 LCZ2 study area and its location in the greater city center of Athens

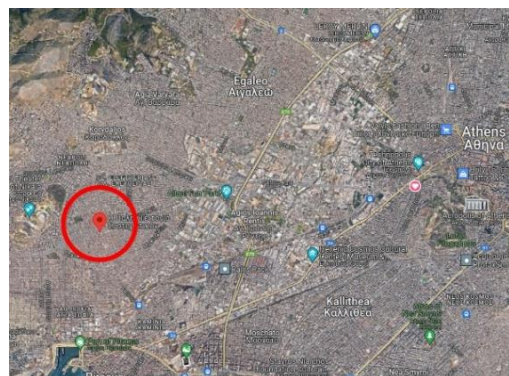
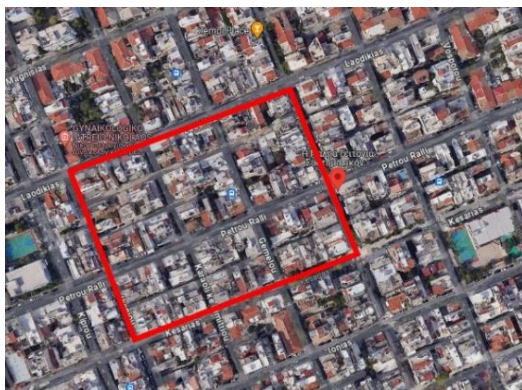


Figure 2 LCZ3 study area and its location in the greater city center of Athens

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2.3 Definition of simulation days and climatic data generation

Due to the high temporal resolution of microclimate analysis, simulations are generally conducted on a daily basis; this study focused on the summer period, when the impacts of climate change in the studied areas are at their peak. The simulations took place on a typical summer day, for the month of July and for a reference period 1980-2000 (Scenario 1) and future periods 2040-2060 (Scenario 2), 2080-2099 (Scenario 3). The climatic parameters were derived by Velikou (2021) and include high-resolution climatic data, issued by the up-to-date, dynamic regional climate model RegCM4.

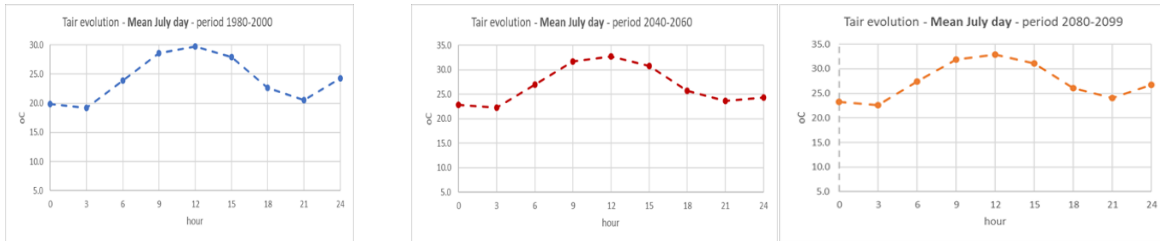


Figure 3 Tair evolution for the typical summer day for the reference (Scenario 1) and the 2 future periods (Scenario 2 & Scenario 3), for the LCZ2 case study area

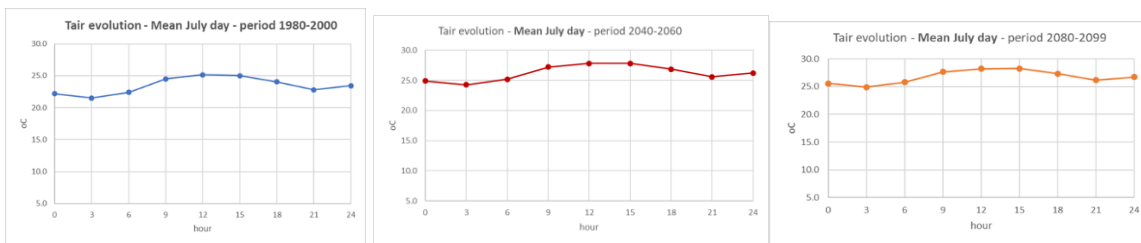


Figure 4 Tair evolution for the typical summer day for the reference (Scenario 1) and the 2 future periods (Scenario 2 & Scenario 3), for the LCZ3 case study area

For future projections the model is using RCP4.5 scenario corresponding to an intermediate pathway with no exceedance of radiative forcing at a stabilizations level of ~ 4.5 W/m². The main physics configurations of the model are described in detail in the study of Velikou et al. (2019). For the purposes of this study, three meteorological parameters are utilized for two selected grid points (the closest to the examined case study areas). The data includes air temperature (°C), relative humidity (%) and wind speed (m/s). The output weather files have a 3-hour temporal resolution. Additionally, the 3-hourly mean data over each 20-year period are calculated and based on the latter output, the typical simulation days are defined. These parameters will comprise the input boundary conditions for the ENVI-met microclimate simulations and will be incorporated within the model through the simple forcing model. The Tair evolution during the typical July day for the reference and the future periods, for both study areas, that have been used as an input boundary condition in the ENVI-met microclimate simulations is shown in Figure 3 and Figure 4.

2.4 Modeling description

For setting up the area in the three-dimensional space of ENVI-met, the basic morphological parameters were defined including building heights, environmental materials, their thermophysical characteristics, area dimensions, cell sizes, etc. The selected sites were adjusted to a standard area of 200x150m accounting for a total surface area of 30.000 m². Based on each areas' footprint, as retrieved from Google Earth. The areas were normalized into an orthonormal grid, with the width of the roads ranging between 7.5 to 10, including sidewalks. The floor height of the ground floor is 4 m.

and of a typical floor 3 m. Existing floor setbacks on higher building floors, as well as staircase upper edge rooms on the roofs were also considered. For the x and y axis a resolution of 2,5 m. was selected, and the model was created on the basis of 60x80 grids. On the z axis, the number of cells was set to 20 with a 3 m. resolution. Six nesting grids were assigned to the model, that surround the main area to reduce the boundary effects and assure the model’s stability. The assigned material of nesting grids is asphalt road, as a most representative material found in the main area. 5 and Figure include the buildings elements, position of trees and numbering of the street canyons. The simulation configuration inputs are included in Table . The physical properties of the materials and ground surfaces and the assigned construction and soil profiles are presented in Table . The materials’ values reflect the construction period of the buildings, dated between 1970-1980.

The geometry and foliage characteristics of the modeled plants are designed in ENVI-met’s “Albero” tool. For this study, Citrus Aurantium (bitter orange) evergreen tree species was selected as the main tree type for both study areas. LAD value was defined as 2 m²/m³ to correspond to the tree’s dense crown. The tree height is 4.5 m. and the crown diameter 3 m. These values correspond to mature trees based on field study and relevant measurements that are reported in the existing literature (Tsoka, Evaluating the Impact of Urban Microclimate on Buildings’ Heating and Cooling Energy Demand Using a Co-Simulation Approach, 2023). Finally, the model initialization parameters are included in Table .

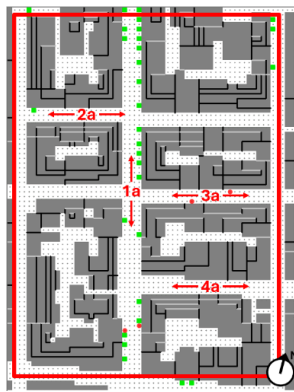


Figure 5 LCZ 2 Study area 3D model

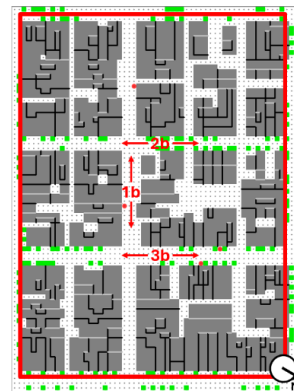


Figure 6 LCZ3 Study area 3D model

Table 1 Model setup data

Model Specifications/Parameters	LC22	LC3
Simulation Model Size (m)	150x200x60	150x200x60
Model Area (Number of Grids) xyz-Grids	60x80x20	60x80x20
Size of grid cell (m) dx, y, z	2,5x2,5x3	2,5x2,5x3
Geographic Location	37.961923, 23.731105	37.968133, 23.645241
Nesting grids	6	6
Reference time zone	GMT+2	GMT+2
Model rotation out of grid north	346°	248°

Table 2 Thermal and optical properties of the building envelope and ground surface materials, wall/roof constructions and soil profiles

Wall/Roof Materials						
Name	Default Brick: burned	Default Plaster	Default Ferroconcrete	Cement Mortar	Concrete tiles	Roofing: tile
Default thickness (m)	0,19	0,01	0,15	0,02	0,035	0,03

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Thermal conductivity (W/m*K)	0,51	0,87	2,5	1,4	1,5	1
Reflection (Frac.)	-	0,4	-	0,3	0,3	0,3
Soils/Ground Materials						
Name	Asphalt (with Basalt)	Cement Concrete: tiles	Loam			
Thermal conductivity (W/m*K)	0,7	1,5	1,45			
Reflection (Frac.)	0,12	0,3	0,2			
Soil Profiles						
Name	Asphalt road	Concrete pavement gray	Loamy Soil			
Albedo	0.12	0.3	0.2			

Table 3 Model initialization parameters and meteorological input boundary conditions

Parameters	Values
Simulation duration	24h
Start time	00:00
Timestep (min)	60
Mean wind speed at 10m above ground	Average monthly data from Velikou
Prevailing wind direction	N (0°)
Roughness length of the site	0.1*
Air temperature forcing	Average hourly data from Velikou
Relative humidity forcing	Average hourly data from Velikou
Cloud coverage	0, No clouds
Specific humidity at 2500m	8g/kg*
Adjustment factor for solar radiation	1
Soil upper layers initial temperature	20 °C*
Soil upper layers moisture content	65% - 75%*

*ENVI-met default values

3. RESULTS – DISCUSSION

The research focuses on the hottest summer period, when the effects of rising temperatures are most evident. The examined climatic parameters involve air temperature (T_{air}), mean radiant temperature (T_{mrt}) and surface temperature (T_{surf}). Here, T_{air} maps at a height of 1.5m above ground level are presented to assess the impacts at the level where human activity develops. The projected T_{air} , during noon (12:00) and afternoon (18:00), for LCZ2 and LCZ3, for Scenario 1, 2 and 3 (i.e. reference and the 2 future periods), is presented in Figure 9 to Figure 10. Based on the results, the average temperature across the entire LCZ2 area during midday ranges from 27.37°C to 33.91°C. The highest temperatures are found in unshaded areas, specifically in canyon 1 (refer to Figure 5), crossing transversely the area with a N-S orientation. In the afternoon, at 18:00, the average T_{air} drops significantly, with a decrease of 7.48°C compared to noon. The lowest value is 24.72°C and the highest at 26.42°C. The central street cools relatively quickly in the afternoon, given the dominant wind speed being North. Higher afternoon temperatures persist in street canyons 2 and 3, oriented towards E-W, that benefit less from natural ventilation. Temperatures in the enclosed backyards of the building blocks remain lower than average throughout the day, likely due to the intense shading from surrounding buildings that block large amounts of solar radiation from insert.

Similarly, in LCZ3 for the reference period (1980-2000), an analogous temperature pattern is observed, with the highest temperatures in streets 3 and 2, which have a NS orientation receiving higher amounts of solar radiation during the sun's peak position. The average temperature of the area

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at midday is 28.7°C, with the maximum reaching 31.07°C. LCZ3 is slightly cooler than LCZ2 (by 2.11°C on average), primarily due to (i) the local climatic variations of the areas, as calculated by Velikou [16], (ii) the increase vegetation cover in LCZ3 that shades larger portion of the ground surfaces and cools the area through evapotranspiration, (iii) the lower building heights allowing the wind to insert the lower layers of the area and enhance natural ventilation. In the afternoon Tair values vary between 25.39°C and 27.07°C. In both cases, air temperature at midday shows higher variability compared to the afternoon, where temperature distribution is more uniform. The temperature range at noon exhibits a larger spread compared to 18:00 pm, suggesting greater variability and the possibility of more extreme conditions during the midday period.

Looking ahead to future projections, both scenarios forecast a substantial rise in temperatures between 2040 and 2060 (Scenario 2). However, the rate of increase is expected to decelerate during the period from 2080 to 2099, aligning with the RCP4.5 scenario. In the case of LCZ2, the average temperature ranges between 29.84°C (+2.46°C) and 36.69°C (+2.76°C) at midday and between 27.26°C (+2.53°C) and 29.29°C (+2.87°C) in the afternoon. Similarly, in LCZ3, midday temperatures range between 28.62°C (+2.52°C) and 33.53°C (+2.46°C), and afternoon temperatures range between 28.06°C (+2.67°C) and 29.71°C (+2.64°C). The average temperature increase in both cases reaches approximately 10%.

For the third period, 2080-2099 (Scenario 3), at midday, the average temperature ranges between 30.09°C (+0.25°C) and 36.97°C (+0.28°C) for LCZ2 and between 29.07°C (+0.45°C) and 34.04°C (+0.50°C) for LCZ3. In the afternoon, these values range between 27.58°C (+0.32°C) and 29.64°C (+0.35°C) for LCZ2 and between 28.52°C (+0.47°C) and 30.16°C (+0.45°C) for LCZ3. The average temperature increase in both cases does not exceed 2%, with the temperature rise stabilizing by the end of 21st century.

The analysis of the results also indicated that the Mean Radiant Temperature (Tmrt), remains high during noon and afternoon hours in both areas. A significant reduction is only observed in areas with vegetation cover and shaded locations. The existing trees, due to their limited number and size, fail to reduce Tmrt values beyond the area covered by their crowns. In certain areas, particularly along streets 2, 3, and 4 in LCZ2, and street 1 in LCZ3, temperatures can reach as high as 70°C, especially where vegetation is scarce or non-existent. In the remaining streets canyons, the cooling impact of trees is negligible.

During the afternoon, the mean radiant temperature (Tmrt) stays relatively high due to the urban heat island (UHI) effect and the high thermal mass of urban materials. These materials absorb heat throughout the day and release it back into the surroundings in the late evening. Future projections indicate that average Tmrt values are expected to rise by 9% in LCZ2 and 7% in LCZ3. Additionally, the range of Tmrt values decreases in Scenarios 2 and 3, suggesting that higher temperatures will affect a larger portion of the areas rather than being isolated occurrences. Finally, ground surface temperature exhibits a similar trend to Tmrt. The study of the areas in vertical sections highlights the extent of the phenomenon at higher elevations within the city. As shown in Figure 11, the temperature increase in LCZ2 affects both the ground level and upper levels where buildings are present, extending 12 meters beyond the highest built volume. The highest intensity of the temperature rise is observed at the lower level, accompanied by high surface temperatures and high Tmrt values. Similar findings are observed in LCZ3.

a)

b)

c)

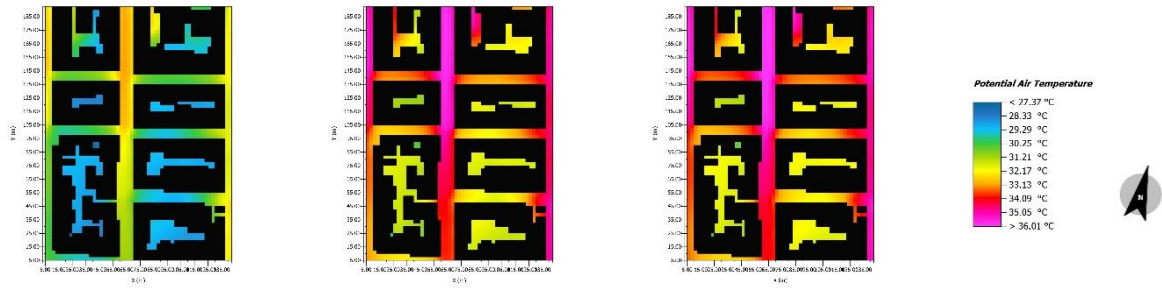


Figure 7 LCZ2, Air Temperature, at 12:00, for Scenario 1 (a), Scenario 2(b), Scenario 3(c)

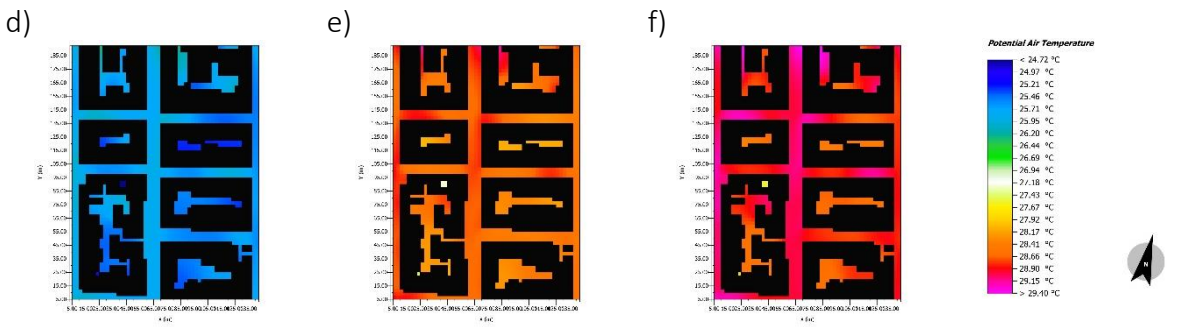


Figure 8 LCZ2, Air Temperature, at 18:00, for Scenario 1 (d), Scenario 2(e), Scenario 3(f)

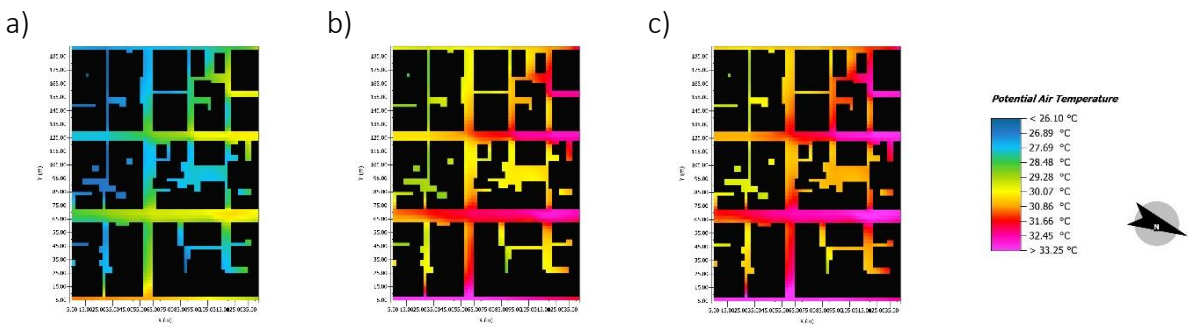


Figure 9 LCZ3, Air Temperature, at 12:00, for Scenario 1 (a), Scenario 2(b), Scenario 3(c)

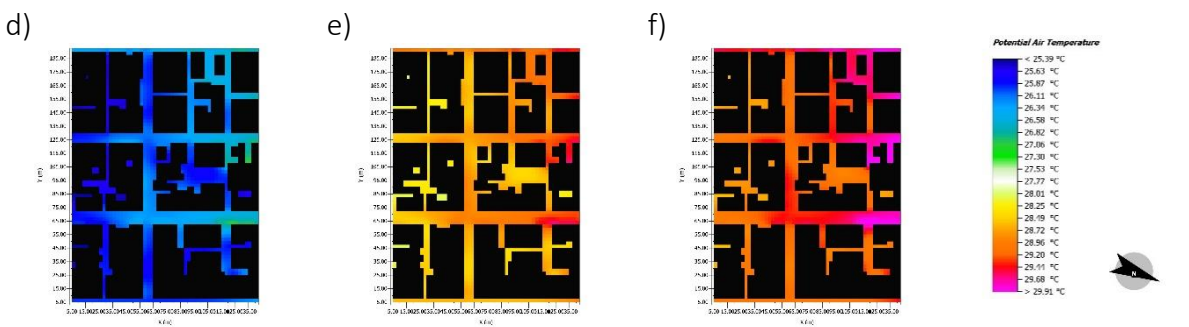


Figure 10 LCZ3, Air Temperature, at 18:00, for Scenario 1 (d), Scenario 2(e), Scenario 3(f)

a) b)

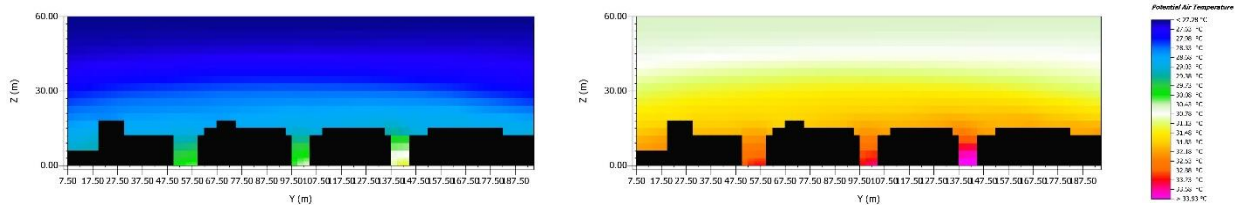


Figure 11 LCZ2, 12:00, vertical section for Scenario 1 (a) and Scenario 3 (b)

4. CONCLUSION

The study aimed to quantify the impact of climate change on the urban environment by analyzing two areas in Athens using the RCP4.5 projection. The initial results indicated that existing vegetation did not significantly improve air temperature, but streets with tree plantings showed lower T_{mrt} and T_{surf} values, as expected. The study reaffirmed the importance of trees in improving microclimates, with their influence remaining significant in future projection scenarios. The highest rise in air temperature was observed in Scenario 2 (2040-2060), where the air temperature increase exceeded 10%. Area LCZ2 showed slightly higher temperatures during midday compared to LCZ3, suggesting an influence of denser urban structure, lower SVF, and less vegetation. By the end of the 21st century (Scenario 3), the air temperature rise continued at a lower rate of 2%. Overall, predicted climate change will impact urban areas by increasing air temperature and deteriorating human thermal comfort. This study offers a preliminary assessment of climate change's impact on the urban environment and is an early component of the Re.Nature research project. Moving forward, the researchers plan to analyze data from extreme weather days in addition to typical day simulations to gain a more comprehensive understanding of climate variability. Furthermore, they will explore a more pessimistic RCP scenario and assess its effects on the areas to develop a more objective perspective on the challenges cities may encounter by the end of the 21st century.

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Wellbeing park design in urban redevelopment strategy. The case of Montecatini Terme, Italy

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Extended abstract

Across Europe, several thermal towns established in the nineteenth-century have faced a profound crisis in recent decades due to shifts in tourist demand and the difficulty of renewing a well-established touristic model. Montecatini Terme in Italy is a case in point: its tradition of diuretic waters dates back to the Middle Ages, and the city boasts a rich system of thermal facilities built in the early 1900s of exceptional historical and artistic value. In 2021, the city was declared a UNESCO World Heritage site within the "Great Spa Towns of Europe" network. Montecatini's peculiarity lies in its thermal structures being located within a park (the Terme Park), which has always played a significant role in the city's tourism. Due to a decline in thermal tourism for medical purposes, the city has gradually reduced its economic impact. Currently, the thermal system is fragmented among various owners (the municipality, the thermal company, and other private entities) and only partially operational, with several facilities closed and abandoned. Similarly, the park is now partially fenced and inaccessible due to a lack of maintenance.

The city is in the process of developing a new Tourism Strategic Plan aimed at reconfiguring it as a "wellness city". Following the guidelines outlined in the plan, the Terme Park assumes a new centrality within the urban context. This contribution presents the outcomes of preliminary research and conceptual design work to redefine the park's role in the system and reorganize its uses and functions. The goal is to translate the general directions of the new Tourism Strategic Plan into a design proposal, developing specific aspects such as greenery, water, and biodiversity as catalysts for the renewal of Montecatini's tourist proposal. The project acknowledges the rediscovery of the value of self-care, stemming from the pandemic, and adopts a holistic approach to urban design for well-being. The proposal aims to enhance the park's capacity to provide Ecosystem Benefits within the urban context while simultaneously proposing a sustainable transformation model, also from an economic perspective.

The park's refunctionalization focuses on three key elements: nature, art, and water. The aim is to enhance and increase the natural heritage of the area, creating thematic areas and structuring botanical paths for biodiversity. Furthermore, Montecatini's rich artistic tradition, tied to names like Joan Mirò, has inspired a new narrative. In this scenario, water, a protagonist in the city's history, regains a new centrality. In conclusion, the case of Montecatini represents an interesting case for other spa cities facing similar challenges and serves as a reference for the redevelopment of urban green spaces.

Keywords: *wellebeing park; open spaces redevelopment; Urban Green Infrastructure; spa town*

**ECONOMIC, SOCIAL AND SPATIAL INEQUALITIES IN EUROPE
IN THE ERA OF GLOBAL MEGA-TRENDS**



Changing Cities VI, Rhodes, 24 - 28 June 2024

Organized and chaired by Prof. Kallioras Dimitris & Dr. Yiannis Saratsis

Prof. Kallioras Dimitris, Department of Planning and Regional Development, University of Thessaly,
Greece

Dr. Yiannis Saratsis, Department of Planning and Regional Development, University of Thessaly, Greece

Consolidating the (unconnected) bodies of literature on inequality

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Extended abstract

Inequality is an interdisciplinary concept given that it is realized in the interwoven fields of economy, society, and politics. Even though an unanimously holistic definition is still missing, inequality denotes: (a) the unequal distribution of income or / and the unequal distribution of wealth (economic inequality); (b) the lack of equality of outcome or / and the lack of equality in access to opportunity (social inequality); and (c) the unequal participation in the political process (political inequality). Evidently, a plethora of pre-market, in-market, and post-market inequality drivers operate simultaneously as it became widely understood that inequality is not only the result of “efforts” but also the result of “circumstances”. The latter are out of individuals’ control, whereas the former are affected by individuals. In fact, “efforts” may provide a reflection of “circumstances”. Pre-market drivers may encapsulate in “the level-the-playing-field principle” and refer to initial conditions, in-market drivers may encapsulate in “the during-the-process-competition”, and post-market drivers may encapsulate in “the nondiscrimination principle”.

Inequality has been a long-standing issue, providing a terrain of theoretical and empirical discussions and debates, in both academia and policy making. Though malleable – meaning different things to different people and in different contexts – the concept and the phenomenon of inequality encompasses discrete, yet overlapping and interrelated, types. Considering that a complex set of theoretical propositions, ideological preoccupations, and institutional arrangements are confronted with the hard evidence of frequent market and policy failures, understanding the relations among the types of inequality is, apparently, an extremely important task that may provide valuable insight both to academic theory and to policymaking. This is especially so in the light of the paradigm shift that is taking place, most emphatically in Europe, as inequality is perceived not only as a problem of (re-)distribution but also as a problem of processes.

The paper consolidates discrete (unconnected) strands of literature that revolve on the concept of inequality. Overcoming the existing fragmented approaches of the various disciplines of inequality, the paper provides a comprehensive understanding of the interplay among different drivers and types of inequality, in the light of the global mega-trends, and, overall, addresses the need for a holistic understanding of the concept. Providing a state-of-the-art understanding of the concept of inequality, the paper paves the way to the identification of path-dependent (or cumulative causation) processes that cause multiple drivers and types of inequality not only to coexist but also to reinforce each other, within and between different social groups and spatial entities.

Keywords: *inequality; bodies of literature; consolidation*

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Defining inequalities in the urban context. Experts' analysis

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Extended abstract

In this paper we examine the way that many types of inequalities are related with urban conditions. We rely on an experts' questionnaire conducted during an ongoing "Horizon Europe" research project on inequalities.

Given the wide spectrum of the notion of inequalities it is important to understand the complexity of the phenomena and its social and spatial dimensions. By doing so, we are able to identify the best solutions to deal with the phenomenon considering that the already implemented policies did not always have the desired effect on inequalities.

At first, questions regarding the various dimensions of inequalities are presented with focus on those relevant to urban areas. We acknowledge that many dimensions are shaped by the wider socioeconomic conditions in a country, but as the results indicated, the urban environment acquires a mediating role in augmenting or attenuating them.

Second, factors that may increase inequalities at the sub-national level, i.e. among regions and cities, are presented and evaluated according to their importance.

Finally, policies that have the best impact on reducing inequalities are discussed having in mind that in many cases these policies are implemented in local or regional scale, and by definition they have a clear urban dimension.

The paper concludes with deeper research and policy recommendations.

Keywords: *inequalities, urban conditions, experts' questionnaire,*

Regional business cycles synchronization and regional inequality in the EU

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Extended abstract

Against the backdrop of the EU economic integration process, the paper focuses on business cycles. Particularly, the paper examines the impact of the evolution and the synchronization of regional business cycles on the evolution of regional inequalities in the EU. Both topics are crucially important. On the one hand, the relation between the evolution of regional business cycles and the evolution of regional inequalities is going to reveal whether (and to what extent) the latter follows a pro-cyclical or a counter-cyclical pattern. The pro-cyclical pattern indicates that growth poles (i.e., metropolitan and dynamic regions) are more likely to be positively affected than the rest of the regions in periods of expansion and, correspondingly, are more likely to be negatively affected in periods of contraction. On the other hand, the relation between the synchronization of regional business cycles and the evolution of regional inequalities is going to reveal whether (and to what extent) sectoral shocks are distributed evenly or unevenly within the integrated economic space. An even distribution indicates the smooth functioning of the economic union. Business cycles are defined as “a type of fluctuation found in the aggregate economic activity of nations that organize their work mainly in business enterprises”. Ergo, business cycles refer to the concerted cyclical upswings and downswings that characterize a span of macroeconomic variables - the most notable one is real GDP – and aggregate economic activity, in general. Typically, business cycles consist of a quartet of recurrent, but not periodic, stages: (a) expansion; (b) crisis; (c) recession; and (d) recovery. Apparently, the notion of business cycles is not compatible with the neoclassical understanding of the (spatial) economy, which operates always in equilibrium and the only variations from a steady-state growth path may be arising from random or external shocks. The analysis of the paper refers to 242 EU NUTS II regions and covers the period 1990-2020. Using sound and rigorous methods of empirical analysis, the paper presents clear-cut empirical evidence that shed light on academic theory and provide valuable insight to policy making.

Keywords: *regional business cycles; regional inequality; EU*

Southern cross-border regions of Poland and Ukraine in the aspect of tourism and protection of cultural values

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Extended abstract

The article presents research on the potential of integrated development in tourism and the protection of cultural values of the cross-border regions of Poland and Ukraine. The scope of the study is selected areas of Podkarpacie, the Outer Western Carpathians, and the Outer Eastern Carpathians. The Carpathians are located in the heart of Europe, a crucial part of the ecological, economic, cultural, recreational, and habitat environments shared by many of its countries.

The research aims to determine places with a functional need and general infrastructural possibility of locating new border crossings and determining directions of activities in integrating cross-border regions. The authors attempt to analyze transport, functional-tourist, natural, landscape, social, cultural, and recreational connections. The research spatial axis is the border, and the central point is the southernmost border crossing Krościenko - Smolnica. A location map of the research area was prepared as part of the graphic studies, considering large cities such as Lviv and Rzeszow and medium-sized ones to facilitate spatial reference. Then, a recreational and tourist infrastructure analysis and the generalized location of the concentration of accommodation facilities were prepared. A road and transport analysis assumed a one-hour travel distance from the border, emphasizing tourist attractions and the Polish-Ukrainian border crossings. Archival pre-war road, railway, and tourist maps were also examined, historically showing this area without a border with the no longer present part of the former road network crossing it.

The conclusions illustrate the directions of suggested actions to increase the potential and integrate cross-border areas, considering their tourism potential, recreational infrastructure, natural resources, biodiversity, cultural heritage, ecological stability, standard guidelines for nature protection, landscape, and sustainable development. New transport and recreation axes create an opportunity for new structures of recreational facilities that will allow for more excellent preservation of natural landscapes, blue-green infrastructure connections, and the authenticity of traditional settlements while using space for recreational purposes. New road and pedestrian crossings between Ukraine and Poland could provide an impulse for the border regions' sustainable economic and social development. The Carpathian region needs to develop concepts and strategies for developing territories and general plans for recreational and tourist areas.

Keywords: *cross-border regions, tourism, Polish-Ukrainian borderland, Carpathians*

Social Exclusion and New Spatial Inequalities: The Case of Palermo in Italy

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Extended abstract

The increase and diversification of levels and forms of poverty (absolute and relative poverty, energy poverty, educational poverty, mobility poverty) have considerably broadened the area of vulnerability of a considerable segment of European citizens in the last decade, especially in the most economically disadvantaged regions. This phenomenon has not only generated marginalisation and social exclusion, but has had significant repercussions on the spatial configuration of cities, with inadequate responses from institutional policies. In the urban contexts of Southern Europe, in particular, critical issues manifest themselves through housing deprivation, difficulties in accessing public services, mobility poverty and structural weakness of urban policies.

This paper aims to address new forms of poverty, marginalisation and social exclusion in Southern European cities, focusing on the examination of new socio-spatial inequalities. A central question is: what are the new spatial boundaries of socio-economic inequalities in Southern European cities? This implies the need to recognise and map these inequalities, not only to understand their extent, but also to inform more effective urban policies.

The chosen case study is the city of Palermo, Italy, which will provide a detailed analysis of local dynamics. The paper proposes to use new socio-spatial indicators, both quantitative and qualitative, and innovative interpretative tools, such as digital and social co-production tools, to recognise and map these new spatial geographies.

Expected outcomes include the creation of new analytical-interpretive frameworks, through the conceptualisation and mapping of emerging socio-spatial inequalities. This will provide a crucial foundation for the development of more targeted urban policies sensitive to the specific socio-economic challenges of Southern European cities. The multidisciplinary approach and the use of innovative tools will provide a deeper understanding of local dynamics, facilitating the implementation of tailor-made solutions that can improve the quality of life and promote social inclusion in these urban communities.

Keywords: *Social Exclusion; Spatial Inequalities; Urban policies; Palermo*

The spaces of productive micro-districts: an asset available for adaptive projects?

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Extended abstract

This paper deals with the adaptive regeneration of productive areas and is a reflection supported by the outcomes of the recent experience in the research project “Productive Areas, Pro-Adaptive Areas” (AP+A) (<https://www.areeproadattive.polimi.it>) conducted by the Department of Architecture and Urban Studies of the Polytechnic of Milan and funded by the Ministry of Ecological Transition (MiTE). The project carried out activities to spread the culture of sustainability and promote projects and actions for climate change mitigation and adaptation. It has made it possible to propose and test innovations for the adaptive regeneration of strategic areas for coping with the climate crisis, which, like productive areas, have received little attention in the history of urban planning since the Second World War. The main actions involved building climate knowledge at the micro-scale, raising awareness and involvement of the local business community and stakeholders, co-designing adaptive solutions, and developing specific urban planning and governance tools.

The research area was the Metropolitan City of Milan, with two pilot municipalities in the north-west and south-west. A territory in which productive areas contribute to a significant extent to determining critical phenomena such as heat islands, inefficiency of surface drainage, poor quality of open spaces, of public and public-private thresholds, in general, of urban habitability.

These are areas with highly impermeable soils, little vegetation, buildings of poor construction and urban quality, and low energy efficiency. The overall picture is one of a territory dotted with widespread micro-production areas, now integrated into the urban landscape. This spatial connotation, the result of functionalist urban planning since the Second World War, has helped to promote the idea of *adaptive productive micro-districts* and a model of *productive urban district governance* that aims to encourage stable, direct, and organised interaction between private and public bodies to carry out regeneration projects.

At the same time as the research was carried out, both the Metropolitan City and the two pilot municipalities developed new tools for territorial governance, the Metropolitan Territorial Plan, and the Municipal Urban Plan, respectively.

This fortunate circumstance was an important opportunity for further theoretical reflection and to explore and establish real implementation prospects for the proposed solutions. In the case of one municipality, the engagement and co-planning activities were part of the participatory process of the urban plan, and the adaptive solutions were classified according to a performance model that will be used, albeit in an experimental form, in the preliminary study phases for the approval of projects and possible bonuses for private interventions.

The idea of adaptive, productive micro-districts, supported by specific district governance, remains, for the time being, a proposal appreciated by public and private actors.

Keywords: *productive areas; adaptive urban planning; adaptive performance; Metropolitan City of Milan*

Business analysis: Citizen Science verge inventory and management in urbanized Flanders

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Abstract

Verges form an important part of the green-blue veins of urbanized Flanders, which can be considered as one large city. They play an important role in relation to climate change, numerous ecosystem services, and genetic diversity to combat pests. Green-blue permeation, including road verges, forms the foundation of resilient cities.

There is a need for a uniform inventory of Flemish verges and their quality for all of Flanders. Through this overview, we know which verge location needs to be actively addressed, for example through adapted verge management. Currently, there are numerous verge inventories, which however all are conducted in very different methods. This research builds on a previous study on Flemish verges that developed a scoring system for the verges and carried out an initial integration of existing verge inventories. With this current research, carried out on behalf of the Flemish Department of Environment, we want to get a more detailed view of the quality of the Flemish verges using a scoring system. We want to do this through Citizen Science and at the same time raise awareness about the importance of biodiverse verges. In this study, we carried out a business analysis, in preparation for an app that will be developed in the context of the Citizen Science project. All stakeholders were surveyed using different research techniques, and a communication strategy for the end users was defined. To confirm the viability of this approach, we developed a proof of concept in the validation phase, containing a solution for technical issues. The analysis found that the app ideally targets two audiences: nature lovers without and with species knowledge. The proof of concept showed that essential functionalities include location determination, registration of flora and fauna, photographic documentation, date and time registration, and space for user notes. For the communication strategy, we recommend a broad approach, aimed at nature lovers and various groups who often seek out nature. The communication should share facts about biodiversity in Flemish verges and the launch of the app is best supported by both traditional media and digital marketing.

The results and recommendations of this research allow us to continue with the development of the app for the Citizen Science project for verge inventory. This will ultimately not only lead to a uniform verge inventory, where data exchange is possible, but also to more support in relation to the importance of verges, as part of the green-blue veins in urbanized Flanders. And in this way, this research contributes to a more resilient Flanders.

Keywords: *verges, business analysis, Citizen Science, green-blue veins of Flanders*

1. INTRODUCTION

Verges collectively constitute a fundamental component of the ecological structure and the green-blue network within the landscape. Beyond their importance for biodiversity, these verges - as an essential part of the green-blue veining - play a crucial role in mitigating climate change, delivering ecosystem services, and preserving genetic diversity. In urbanized Flanders, they serve as essential buffers against the urban heat island effect, providing necessary cooling. However, biodiversity in Flanders faces significant challenges due to various factors, including environmental pollution, land use expansion, spatial fragmentation, barriers, monocultures, and pesticide usage. Addressing these

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issues is critical for maintaining ecological balance. There is a need for a uniform inventory of Flemish verges and their quality for all of Flanders. Through this overview, we know which verge location needs to be actively addressed, for example through adapted verge management. We achieve this by deriving a comprehensive scoring system and visualizing this information on maps in the study of 2022, namely ‘Onderzoek Vlaamse bermen en onmiddellijke omgeving in het kader van groenblauwe netwerken en de afname van biodiversiteit’ [Investigation of Flemish Roadside Verges and Immediate Surroundings in the Context of Green-Blue Networks and Biodiversity Decline] [1].

Understanding the biodiversity status of the verges informs optimal verge management strategies based on their respective scores. Currently, there are numerous verge inventories, but they were all conducted in very different methods. There is a need for a standardized verge inventory to enable data exchange and comparison across different verges. Building upon the above-mentioned first verge study [1], we propose data collection through a Citizen Science project. An accompanying mobile application will facilitate data gathering. Additionally, the Citizen Science initiative will raise awareness about the importance of roadside verges.

This article also discusses the business analysis carried out in the context of the preparation of the app development and outlines the communication strategy associated with the proposed app, as described in the report of 2024, ‘Business analyse: Citizen Science Bermininventarisatie en -beheer’ [Business analysis: Citizen Science Roadside Inventory and Management] [2].

2. FIRST STEPS TO INTEGRATION OF ROADSIDE INVENTORY

Two studies have already been conducted on this topic. In the first study [1], the need for a comprehensive overview of Flemish road verges was highlighted. However, to gain insight into the quality of these verges, a robust inventory methodology (via Citizen Science) with data collection in a reliable database and an ecological score are essential requirements.

This first study on verges [1] consists of three parts: integrating existing roadside inventories, setting up a scoring system and initiating a Citizen Science study.

Firstly, data from existing inventories provided by the Flemish Waterway Authority (Vlaamse Waterweg nv) and the Agency for Roads and Traffic (Agentschap voor Wegen en Verkeer) were analysed. A high-performance relational (geo) data model was developed to seamlessly integrate existing databases containing information about these verges without any data loss.

Second, to assess the quality of the verges, a dual scoring system was devised based on landscape-ecological and biotic values. The landscape-ecological value, with a score from 1 till 10, considers the verge’s proximity to legally protected natural areas (such as nature reserves) and watercourses. In the figure below (Figure 1), this scoring system with landscape-ecological value has been applied to the verges in Flanders.

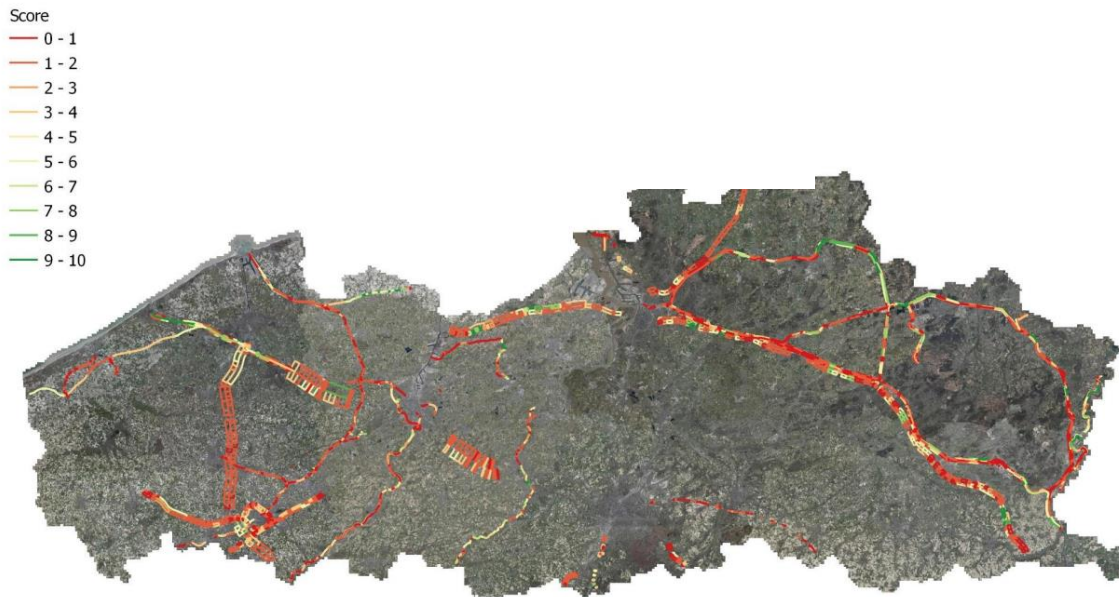


Figure 1. Landscape-ecological score of the roadsides (Anteagroup & Natuurpunt, 2022)

Additionally, the score considers adjacent land use, exposure, and slope (Figure 2). The biotic score relies on verge characterization and the presence of red-listed species (both fauna and flora) and has a score from 1 till 20.

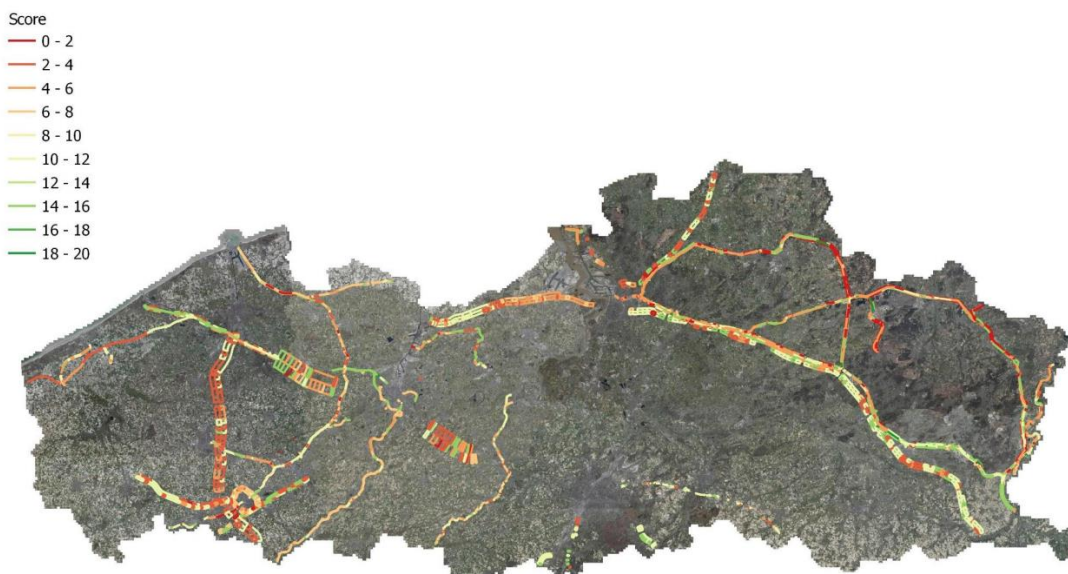


Figure 2. Biotic score of the roadsides (Anteagroup & Natuurpunt, 2022)

This first study also serves as a stepping stone toward a Citizen Science project. It identifies success and failure factors based on known Citizen Science projects and outlines an action plan for the Citizen Science initiative, leveraging the established database.

In the policy recommendations emphasis is placed on expanding the database. This expansion would involve local managers in verge maintenance and allow for the derivation of baseline data and trends

to inform management tips. Expert assessment remains crucial for establishing effective management practices (e.g., practical considerations)."

Furthermore, it is emphasized that a sufficiently robust communication component (with targeted awareness and motivation) needs to be established to engage administrators, associations, etc. In terms of the follow-up process, it is indicated that it is crucial that the various stakeholders and developers work together to actively utilize the results of this study.

The current research builds on the preliminary investigation and focuses extensively on stakeholder mapping and surveys. In addition, the Citizen Science project was further developed into a proof of concept.

3. NEXT STEPS – RESEARCH QUESTIONS

The second study on verges [2] presents the results of the business analysis for the development of an app for a Citizen Science project on verge management and inventory. The analysis includes a definition of the goals, a thorough investigation, an internal and joint brainstorming, an elaboration of a proof of concept and advice on a matching communication strategy. The main findings indicate that the app would be optimally aimed at both nature lovers with and without knowledge of plant species. Through features such as location tracking, flora and fauna registration, photographic documentation and user notes, the app has the potential to deliver significant added value to existing verge management in Flanders.

Thus, the main objectives of this business analysis are the following: a stakeholder mapping, the realisation of a proof of concept and a communication strategy.

For the business analysis of the application, the following research questions were asked (objectives).

- Who owns the app?
- What functionalities should the app have?
- What data should the app record?
- How is app management organized?
- How is data entered into the app?
- Who processes the data and how is it handled?
- What will be the cost of the app, including app management and processing the data entered in the application?

In line with this, the following questions must be answered when providing advice regarding the communication strategy:

1. What is the target audience?
2. Which content needs to be communicated?
3. How will the app be launched (via which tools, which media)?
4. How will further guidance and follow-up occur after the app's launch?

This part of the paper includes objectives with the research questions. In the following, the methods to answer these questions will be briefly described.

4. NEXT STEPS - METHOD AND RESULTS

Stakeholder consultation

An extensive stakeholder analysis examined and surveyed the key stakeholders for roadside research and roadside management. This ultimately resulted in an overview.

The stakeholder mapping related to roadside inventory and management identifies the various stakeholders, including their shortcomings, obstacles, and gains. It also assesses the available knowledge about these stakeholders and identifies any missing information.

During flow workshops with different stakeholders, the research maps both the current (as-is) and desired (to-be) flow. In this research, we meticulously go through all the steps of the various processes

involved in inventorizing (and sometimes managing) roadside areas. The outcome is a business process map that captures the different flows resulting from the research.

Additionally, the research conducts interviews with users (traditional observers, novice volunteers, average citizens, schools, municipalities, etc.) to understand their needs, desires, and current customer journey. The investigation specifically examines their existing interactions with government initiatives and identifies their main motivations and obstacles, aiming to address the latter.

Using all the gathered information, the research creates several personas and customer journey maps. The personas (four types: volunteers with extensive natural knowledge, volunteers with limited natural knowledge, volunteers with no natural knowledge, and biology teachers) focus on the different stakeholders, their needs, desires, and frustrations. The customer journey map highlights the processes and how stakeholders navigate them, including where they seek information, through which channels and which other target groups they interact with. A customer journey reflects the context and behaviour of an individual within a user group, describing both the current state (as-is) and a potential future state (to-be).

In this section, we will briefly describe the main conclusions of this research phase:

- **Project Objective Clarity:** It is crucial to define the project's objective precisely. This research identifies issues related to awareness among citizens and challenges in monitoring, knowledge, and communication within institutions and municipalities regarding roadside management. If the goal is to accurately inventorize road verges, multiple parameters must be considered, with a focus on naturalists as primary users. However, if the aim is to raise awareness and sensitize the public, fewer parameters are necessary, allowing for a broader audience reach.
- **Tailoring Content for Different Audiences:** As mentioned in the previous study (Heylen et al., 2022), content alignment with various target groups is essential. For instance, when communicating information within the tool to (novice) volunteers or young individuals, we need an approach that is easy to understand. Since knowledge is essential for plant recognition and effective inventorizing, the provided information should be clear and visually presented. Additionally, the application may benefit from training sessions or informational meetings. On the other hand, for experts, the application should not be overly simplified. Their expertise warrants efficient execution of tasks and input to optimize roadside management.
- **Ensuring Data Quality:** To maintain high-quality input data, consideration should be given to methods for error checking and prevention of misuse. Allocating limited additional resources or time to monitor and address erroneous or incomplete inventory data within the Citizen Science project is crucial.

Proof of concept

In this phase, a prototype of the concept was developed to validate the technical feasibility or report any remaining limitations. The focus and content of this prototype are based on the findings from the research phase.

At the start of the proof of concept (POC), two possible tracks were identified based on the research conducted by Heylen et al (2022) [1]. The first track involved creating an entirely new application, while the second track aimed to develop an app connected to [waarnemingen.be](https://www.waarnemingen.be). Both tracks were carefully analysed, with extensive research to map out the specific advantages and disadvantages of each approach. The findings of this research can be found below.

The first track, focused on developing a completely new app, is characterized by several notable benefits. A crucial advantage is the ability to have full control over both the design and functionalities of the app. This allows the development team to tailor the application precisely to specific needs and objectives. However, these advantages are offset by some drawbacks, including higher development costs and a longer development timeline.

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On the other hand, the second track, focused on developing an app connected to waarnemingen.be, also presents an interesting set of advantages and challenges. A significant advantage of this approach is the ability to leverage an existing platform with an established user base. This can result in lower development costs and an accelerated implementation timeline, as building upon an existing infrastructure is feasible. Furthermore, the benefit of having pre-existing data and functionalities provides a solid foundation for further development. However, the reduced level of control over app functionalities, compared to the first track, is considered a drawback. Additionally, there is a need to consider the dependency on the external platform and the inherent limitations it brings. This includes constraints on customization and integration, which are crucial factors in decision-making during the development process.

The research questions from part 2 of this paper and their corresponding answers are concisely presented in Table 1 below.

Table 1. Research questions and answers derived from the research.

Who owns the app?	The entity responsible for the app is the Flemish Environmental Assessment Agency (owner)
What functionalities should the app have?	1. Location tracking, 2. Registration of flora and fauna, 3. Photographic documentation, 4. Date and time registration, 5. User Notes
What data should the app record?	1. Location, 2. Type of observation (flora and fauna), 3. Description, 4. Date and time, 5. Additional Notes
How is app management be organized?	The technical party that develops the app is responsible for the management of both the app and the associated data.
How is data intered into the app?	(1) automation through existing systems, (2) user input, (3) validation and quality control.
Who processes the data and how is it processed?	Since the technical party chosen for the development of the app is in charge of the processing of the data, this responsibility includes a thorough series of steps aimed at ensuring the secure, organized, and easily accessible storage of the data received: (1) processing for secure storage, (2) rapid search and geolocation, (3) data analysis and reporting. This comprehensive approach to data processing by the technical party guarantees secure storage of the data lays the foundation for a quick and effective use of this data to identify valuable insights and trends. The stored data is considered a static entity, and a dynamic resource that contributes to the app's success in understanding and conserving biodiversity.
What will be the cost of the app, including app management and processing the data entered in the app?	(1) development costs, (2) management fees

Figure 3 provides a simplified representation of a possible look of the app. However, the app needs further development in a follow-up study.

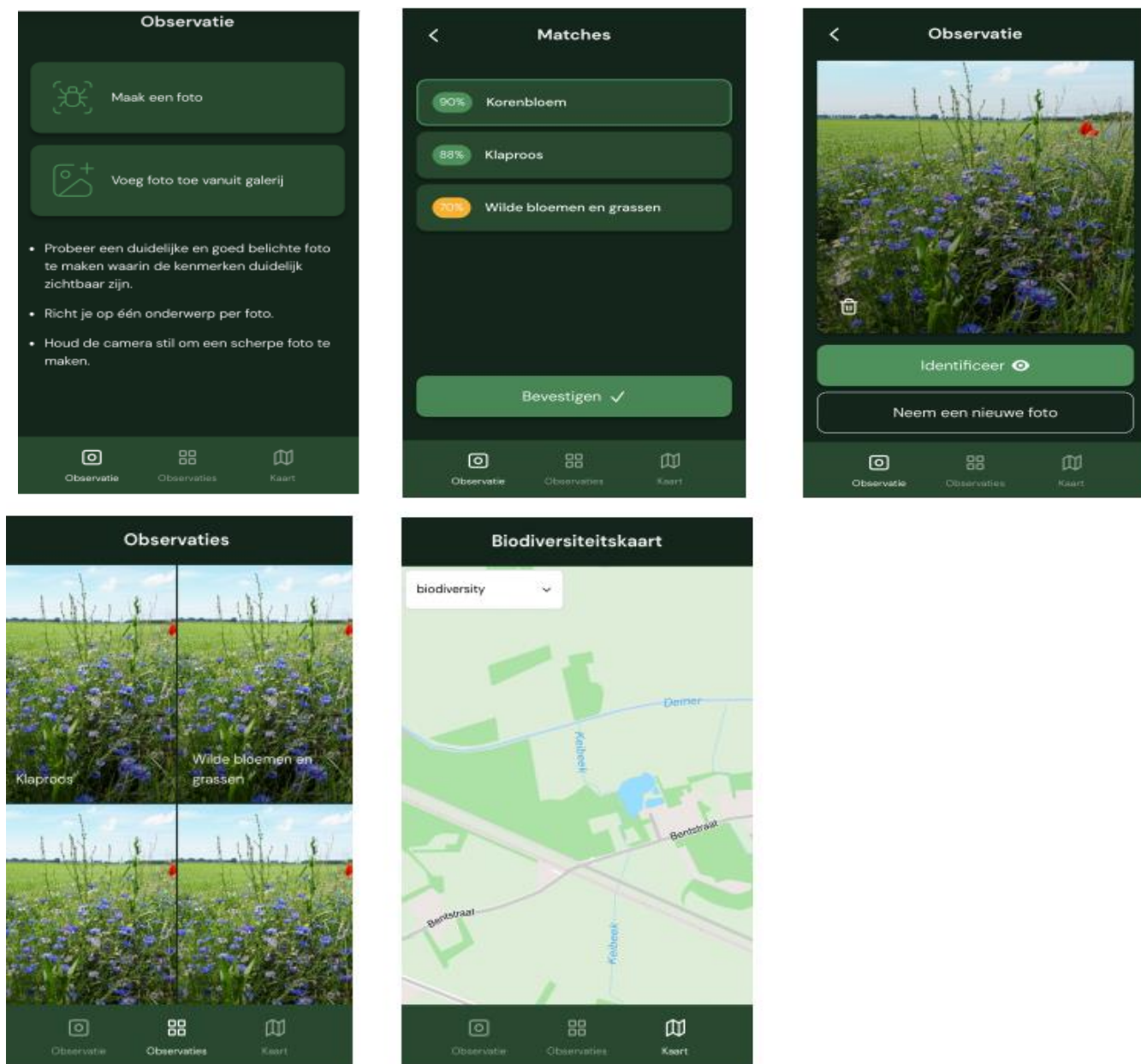


Figure 3. Proof of concept of the application (Wisemen, 2024)

Communication strategy

The research questions in order to communication (cfr. part 2 of this paper) and their corresponding answers are concisely presented in Table 2 below.

Table 2. Research questions and answers in order to communication, derived from the research.

<p>What is the target audience?</p>	<p>Nature lovers, groups that often seek out nature. Reaching individuals with marketing is fine, but also: the wider the participating audience, the better.</p>
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Which content needs to be communicated?	(1) Information about the verges, (2) Brand story, which consists of three parts: status quo, conflict, resolution, (3) Creating content categories (e.g. roadside hero), which has the following benefits: targeted communication and recognizability.
How will the app be launched (via which tools, which media)?	Balance between traditional media and digital marketing (each with advantages and disadvantages), launch event, PR as a cost-efficient tool, App Store Optimization (ASO) and Search Engine Optimization (SEO), Email marketing, Influencer marketing, Boost your app with reviews, measure and adjust goals.
How will further guidance and follow-up occur after the app's launch?	App Store Optimization (ASO) and Search Engine Optimization (SEO) is important to increase the app's visibility on different platforms. Email marketing is recommended for activating existing users and using the network of stakeholders. Influencer marketing with influencers in environmental and nature-related domains can increase brand awareness. The importance of positive reviews and effectively measuring and adjusting goals using collected data is emphasized for long-term success.

5. CONCLUSION

Preparatory steps were taken in the previous studies [1] and [2] to develop an app for the Citizen Science Project. In the business analysis, all kinds of questions are answered about the app and a proof of concept is made that can be tested by the partners of this research. A communication strategy has been developed in parallel. The answers to all these questions form a preparation for the next phase, so that we can immediately proceed to the development of the app needed for the Citizen Science project. Undoubtedly, additional questions will arise and will have to be investigated during the development of the app. Based on the proposed communication strategy, the next step is to proceed with a broad communication of the project.

The Citizen Science project for verge inventory will ultimately not only lead to a uniform verge inventory, but also to more support in relation to the importance of verges, as part of the green-blue veins in urbanized Flanders. In this way, this research contributes to a more resilient Flanders with more resilient cities. The results can also form an important approach for environmental urban planning, which will become increasingly important, given the impending climate effects.

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The Masking of Inequities in Naples: Constructing the Invisibility of the Poor since the 19th Century

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Extended abstract

Urban incisions—characterized by wide linear demolitions and boulevard-shaped reconstructions—have profoundly reconfigured the physical and socio-economic landscapes of cities since the 19th century. Comprehending the enduring repercussions of these often-contested interventions poses a challenging task due to the intricate choreography of institutional actors, the scarcity of longitudinal spatial datasets, and methodological shortcomings in planning history.

This paper addresses these challenges by advancing a spatial history investigation of the enduring legacy of the late-19th-century urban incision (*Rettifilo*) bisecting Naples' water-facing neighborhoods. It employs computational humanities and historical GIS techniques to shed light on the design politics of masking the urban poor and on the spatial inheritance of social exclusion in the spaces behind Naples' 2Km-long boulevard. In this paper, I use archival administrative documents, extract urban morphology metrics from historical maps, and mine data from longitudinal socio-economic records.

This research provides empirical evidence of how Naples' urban incision masked and isolated vulnerable communities and neighborhoods with precarious living conditions. It demonstrates that promised gains in public space coverage were never realized, overcrowding persisted in less visible areas, and topography was manipulated to eliminate previously-available ground-level affordable housing. Most importantly, this research exposes enduring inequalities resulting from centuries-old design interventions in contemporary communities, revealing the connection between forms of linear development and socio-economic exclusion.

Keywords: *legacy; urban analytics; digital humanities; coastal cities; Naples*

Affordable Housing and Neighborhood Unit Design. Two Case Studies from Cyprus

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Extended abstract

The proposed study delves on the challenge of providing affordable housing at the neighborhood or district scale. Affordability is examined as part of a broader mandate for sustainable urban development that examines aspects of reducing housing prices through compactness in design, while at the same time making a case against energy poverty. In this latter aspect of neighborhood design, housing block layout is based on prior work done on optimizing building massing outlay to take advantage of harnessing the potential of solar energy. Insolation is examined in the context of photovoltaic and solar thermal systems that may be located on roofs and building envelopes, as part of integrated design approaches and alongside complementary passive design strategies. The geographic context of this examination is the island of Cyprus and its two major cities on Nicosia, the center of government and Limassol incorporating the main seaport. In the first instance the site for this pilot proposal is an exurban location just beyond the city's western suburbs, whereas in the latter case the site investigated lies on the fringe of the northern outer suburbs. In both instances the land is owned by the Cyprus Land Development Corporation, the republic's main provider of socially minded and driven housing, which has a special interest in solutions that decrease real estate asset prices and increase energy savings with regards to winter heating and summer cooling. The work briefly examines some relevant literature, learns from appropriate precedents, and it references and analyzes comparable case studies. The aim of this approach is to subsequently devise masterplan proposals that adhere to the stated goals and are enabled by standardization of lot sized and built components at the district scale and by the use of an infrastructural kit-of-parts for the accessorization of neighborhood amenities and services. The proposed study concludes with a presentation of masterplans at these two locations and with a brief critical positioning of a procedural roadmap that made use of participatory and co-creative urban design practices.

Keywords: *Socially-minded housing; energy poverty; compact development; passive design; co-design.*

1. INTRODUCTION

The current research project between the Cyprus Land Development Corporation (CLDC) and the Department of Architecture of the University of Cyprus concerns the development of innovative planning for the residential development of the Organization's plots in the areas of Kokkinotrimithia and Polemidia, 274,000 sq.m. and 128,000 sq.m., respectively. The two regions present particularly different geographical, urban planning and topographical data and therefore each region is analyzed separately. Analysis that will form the pillars of study and planning, of interest being the fact that the areas of Kokkinotrimithia and Polemidia negotiate the urban-rural fringe, i.e. an extensive area, involving on the one hand the urban condition, including the nearest urban centers, and on the other hand, the rural areas and the related settlements of the nearest communities. Also, a decisive planning

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factor is the large size of the available lots, as this makes them suitable for integrated and unified planning of self-sufficient settlements with a special identity that will ensure a harmonious and sustainable coexistence with the existing neighboring and future communities. On this basis, a common development vision for both areas is the proposal of a new and sustainable development plan based on international standards of eco-neighborhoods with the main aim of creating a new standard of affordable housing.

1.1 A new Identity for CLDC

The design of eco-neighborhoods is guided by ecologically responsible development principles concerning the design quality of public spaces and the quality of social life. At the same time, it must be shielded from threats (e.g. climate change, difficulties in acquiring housing). Neighborhoods intended primarily for the purpose of affordable housing must be the basis for continued social and economic sustainability, which is achieved by the interconnection of five pillars, taking into account the scale, organizational structure and physical characteristics of the area. The purpose is to create a new approach that connects affordable housing with sustainable development by defining a new identity for the residential projects of the CLDC. The five main design pillars for creating model eco-neighborhood development plans have been defined as follows:

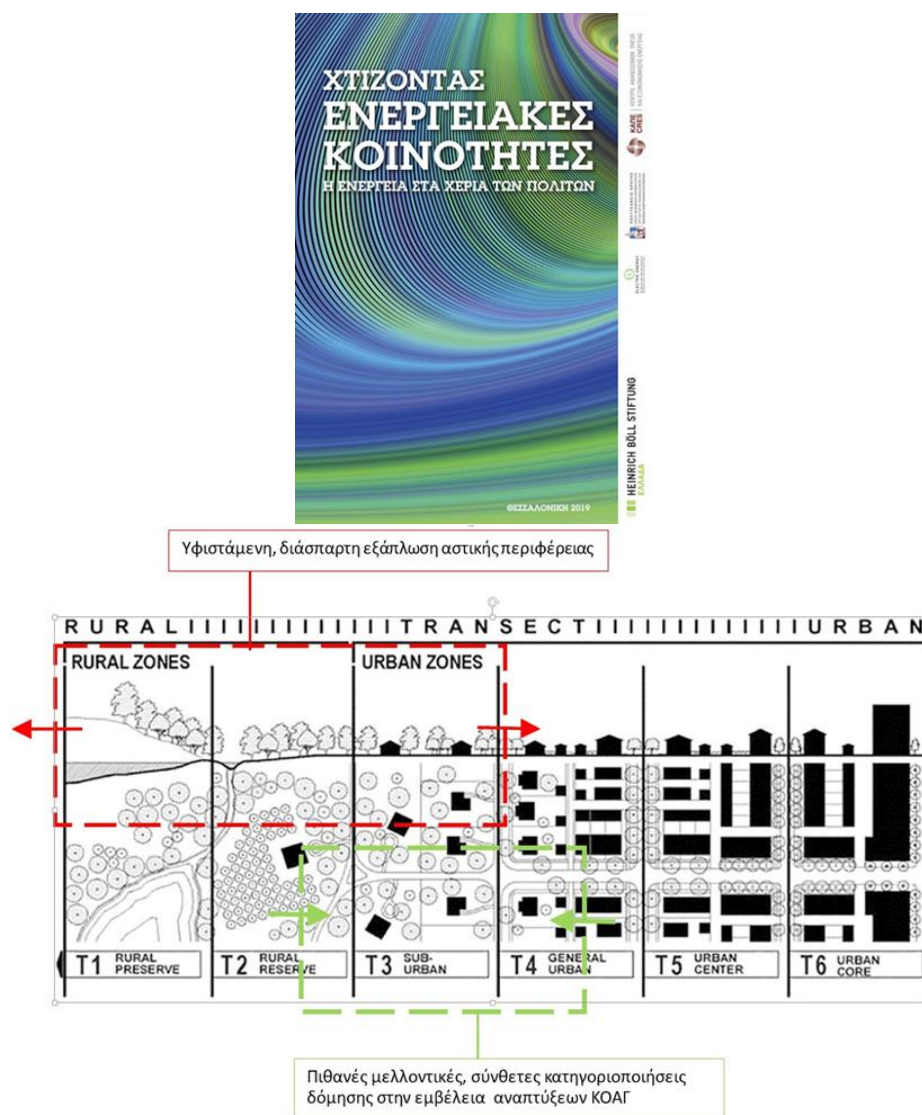
- Urban morphology that includes differentiated building scales and volumes that encourage appropriate density to support relevant infrastructure and services.
- The transition spaces and spaces of multiple activities, multiple surfaces with an emphasis on green infrastructure design.
- Movement within the neighborhood is based on the use of sidewalks, bike paths and shared streets that develop a network of sustainable transport and limit the use of private means of transport.
- The production and use of energy and the management of water are done locally. Also, the design of the buildings is based on the principles of environmental design.
- Social planning aims at the connectivity between open/public and private spaces and the development of social participation.

1.2 Energy Communities

On the basis of the aforementioned planning and development pillars, the opportunity is created for the creation within the development areas of "Energy Communities" (ECOIN Figure 1). These communities are an important tool for the energy transition but also for the more active participation of the local society and the strengthening of the role of consumers through the local production of energy from RES. The opportunity to create Energy Communities is inextricably linked to the principles of sustainable development, it contributes to the implementation of the European energy policy for 2050 and is combined with saving energy costs which significantly helps vulnerable social groups, as "tackling energy poverty within the region, in which the headquarters of an ECON is located, it is, under the legislation, the purpose of establishing an ECON." [8].

1.3 Development in the urban periphery

Following Duany and Talen's (2002) classification of the urban-rural intersection, the range of typologies and spaces in relation to urban planning is categorized into 6 zones that differ according to the level and intensity of the urban character from the urban center to the countryside as shown in Figure 2.



Figures 1 & 2. Strategic manual for the development of energy communities & transect planning classification of the urban-rural intersection

In Cyprus, the current situation, while fluctuating between T1 and T6, presents particularly multiple and frequent changes between the rural landscape (T1) and the suburbs (T3) in an arbitrary and scattered manner. In addition to the well-known negative environmental impacts of this type of scattered building within the natural and rural landscape, communities located far from urban centers usually rely on the private vehicle for their daily needs. For this reason, the new eco-neighborhoods proposed through this study can contribute positively to the more compact development of regional urban areas, reducing the use of private transport within the community, through appropriate building density and at the same time, urban planning and complementary public transport to cover basic uses / needs in the scope of the area under study.

Within urban centers over the past two decades, there has been a significant increase in high-rise buildings, such as student residences and luxury apartments. However, a large proportion of the building stock is in an unfavorable condition within the historic cores. At the same time, outside the urban centers, there is a low density of buildings, due to urban sprawl and the construction of single-family houses in the countryside and peripheral areas. These two observations, scattered development in the urban periphery and the growth of apartment buildings in the urban centers, contributed to the

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lack of complex housing types and possibly to the lack of housing opportunities for low- and moderate-income groups.

As residential areas continue to expand onto agricultural land, the suburbs of urban centers in Cyprus today and their surrounding communities are today sites of modern commercial activities and other complex land uses in a landscape that combines urban and rural lifestyles. At the same time, many young families are today looking for an alternative solution to the high cost of owning a home close to the urban center or the existing suburbs, with opportunities for services and the comforts of a modern lifestyle close to their place of residence. Thus, the new developments of the CLDC, by creating new composite types of housing, mixed uses and combinations of building densities, can contribute positively to the regional development of these areas. For this reason, the future building developments of the CLDC should manage the relationship of the urban to the suburban, by weighing opportunities versus challenges (Figures 3, 4 & 5).



Figure 3. Diagram indicating suburban typologies on the left versus urban typologies on the right, in Cyprus today

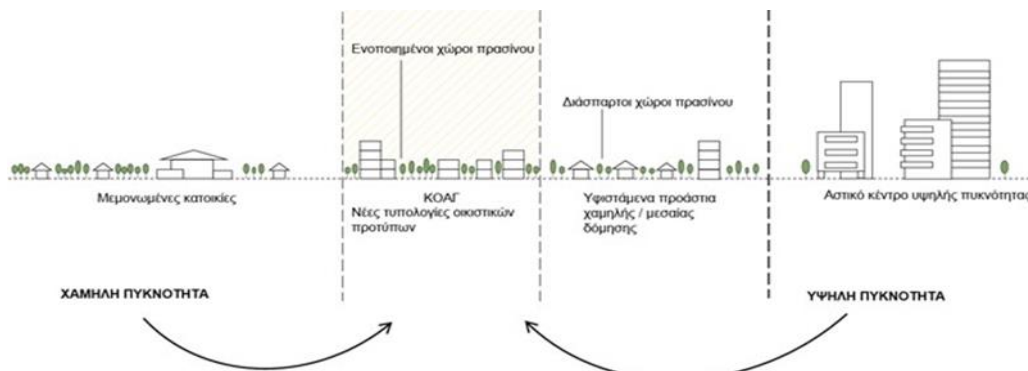


Figure 4. This second diagram indicates the same dichotomy in terms of density considerations

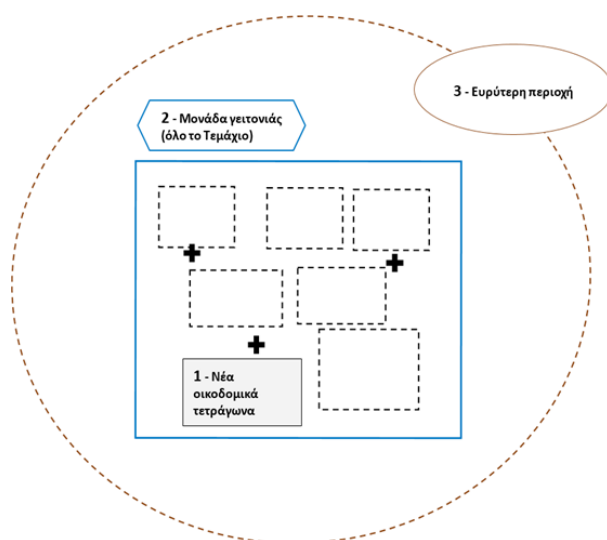


Figure 5. Visualization of proposed neighbourhood unit oriented development

2. METHODOLOGY

The methodology of the present study is based on the opportunity to develop new tools for the production and evaluation of urban planning of settlements with the aim of developing innovative types and alternative organizational configurations of residential development. Through the systematic analysis and codification of design specifications based on known urban design standards, possibilities are combined to encourage sustainable mobility and empower outdoor public spaces, with the aim of reducing the use of private transport as much as possible. Also, the need to approach the topography of each plot, and the need to design infrastructure and land uses with a low environmental footprint and for the environmental management of rainwater and other architectural environment characteristics, are also considered.

Then, the urban morphology is processed using three familiar housing models: maisonette, semi-detached house and the two-three-story apartment building, the evolution of various arrangements developed through the adaptation of the relationship between built and unstructured space. The "typical" building block that often arises in Cyprus is examined, due to the association of access roads to private plots. In transforming the scale of the typical Cypriot building block, examples are presented in a large new building block (or super-block) with an area of one hectare, using all the previous tools. Combinations with a distinct identity at this scale are presented and a first insight into the opportunity to evaluate the wider neighborhood unit is given. The specific identities give rise to a discussion about the evolution of details in relation to the multiple factors that make up the proposed eco-neighborhoods.

Having worked out local characteristics with the organizational and supra-local relations within the wider areas for each case, design intentions at the neighborhood level for the whole block are created, which will be examined in more detail as to the following:

1. The morphology of built-up space and the percentage of coverage
2. Transition areas / common areas
3. Green infrastructure
4. Circulation
5. Energy and environmental planning
6. Building densities (units / hectare)

In the final study, Schematic Local Plans (masterplans) are proposed, encompassing the necessary infrastructures and the complex evaluation criteria that determine them. In this way, the opportunity

is offered to the private sector to find different ways of addressing the building needs through the process of announcing an architectural competition at the level of the scale of the new building blocks. The three main categories of scales that interact in the design of Schematic Local Plans are:

1. Scale (1) the new building blocks that will create a connected network of outdoor transition spaces and emphasize the strengthening of the collective responsibility of residents towards their neighborhood, especially in matters of park maintenance and the operation of other community events such as the organization of small markets, etc.
2. Scale (2) has as its basic framework the unit of the neighborhood, i.e. the entire building block. A sustainable system will be created with various renewable energy solutions and a layout along the main traffic axes.
3. Scale (3), the on-site organizational directions of each area, the indicators from the study of the social profile of the potential beneficiaries and the local urban planning issues in relation to the boundaries of the parcels will be considered.

3. DESIGN – PRODUCTION AND EVALUATION TOOLS

An important part of this study is the creation of a system of coding and categorization of various elements in order to create a clear urban planning tool with specific specifications for good local practices and global design standards translated into the Cypriot context of institutions and practice. As a result, a new organizational structure of roads, streetscape creation scenarios and standard strategies are proposed that aim to optimize the planning of future residential developments of the KOG.

3.1 Planning typologies of roads, connections and transition areas.

High-quality public spaces and various ways of street design are shaped by urban design practices that encourage sustainable mobility. Safety in relation to travel speed, multiple means of transport and the enhancement of sustainable mobility, public and private space relations, shared streets, urban infrastructure and planting spaces act as design parameters. Specifically, the following typologies of roads are "Primary Collectors", "Secondary Collectors" and "Local Public Use Roads" of the Traffic Policy of Local Plans of the Department of Town Planning and Housing, based on the "Guidelines for Functional Hierarchy / Categorization and Basic Desired Urban Functional Characteristics" Road Network - 3rd Amendment". New design guidelines are proposed in this guidance panel and specifically in the 'Local Public Roads' category.

3.2 Building square connections (BSC)

Connecting across building blocks using intermediate shared paths is a flexible tool that provides travel route options, increases ground-level ventilation and permeability, and ensures pedestrian priority. At the same time, it can operate with or without parking spaces, depending on the need for access by motor vehicles or the limitation of presence of connections to building blocks and common use routes.

3.3 Transition areas

In addition to the allocation of open public spaces resulting from the provisions of Local Plans, green infrastructure is used at the boundary of the plot for their utilization by the co-owners, as spaces of transition from private to public space. A sense of ownership by the same users will encourage their maintenance. At the rear boundaries of residential plots, which may border agricultural plots, it is proposed to address the nature of the boundary and the relationship between the two land uses, by considering public connections and private space in the urban environment where there is an agreement between the residents and Local Authorities for the organization and maintenance of these areas.

3.4 Basic typologies

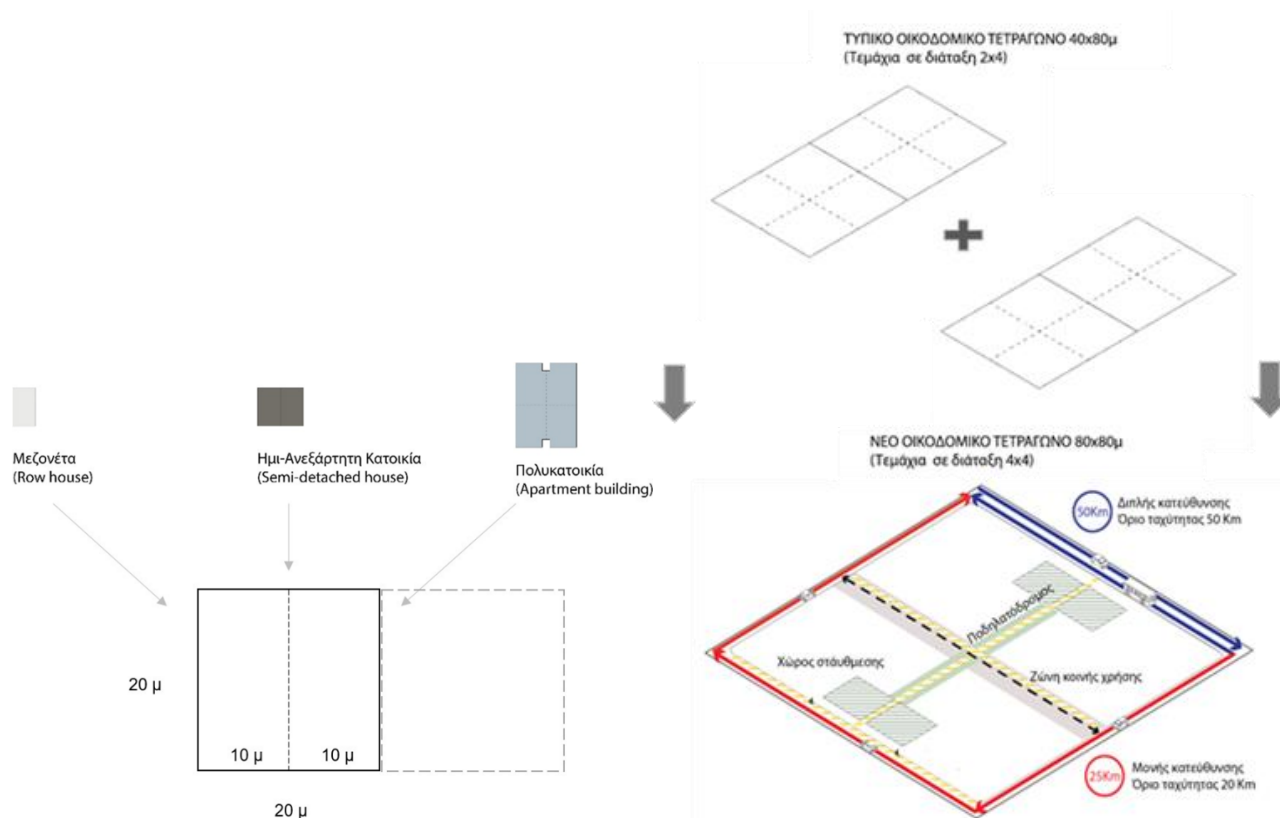
The most common typologies of residential construction are the single-family house, the maisonette, the semi-detached house and the multi-family house (Figure 6). The single-family house is avoided as a design type due to building density and cost reduction. There are many examples worldwide where uniformity is avoided regardless of typology and which are harmonized with local residential and user needs. These three types of residential developments encourage the use of simplified forms and materials, saving construction costs, without compromising the quality of the architectural composition.



Figure 6. Common typologies of residential construction : the single-family house, the maisonette or semi-detached house and the multi-family house

The drawing below leads into the next section of discussion and conclusions, with regards to the character of the residential blocks in the study areas: it shows that the block is in line with the sizes of the existing blocks of the CLDC and smaller than the typical suburban blocks. Therefore, the 400 square meter (20 x 20 meter) block acts as the basic unit and defines the dimensions for a building system based on this size (Figure 7).

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Figures 7. 400 square meters (20 x 20 meters) block as the basic residential development unit.
Figure 8. Development diagram of a large building block

Essentially, this is a small block that begins to function as a pattern for the creation of a new type of building block of unified residential development, based on the aforementioned typologies, when two of these “halves” come together. Thus multiplying the pieces and connecting them together, may create initial opportunities for new layouts.

3.5 Superblock design

The typical building block in Cyprus is determined by the dimensions of approximately 40 x 80m. This can be used as an initial guide for the layout of the 3 typologies with initial simple combinations and new organizational structures of the typical building block. The composition of similar types is organized with different relationships and the resulting building densities for each building block in the total number of units (Figure 8).

The diagram shows the transition from the scale of the typical Cypriot building block to the scale of a new, larger building block. The large building blocks discourage the use of cars and allow for more complementary combinations of the three building types and of related open spaces for collective use. These open spaces can be granted both inside and outside the large building block. At the scale of one hectare (100x100m) the different morphologies of the built space and the transition spaces create specific conditions in relation to the building density that varies between 35-40 units/hectare.

For traffic between and around the neighborhood unit, the tools for planning streets, block connections and transition areas are used. Car use is limited and speed within the unit is reduced. Their application is expected to be adapted to the unit scale of the entire neighborhood as the end result of the composition of multiple large blocks.

3.6 Comparison of layout to neighboring built-up areas

For purposes of comparison, the typical system of the neighboring built-up areas within the block of the CLDC has been included indicatively. It would correspond to 7 units per hectare if the plots consisted of detached houses in Kokkinotrimithia and 14 units per hectare in Polemidia (Figure 9).

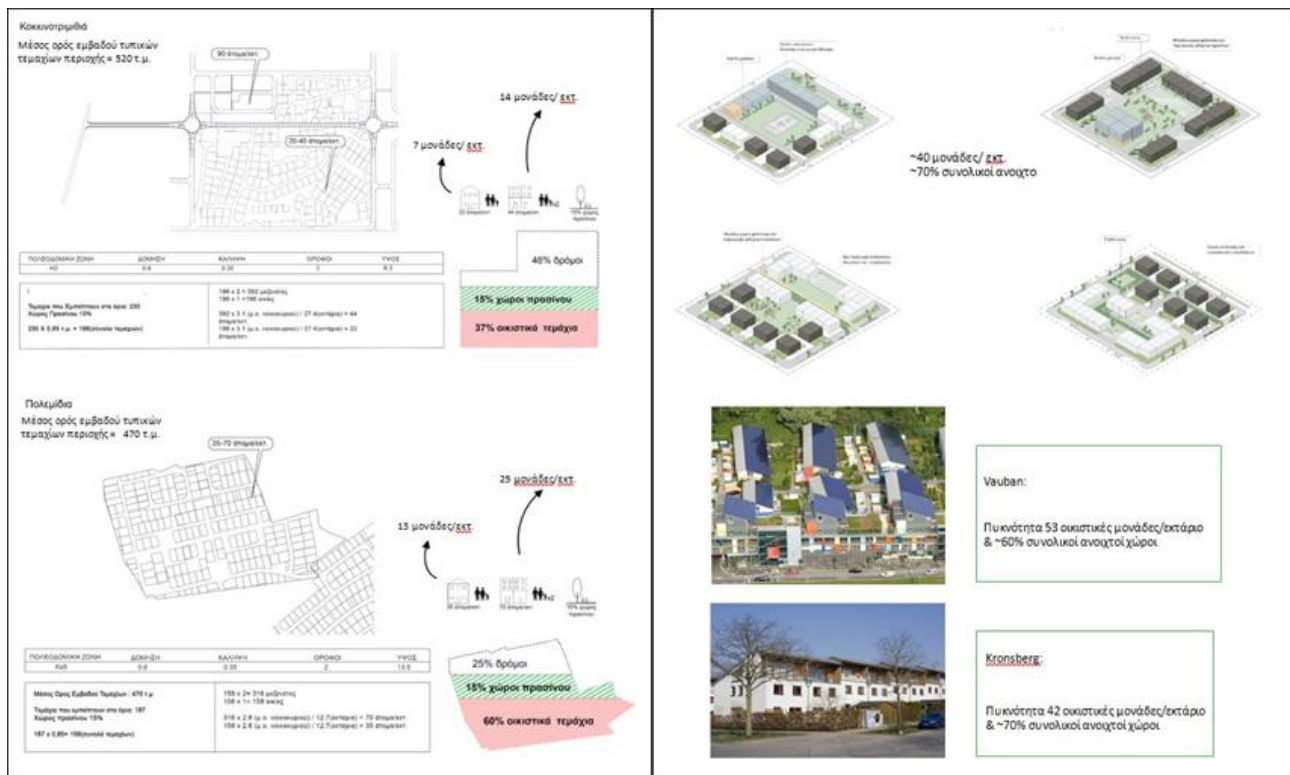


Figure 9. Comparison of layout to neighbouring built-up areas

In contrast, if the existing divisions of typical plots of each area were used, with the new type of a large building block and the use of various and smaller units in various hectare arrangements, these would be consistent with those observed in European neighborhood unit standards. Similarly, total open spaces (green spaces whether public, private or shared) also show higher percentages when compared to known patterns in European neighborhood unit standards.

4. AN EXAMPLE AND AN EPILOGUE IN LIEU OF CONCLUSIONS

In this particular neighborhood unit example, the built space creates a central perimeter typology, consisting of 41 residential units of mixed habitation typology, corresponding to 100-125 people per hectare.

The housing units enclose a central green, collective area with sports facilities and two common transition areas that penetrate the neighborhood unit at its ends, as shown in Figure 10.

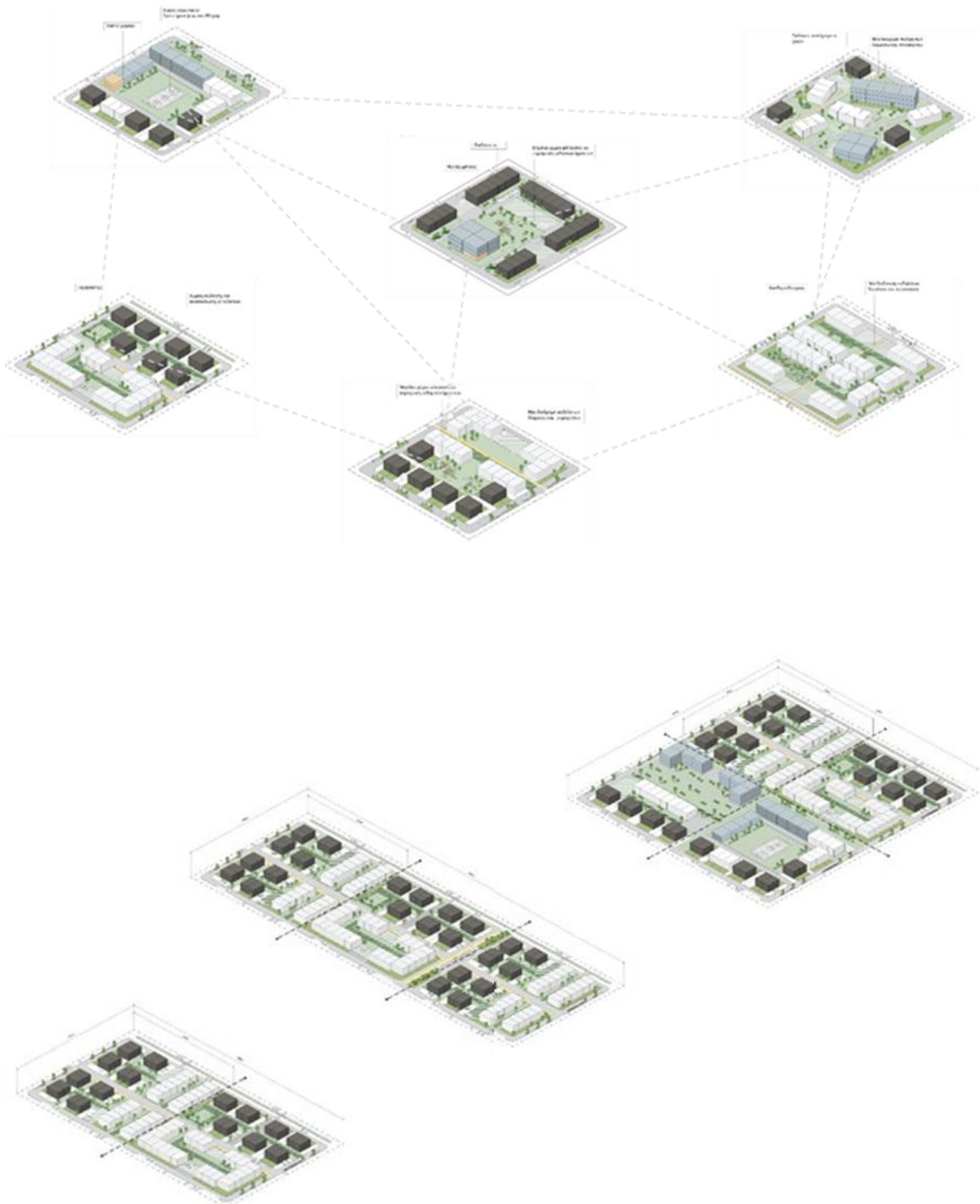


Figure 11. Perceiving the proposed superblocks as pieces of a puzzle, where a network of different uses and semi-public spaces is created in resonance with eco-neighbourhood practices.

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NEW EUROPEAN BAUHAUS

**CHANGING
CITIES**



Changing Cities VI, Rhodes, 24 - 28 June 2024

Organized and chaired by Prof. Riva Lava

Prof. Riva Lava, School of Architecture, National Technical University of Athens, Greece

Towards a Regenerative Built Environment. The Barcelona Protocol for the City and the Earth

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Extended abstract

The object of this paper focuses on the exploration of cities as carbon sinks, that function more like forests, as self-sufficient hybrid green bio-lungs that produce the resources to thrive and enhance quality of life in densely populated urban centers. Humanity is experiencing a paradigm shift in which the notions of matter, sustainability and quality of life in densely populated urban centers are being redefined. Almost a century since the establishment of Bauhaus in Weimar by prominent architect Walter Gropius, on 8 June 2022 Bauhaus Earth launched, and established at the MAXXI Museum in Rome the New European Bauhaus initiative, named “Toward re-entanglement: a charter for the city and the earth”, while creating a manifesto expressing that our cities can act as carbon sinks and create equitable development opportunities by becoming climate positive, creating new value systems and promoting equitable societies.

After the Charter of Rome launching, the “Reconstructing the Future for People and Planet” conference, hosted by Bauhaus Earth and the Pontifical Academy of Sciences, took place between 9-10 June 2022. The New European Bauhaus vision is looking at a different way to deal with our built environment. Prof. Hans Joachim Schellnhuber, founder of Bauhaus Earth, stated that there are three conditions for achieving climate restoration. The first is the reduction of greenhouse gas emissions by 2050, the second is the better protection of natural ecosystems and the third one is the creation of additional carbon sinks. Following this line of thought, Ursula von der Leyen, initiator of the “European Green Deal”, states that all 27 members agreed on two goals: to be climate neutral by 2050 and to reduce greenhouse gas emissions by at least 55 percent by 2030. The “Reconstructing the Future: Cities as Carbon Sinks” conference papers were published in 2023, while many initiatives have been launched ever since.

To this end, this paper is to highlight the “European Action Plan for the City and the Earth” presented at the Mies van der Rohe Pavilion, in Barcelona, on 4 October 2022, as an initiative of Bauhaus Earth, IAAC - Institute for Advanced Architecture of Catalonia, European Forest Institute (EFI) and Barcelona City Council. Since Barcelona was selected as the European Forest City 2022, the Barcelona Protocol called on European cities to take a lead, while underlining that the future of the earth, its ecosystems and our own civilization will be decided in and by our cities.

Keywords: *Climate Crisis; Circular Economy; Bio-cities; Architecture Ecology; Material Energy.*

1. INTRODUCTION

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The construction sector is responsible for over 35% of the EU's total waste generation and accounts for about 50% of all extracted resources and an estimated 5-12% of total GHG emissions. Forests cover 31 percent of the planet. Approximately half of this forest area is reasonably intact, and more than one third is primary forest. The net loss of forest area has decreased significantly since 1990, but deforestation and forest degradation continue at alarming rates resulting in significant loss of biodiversity. The world is not on track to meet the target of the United Nations Strategic Plan for Forests to increase forest area by 3 percent worldwide by 2030. Urban and built-up areas are equal to 1% of the total land area of the world [1]. The carbon sequestered in a tree has already been absorbed from the atmosphere. The benefit of sustainability and responsible construction is to protect wood so as not to release carbon back into the atmosphere. Storing carbon in buildings may create cities that could act as oxygen capacitors. The more we build with wood, the more carbon is stored to protect our environment and our existence on the planet. The use of mass timber construction has the potential to counterbalance short-term declines in the carbon stock of forests [2]. As they regrow, they will renew their place in the carbon cycle, absorbing carbon dioxide. In general terms, as global temperatures rise, increasing the effects of climate change on forests, the relocation of carbon from the forest to the urban environment may counterbalance these effects, along with those caused by dwindling land-based carbon sinks. The Charter for the City and the Earth, initiated by Bauhaus Earth is committed to a call to action towards the systemic transformation of buildings and cities to rebalance nature's health [3]. To this end, this paper is to highlight the "European Action Plan for the City and the Earth" presented at the Mies van der Rohe Pavilion, in Barcelona, on 4 October 2022 [4].

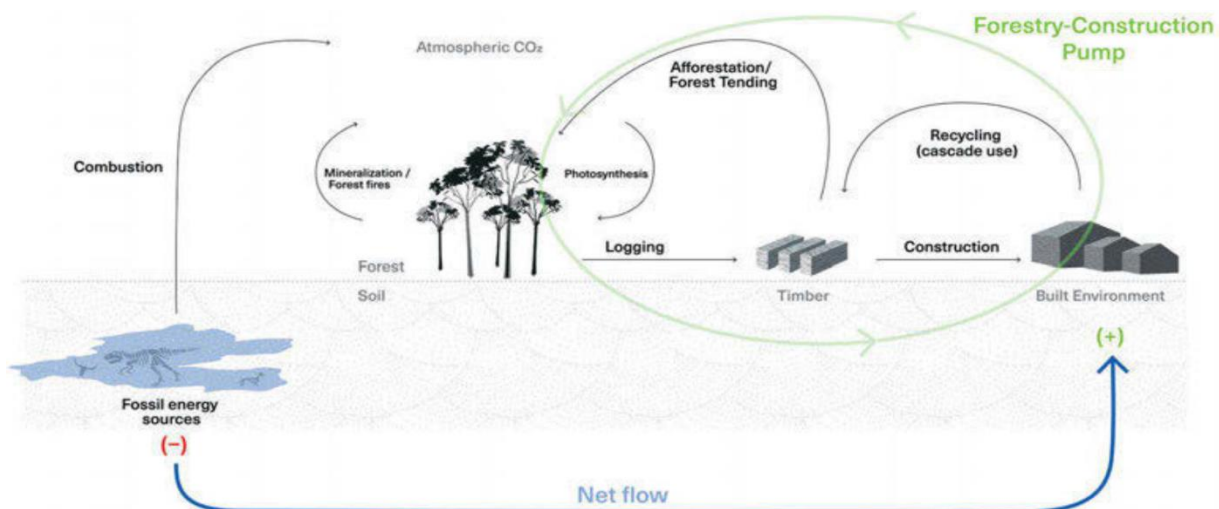


Figure 1. The Forestry Construction Pump (Schellnhuber H.J., 2023, "Saving the World by Construction", in Bauhaus Earth, Schellnhuber H.J., Tiseyra R.A. *Reconstructing the Future: Cities as Carbon Sinks*, Basel:Birkhauser, 32).

2. THE BARCELONA PROTOCOL

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Since Barcelona was selected as the European Forest City 2022, the Barcelona Protocol called on European cities to take a lead, while underlining that the future of the earth, its ecosystems and our own civilization will be decided in and by our cities.

“The future of the earth, its ecosystems, and our own civilization will be decided in and by our cities. Only if we ensure that the material, means, and methods with which we build and manage our cities are primarily drawn from regionally available and sustainably managed biological resources can we transform our urban settlements from culprits of climate change to catalysts of eco-systemic healing. The vision for a regenerative built environment has been described in the 2022 Charter for the City and the Earth, presented in Rome. Now is the time to put this vision into reality. The Barcelona Protocol calls on European cities to take a lead.”

SHORT-TERM MEASURES

1. CO2 CENSUS – stage one
2. DEMOLITION MORATORIUM
3. NEW BUILDING GUT CHECK
4. MICROCLIMATE MONITORING
5. PUBLIC GREEN PROCUREMENT

NEXT STEPS ALONG THE DECARBONISATION PATHWAY CAREFUL CITY REPAIR (existing buildings and infrastructure)

1. CO2 CENSUS – stage two
2. CARBON TRIAGE
3. CO2 BUDGETS
4. NET ZERO CARROTS

CARBON POSITIVE CONSTRUCTION (new building and infrastructure)

- NO WASTE CONSTRUCTION
- LIFE CYCLE DESIGN
- DESIGN FOR DURABILITY, DISASSEMBLY, and REUSE
- CARBON BANKING

OPEN SPACES and BIODIVERSITY

- CITY AS A FOREST
- TALKING TREES
- BIO-SUBSTITUTIONS for CONVIVIAL URBAN MOBILITY
- ECOSYSTEM SERVICES
- ENRICHING BIODIVERSITY

BIOREGIONS

1. CARBON SINK RESTORATION
2. NATURAL ECOSYSTEM ACCESS
3. NATURAL CAPITAL INVESTMENT

CROSS-CUTTING ACTIONS

- CREATIVE GOVERNANCE AND FINANCE
- EXPERIMENTATION
- CARBON POSITIVE KNOWLEDGE BUILDING AND EXCHANGE
- ACTIVE AND INFORMED GREEN COMMUNITIES

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ACTION FRAMEWORK

3. MASS IS MORE

The “European Action Plan for the City and the Earth” presented at the Mies van der Rohe Pavilion, in Barcelona, on 4 October 2022, as an initiative of Bauhaus Earth, IAAC - Institute for Advanced Architecture of Catalonia, European Forest Institute (EFI) and Barcelona City Council. Mass Is More was a project by the Institute for Advanced Architecture of Catalonia (IAAC) and Bauhaus Earth at the Barcelona Pavilion. The two-week exhibition explored the use of regenerative and carbon-negative architectural materials, exposing the multi-layered processes behind the construction of the built environment. Mass is More radically transformed the Pavilion with large laminated timber structures that represent a material departure from the Modern Movement – mostly concrete and steel – in favour of renewable, carbon storing biomaterials that are sourced regionally and sustainably. The installation is related to the thin planes of Mies van der Rohe's pavilion in Barcelona, using cross-laminated timber.

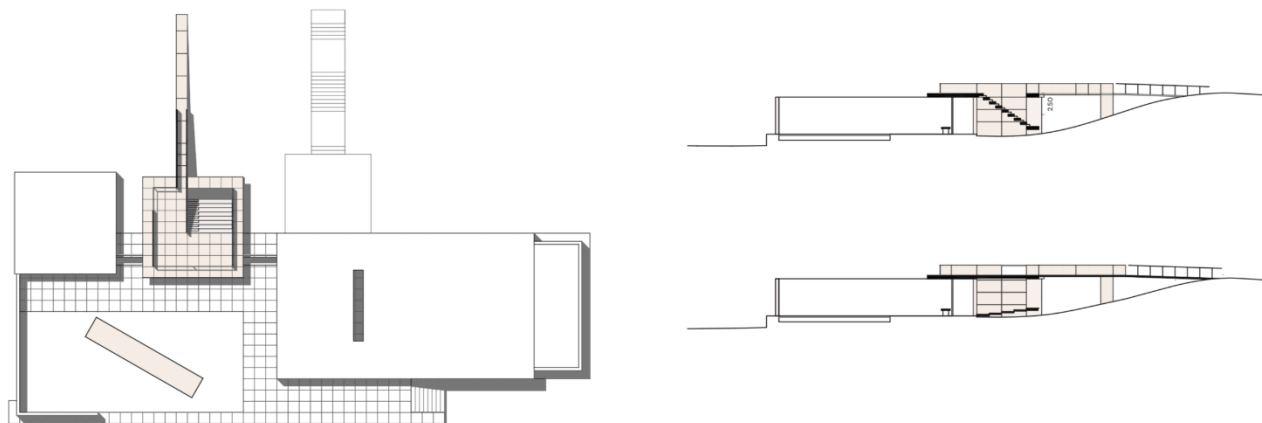


Figure 2. Architectural Drawings. Image Credits: IAAC & Bauhaus Earth. (<https://www.archdaily.com/990470/mass-is-more-installation-arquitectura-avanzada-de-cataluna-iaac-plus-bauhaus-earth>), Accessed May 2024.

If the 19th century was characterized as the century of steel and the 20th century as the century of concrete, then the 21st century is positioned to become the century of wood. This assertion is not solely based on wood's constructive qualities, but also on its potential positive externalities. Industrialized solid wood possesses the capacity to establish an exemplary model of a circular economic flow. Being of renewable origin, its utilization promotes sustainable forest management. Moreover, it demonstrates the ability to securely sequester CO₂, and its lightweight nature, ease of transport, and insulating properties make it an advantageous structural material. Furthermore, it facilitates rapid construction, offering enhanced control over construction sites, reduced risks, and minimized pollution. The new installation at Barcelona Pavilion, develops a conversation between the cutting-edge materials of the 20th century and those of the 21st century. Featuring a series of components produced from cross-laminated timber panels sourced from local forests, the installation showcases the structural potential of wood and its appropriateness for building more sustainable structures with significantly reduced environmental impact. Alongside the physical installation, the exhibition highlights the narrative of the new materiality through different sections.

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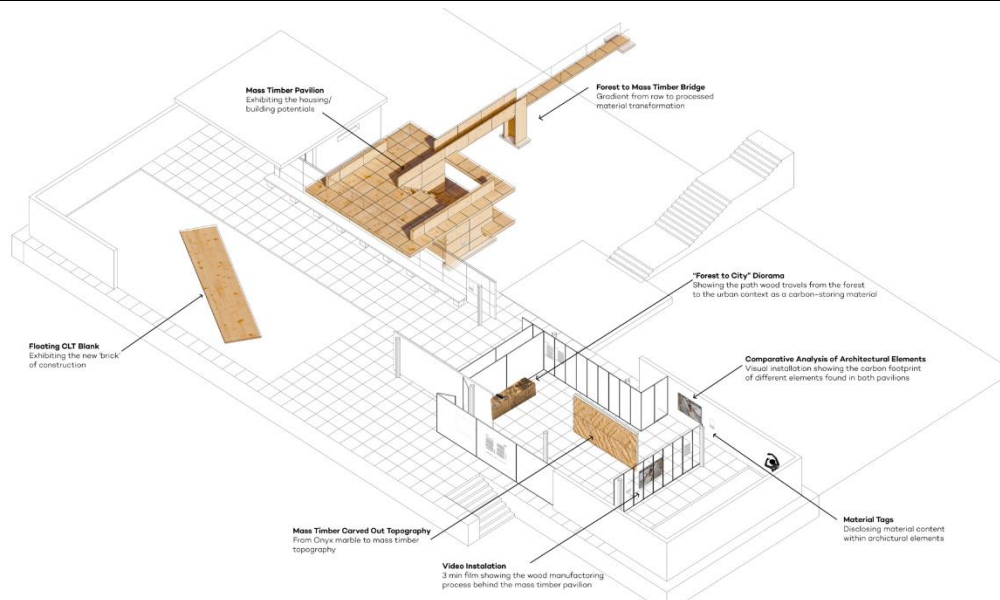


Figure 3. Axonometric Analysis of the Installation. Image Credits: IAAC & Bauhaus Earth. (<https://www.archdaily.com/990470/mass-is-more-installation-arquitectura-avanzada-de-cataluna-iaac-plus-bauhaus-earth>), Accessed May 2024.

3.1 Forest to City Diorama

The exhibit includes a 4.8-meter-long diorama that illustrates the path of wood from the forest to the city, highlighting its properties as a carbon-storing material. This includes the harvesting of trees used to produce the pavilion, followed by extraction, processing, and assembly, and extends to the replanting process that symbolizes the regeneration and sustainable use of the material, presenting the topic with radical transparency.

3.2 Mass Timber Curved out Topography

The pavilion's onyx central wall is reimagined with new textures created from a CLT panel composed of multiple wood species. Replicating the original marble geometry, the panel is digitally milled to create a three-dimensional mass timber topography that reveals its various layers.

3.3 Comparative Analysis of Architectural Elements

The visual installation showing the carbon footprint of different elements found in both pavilions. An interactive digital application provides a comparison of the environmental impacts between the 1929 Barcelona Pavilion and the mass timber installation. To ensure an accurate comparison, only architectural elements such as the roof, walls, columns, and floor were taken into account. The comparative analysis includes the embodied carbon emissions in each element, as well as the energy consumed, kilometers travelled, and steps taken during the extraction, manufacturing, transportation, and assembly processes. This digital feature is accompanied by analogue tags on various vertical elements of both pavilions, listing all materials used in their construction. Moreover, visitors can watch a video installation by filmmaker Jaume Cebolla within the pavilion, which depicts the transformations of the wood harvested for the mass timber structure from a first-person perspective.

3.4 Mass Timber Pavilion

The design of the installation reflects the original pavilion's formal grid, creating an alternative narrative and offering a new way to experience the site with new pathways and view corridors.

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Throughout the tour, visitors will see different uses and representations of wood and modern building technology. The entrance to the space reverses the traditional circulation, allowing visitors to first pass through the trees in the garden behind the pavilion. An elevated walkway leads to a cantilevered platform that provides unprecedented views of the Barcelona Pavilion. This platform also grants access to an auditorium. This transition is related to link the processes from forest to mass timber bridge, showing the gradient from raw to processed material transformation.

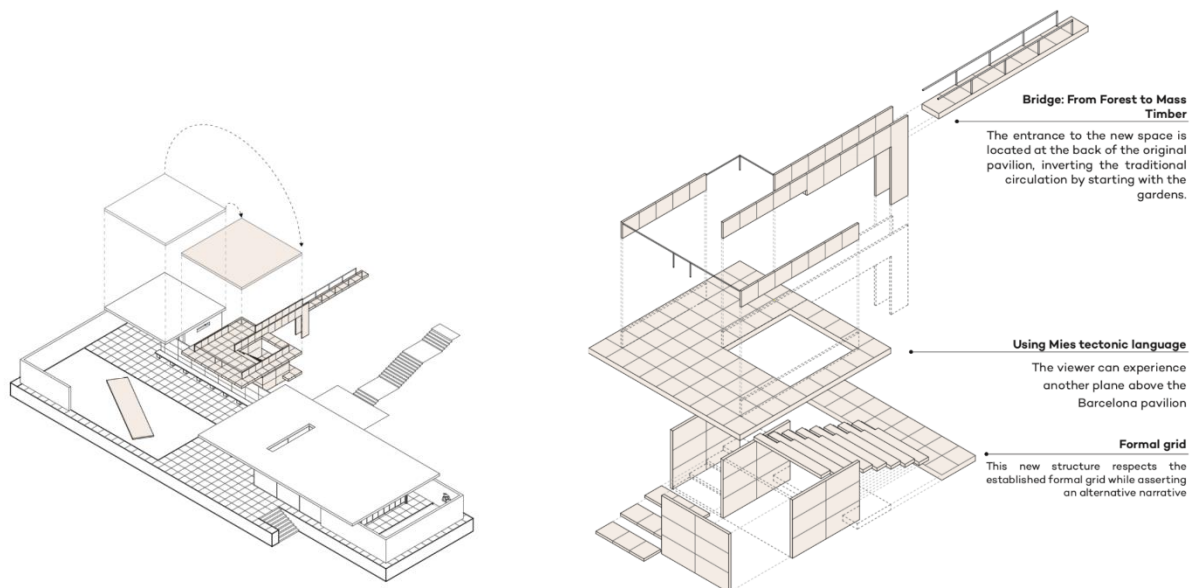


Figure 4. Fabrication Grid & Tectonic Language. Image Credits: IAAC & Bauhaus Earth. (<https://www.archdaily.com/990470/mass-is-more-installation-arquitectura-avanzada-de-cataluna-iaac-plus-bauhaus-earth>), Accessed May 2024.

3.5 Floating CLT Blank

A 12 x 2.5 meter industrialized wood panel has been installed in the pavilion's pond, illustrating the 19th-century process of transporting materials directly from the forest to the factory via the river. This line of thought, exhibiting the new "brick" of construction.

4. CONCLUSION

Cities play a pivotal role as hubs for absorbing CO₂ emissions. The majority of emissions stemming from buildings occur during the construction phase, encompassing material sourcing, rather than from their operational emissions. [5] In this context, the sustainable management of productive forests emerges as an optimal natural solution for mitigating carbon dioxide (CO₂) emissions. Furthermore, numerous productive forests are not optimally managed for carbon sequestration due to factors such as intensive logging practices and abbreviated harvesting rotations. However, the advocacy for wood as a primary building material could catalyze heightened demand for certified wood products, thereby incentivizing the adoption of more sustainable forest management strategies. The transition towards integrating wood into urban environments necessitates the implementation of incentives to overcome prevailing barriers. These barriers encompass sectoral uncertainties, a scarcity of companies and experts specializing in industrialized solid wood, inadequate incentives and regulatory frameworks supporting wood-based construction, and a general lack of awareness regarding the environmental benefits of wood. New initiatives should be born with the intention of overcoming these challenges and barriers, with the aim of communicating, coordinating and connecting agents in the use of these construction systems, accelerating their growth.

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Mapping the Externalities of Contemporary Architectural Design in the Environment

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Extended abstract

Construction is arguably the most important pillar of our financial system and architecture is undoubtedly a very important part of this. The building industry, that architects operate, is one of the major contributors to climate change. 36% of CO₂ emissions is generated in the process of construction alone, but even though it negatively affects the quality of life for everyone, is not an expense that is paid accordingly by the responsible individuals. At a time of energy transition, how contemporary architectural design can contribute to climate goals and improve the quality of life for all citizens?

Recognizing the worldwide urge for a transition towards greener, sustainable, beautiful and inclusive cities and rural areas with prosperous citizens, as it was validated by United Nations Agenda 2030 for Sustainable Development and the New European Bauhaus (NEB), this paper attempts to investigate the value of contemporary architecture mapping its externalities to the environment, and consequently to wellbeing. Architecture plays a crucial role in the NEB initiative, driving the transformation of the built environment and promoting sustainable living, aesthetics and inclusion for the benefit of everyone. Knowing that the value of contemporary architecture is often underestimated, this paper aims to illustrate the cultural value in conjunction with economic value of architecture, contributing in understanding the overall impact of contemporary architecture to the environment and to shed light on good practices. The cultural value derives from the fact that architecture as public good produces externalities and “in the economics of heritage, has been represented as a multifaceted and shifting concept that has no single unit account” (Mazzanti 2003, Choi 2010). The economic value is defined using methods of economic analysis and can be expressed in monetary terms. Given that the resources are finite and their management is always an issue, it is important to assess both market and nonmarket values of architecture and to shift the focus from a strictly economic-centered towards a more people-centered, long-term evaluation in architecture management and policy making. After all, nonmarket effects or externalities of contemporary architecture have significant impact on the natural and built environment and its residents, extending to present and future generations, that can even exceed the hard economic effect and therefore should be explored and taken into account during decision making.

Keywords: *architecture; cultural value; economic value; sustainability;*

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Framing Collective Spaces through Recreation and Sports – the Mediterranean Games in Split and Emerging Urban Identities

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Extended abstract

The intertwining relationship between space, sports, and urban culture along the Eastern Adriatic coast, particularly in Split post–World War II, exemplifies how geopolitical, social, and physical landscapes can shape and are shaped by athletic and urban cultural practices. In the aftermath of WWII, Yugoslavia embarked on a project of socialist modernization that significantly impacted urban development and sports across the country, including its coastal regions.

As the host city of the Mediterranean Games in 1979, Split became a central hub for this transformation. The period preceding the Games witnessed a surge in the construction of sports facilities, public parks, and recreational areas, seamlessly integrating sports into the fabric of everyday life and urban culture.

The complexity of the planning, organization, and managing of the Games extended beyond mere physical infrastructure; it underscored the significance of mobile and the intangible infrastructures crucial to orchestrating a multinational athletic contest and its associated spaces. Apart from the organizational bodies, other labor mobilities were involved; volunteers of socialist youth organizations, high-skilled sports workers, and enthusiasts played a pivotal role in the event's 'construction' process and execution, reflecting a broader ambition to promote a collective identity and a lifestyle that values physical fitness, leisure, and sports as essential components of citizenship. Moreover, the Games also highlighted the role of sports in diplomacy and international relations during the Cold War era, reaffirming Yugoslavia's position amidst the iron curtain, an unaligned, progressive identity open to visitors from all sides.

Within the Yugoslav socialist system and less than three years, the infrastructural renaissance of Split was successfully realized, as a long-term result of rational and efficient planning of all the elements of the Games, therefore outliving its dominant political dimension and specific historical circumstances.

Today, the enduring legacy of this period remains palpable, as the relationship between space, sports, and urban culture amalgamated heritage, socialist modernization, and the Adriatic landscape. Revisiting such case-studies serves as a broader lesson on the role of health and hygiene in articulating the modernist goals of the 20th century, but also prompts a revisiting of the contemporary goals of the New European Bauhaus and the hidden infrastructures making their realization possible. Drawing parallels between state-led initiatives enabling systemic interventions in recreation, green spaces, citizen inclusion and high-quality architecture is more than timely.

Keywords: *collective spaces; sports infrastructure; urban identity; Mediterranean Games; Split*

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The urban condition and the challenges of the 21st century: understanding threats and principles of intervention through water

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Extended abstract

This paper intends to present the syllabus of the course Urbanística 2 of the Integrated Master in Architecture of the Faculty of Architecture of the University of Porto. Urbanística 2 is a theoretical subject that reflects on the urban condition and the challenges of the 21st century.

The recent development of the contents of this course has made it possible to adjust it to the principles defended within the framework of the initiative 'NEB goes South': a platform founded by six architecture schools at universities in six different countries, which recognise the shared geographical and cultural legacy of the countries of southern Europe. 'NEB goes South' considers education as its primary goal, taking into account the decisive role of higher education and research institutions in promoting inclusive participation to present solutions, organising and disseminating the results.

The perspectives addressed in Urbanística 2, and the content covered in the course are based on the principle that defends that implementing shared values of sustainability and inclusion as established by the New European Bauhaus cannot only be understood as an environmental or economic project, it must also be understood as a new cultural 'project' in which the whole of society is involved and where educational institutions play a decisive role. Creative solutions are crucial to improving urban areas, changing mentalities and raising awareness of the essential issues of our time.

Water is the topic that mobilises discussion and makes students aware of the complexity of perspectives and the diversity of issues that converge in cities. Water is emphasised as a central element in the past history of urban agglomerations and, above all, as a determining factor for the qualified future of their existence: the risks of its absence or excess are presented and discussed using concrete examples that describe the effects of the current climate changes framework.

The natural water network and the artificial supply system, water-related artefacts, and permeable and impermeable areas, among others, give visibility to traditionally imperceptible topics. To future architects, it must be clear that architectural or urban projects that respond to the population's discerning questions must acquire new levels of depth and integrate new demands that address the effects of climate change.

By crossing disciplinary boundaries, water reveals the importance of a multidisciplinary approach. It demonstrates new possibilities of intervention and the correlated role of different disciplines that emerge within the threatening reality of contemporary urban realities.

This paper presents the sequence of issues addressed, the exercise proposed for the students' assessment and the results obtained in the scope of the course in the last three years.

Keywords: *New European Bauhaus; NEB goes South; co-design; water; education*

Designing communities with the “New European Bauhaus”- The architecture of coming together

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Extended abstract

The work entitled “Eating Together as Architectural Program” began during the pandemic, when people were staying at home and social life was abruptly disrupted. A return to natural landscapes re-establishes the communities in their primal form by creating spaces of coexistence and exchange around a table. This archaic form of sharing was situated in selected natural settings with the aim to bring forth cultural context and natural beauty. Not long after the New European Bauhaus was launched, small groups of people started to gather together and explore the power of ritual and place. “Eating Together” is a project based on the New European values “Beautiful, Together, Sustainable”. The presentation features a number of such case studies, which lead to a normative expression of design principles and cultural underpinnings gathered in a toolbox. By investigating the hidden potential of landscape, eating tables become the module to structure the open space and design ritual and co-existence.

“Beautiful, Together, Sustainable” lead to a set of anthropological design tools which are next applied within the urban tissue of downtown Athens, opening new and unexpected possibilities of city life.

This project explores how an architectural program can be obtained originating from the study of activated landscapes, both natural and urban. The gatherings that served as case studies for the project were specifically linked to their locations under a singular thematic. Both natural and man-made landscapes were chosen for this study to look into the ways they interact with it. This study concludes by presenting a generalized theory around architectural design and its principles.

“Beautiful, Together, Sustainable” points to the reinvention of cityscapes in the ways already explored through the first leg of the project: the values governing gatherings around the table now provide complex analogies and activate the potential of cities. New spaces, uses and programs emerge from the experience beyond the built and is transliterated in sustainable, simple urban enclosures for newly established communities. Building concepts are conceived from unconventional frameworks and architectural programs are informed by the rich experiences cultivated through coming together. This approach creates new architecture that not only redefines the urban landscape, but also enhances the quality of life for European citizens and communities.

Delving deeper into the design ethos we challenge conventional paradigms with which new possibilities allow to sculpture the Athens of tomorrow. The project adopts a holistic view to not only redefine the physical aesthetics of urban space but to also cultivate vibrant communities and sustainable eco systems opening the way for a more resilient future.

Keywords: *community; designing with the landscape; architectural program; eating together; New European Bauhaus*

**TOURISM RESILIENCE AND ENVIRONMENTAL
TRANSFORMATIONS: NEW CHALLENGES FOR CULTURAL
AND SOCIO-ECONOMIC SUSTAINABILITY**

**CHANGING
CITIES**



Changing Cities VI, Rhodes, 24 - 28 June 2024

Organized and chaired by Assis. Prof. Konaxis Ioannis

Assis. Prof. Konaxis Ioannis, Department of Tourism Studies, University of Piraeus, Greece

Tourism Resilience and Environmental Transformations: New Challenges for Cultural and Socio-economic Sustainability

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Abstract

Tourism sector gradually recovers from the severe environmental and socio-economic impacts of the Covid-19 pandemic while there is currently attempts to handle the consequences of the war in Ukraine and the Gaza Strip, the Middle East. The World Tourism Organization (UNWTO) by means of the Glasgow declaration 'Climate Action in the Tourism Sector' signed by its members in 2021, encourages faster actions to protect tourism destinations and businesses threatened by the climate crisis. The signatories committed to apply the terms of the Agreement on 5 main axes: Measure, Decarbonize, Regenerate, Collaborate and Finance. Tourism development is extremely fragile while the global community facing the risk of the climate crisis, enhances the aim of resilience so as to reinforce socio-economic development and cohesion. This paper aims to point the necessity to understand and clarify the importance of socio-cultural values in the tourism sector. In cases these values are not apparent, a strategic plan of actions and objectives will provide a sustainability in each regional unit of study in order to reinforce local identity and tourism development. Such actions relate to the environmental transformations which do not exclusively involve to common green spaces but also the materials and intangible values of the area. In addition to this, all actions have to deal with the economic impact of tourist activities; sustainable tourism has also limits, as for example, from the growing differentiation within communities, from social conflicts, from problems deriving from the decision-making process adopted, from the lack of technical knowledge and training, from changes in the social structure. Community-based tourism is part of the practical dynamics of the supply and demand of the market; and its development is grounded on synergies among the local stakeholders with touristic interest, and tourism experts having the knowledge to strengthen and highlight the environmental and socio-economic background of the areas. Keywords: sustainable tourism, tourism resilience, landscape transformations, cultural management, The Glasgow Declaration.

Keywords: sustainable tourism, tourism resilience, tourism, landscape transformations, cultural management.

1.Introduction

As the Tourism sector gradually recovers from the severe environmental and socio-economic impacts of the Covid-19 pandemic, it is called upon to face the corresponding consequences of a war situation between Russia and Ukraine as well as that in the Middle East in the Gaza Strip.

The World Tourism Organization (UNWTO) with the Glasgow declaration 'Climate Action in the Tourism Sector' signed by its members in the year 2021, encourages faster actions to protect tourism destinations and businesses threatened by new facts of the climate crisis. The signatories committed to base this agreement on 5 main axes: Measure, Decarbonize, Regenerate, Collaborate and Finance. Tourism development is an extremely fragile case for the global community which, faced with the risk of the climate crisis, must acquire a character of resilience in order to obtain a stable Socio-economic development.

2.The strong upheavals in World Tourism from 1990 to 2024.

The concept of tourism includes a multidimensional interpretation and synthesis which has a supralocal and multinational character. With globalization policies affecting the societies and

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economies of the planet, their influence on tourism was inevitable and experienced a great flourishing which reshaped the daily human life. The world tourism organization(UNWTO) had already predicted this development in its researches from the year 2013(Figure 1.1). International tourist arrivals have risen from 278 million in 1980 to 1035 million in 2012 and was expected to grow by 3.3% a year on average from 2013 to 2020. The multifaceted conditions created during the pandemic period in the first half of the year 2020 were unexpected and unfavorable for international transport and for entrepreneurship based on tourism. Both the health crises and the economic crisis since 1990, had affected the tourist arrivals map whose data is reflected in the Figure 1.2. of statistical forecasts as issued by the UNWTO on 2023 report. In the light of these dynamic developments, the expansion of the tourism business worldwide has taken on different aspects. For example, the creation of professional relationships between hotel units, tourist agents and other investment fuds, in recent years has become more powerful, trying to give tourism entrepreneurship a global character. Among the reasons that have pushed towards the internationalization of tourism businesses are some that are common to all tourism sectors, including, in particular, the internationalization of demand. This new trend arises as a result of increasing disposable wealth and a redefinition of the value placed on leisure time for vacations.

At the same time, additional factors of influence have been the increasing mobility of international labor and an aspect that is no longer secondary, the greater mobility of social and migratory flows.

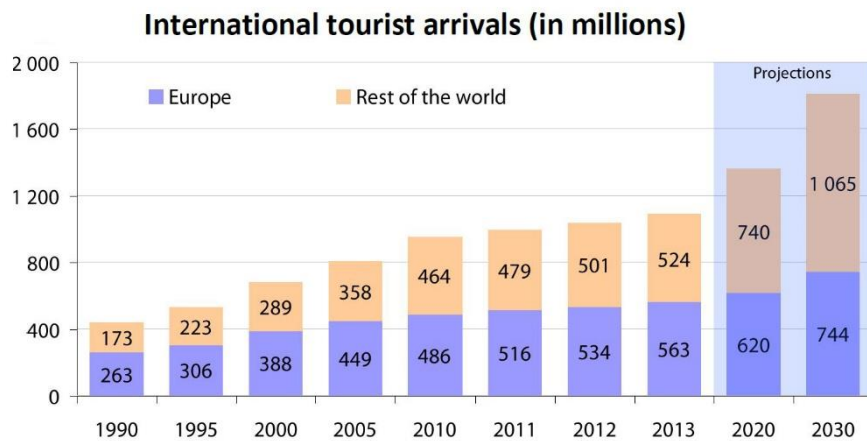


Figure 1.1.: International Tourist Arrivals Worldwide, Data Source: World Tourism Organization(UNWTO) – Tourism Highlights 2013.

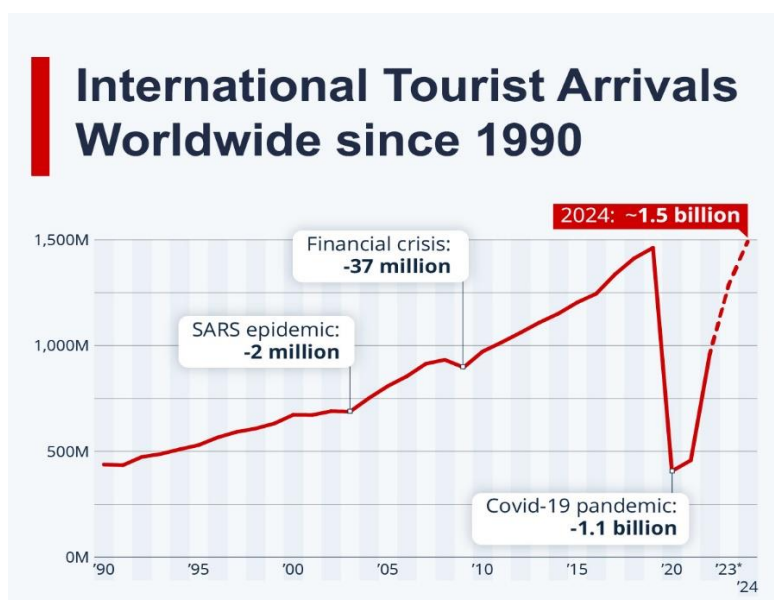


Figure 1.2.: International Tourist Arrivals Worldwide, Data Source: World Tourism Organization(UNWTO)-2023

3. The Glasgow Declaration: an importance of Environmental Sustainability in Tourism

The Conference of the United Nations on Climate Change was held in Glasgow in November 2021, where the world's leaders gathered to discuss the interventions to be made to face the phenomenon of climate crisis. It is on the occasion of this event that an important document is drawn up, destined to become another milestone in the fight against climate change and in the definition of tourism sector strategies: the declaration of Glasgow. This statement contains in itself the need and urgency to accelerate climate action on the part of the tourism sector, in order to cut the amount of greenhouse gas emissions in the next decade and to reach the so-called Net Zero Emissions by 2050. A first point to reflect on is precisely the way in which the travel experience proposed to the visitor is created: if priority were given to the well-being of the community and ecosystems rather than preferring activities with a high environmental impact, tourism could be considered an excellent example to hope for a more eco-sustainable future. The Glasgow Declaration on climate action aims to bring together and create a common path between various governments and all institutional bodies, financial institutions, international organizations, civil society, private sector and education.

The signatories of the Declaration, in order to ensure a concrete commitment, operate following five different directions:

- **measure:** make the data, methodologies adopted and tools relating to travel and tourism available and accessible to the entire tourism sector, ensuring that they are in line with the United Nations Framework Convention on Climate Change.
- **decarbonise:** set and meet targets aligned with global carbon reduction objectives in the tourism sector, this would include transport, infrastructure, related activities, accommodation, food and drink and waste management.
- **regenerate:** restore and protect ecosystems, promoting nature's ability to naturally absorb carbon dioxide, safeguard biodiversity, food security and water supply; ensure that tourism helps and supports the areas most in difficulty; promote a better relationship between visitors/local community and nature.
- **collaborate:** share information on risks and solutions to various problems with all stakeholders. Strengthen governance and capacity for action at all levels.

- **finance:** ensure that resources are sufficient to achieve the objectives set out in climate plans, including funding for training, research and implementation of appropriate fiscal and policy tools.

4.The Environmental role of Sustainability in Tourism

The concept of sustainable tourism therefore, as it has been structured, envisages on the one hand the reduction of tensions and frictions that are created by the complex of interrelationships between the tourism industry, tourists, the environment and the host communities. In addition to this, the construction of a process in which human resources, together with natural ones, are able to persist over time without sacrificing quality and are able to respond to an ever-increasing demand, due to the spread of tourism even in those Countries experiencing strong expansion and once considered not touristically relevant. The concept of "sustainable development" associated with tourism has now become a globally accepted term, very widespread in common language, in the political panorama and among professionals in the hospitality sector, especially for promotional purposes; however, several authors identify limits to this concept.

The debate on the negative externalities produced by mass tourism historically focused on problems related to social and economic aspects. In the end of the 1980s' and beginning of the 1990s', the discussion was focused on problems relating to environmental aspects and also begin to be taken into consideration, like protection of natural resources and sites of historical and cultural interest. The distorted development model focused on objectives based exclusively on concepts such as progress, growth and modernization that appeared successful in those years, where well-being and quality of life were associated exclusively with economic rules, considered the natural environment exclusively as a source of production and improvement without taking into account the limitations of resources and the deterioration of the natural environment.

Already in 2012, the European Union issued a guide with the cooperation of the European Commission's Directorate-General for Development and Cooperation - EuropeAid in order to promote the values and perspectives of Sustainable tourism with the project entitled: " Enhancing capacities for sustainable tourism for development in developing countries". The World Tourism Organization (UNWTO) emphasizes the need to maximize tourism's contribution to development and international perception, while minimizing its negative impacts, paying particular attention to the development potential of developing countries. The Figure 2.1 depicts the methodology which is useful as a tool in order to constitute a system for assessing the state of the areas of interest but also a system for identifying weaknesses and gaps and examining possible actions.

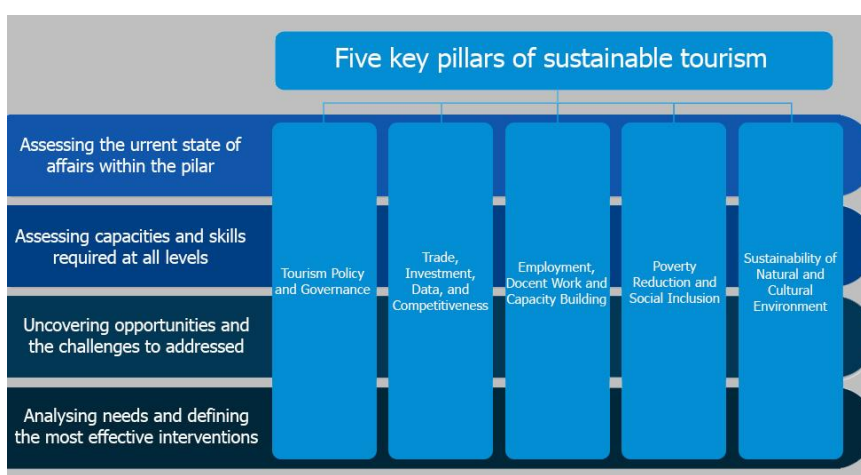


Figure 2.1.: "The Methodology": How to assess priorities for Sustainable Tourism in Developing Countries?,

Data Source: Sustainable Tourism for Development Guidebook (2013).

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5. Cultural and Social elements as tool for Tourism Sustainability

The cultural and social impacts of tourism are visible through the various modifications that underline the representations, material and immaterial, of the local culture. Researchers focus on three main cultural forms that attract visitors when they visit a destination: the forms of inanimate elements, therefore places with unique architectural or artistic characteristics, historic buildings, monuments, secondly another socio-cultural forms as attractions, it is considered the reflections in the normal daily life of a community. The visit mostly has the aim of observing local social, economic and leisure activities, in an attempt to understand their lifestyles, ideologies and customs. The third form are considered all animated elements like music festivals, carnivals, battle re-enactments, displays of old contraptions. Anthropologists have studied the acculturation process for decades and have understood that the intercultural meeting of two social groups of different origins is never one-way, but turns out to be a two-track exchange.

From another point of view, the relationship between tourism and social and cultural impacts proposed by Richards, supports that the distinction between cultural tourism and other forms of tourism is essentially that of being centered on the educational function. Cultural tourists can learn about a destination's culture and gain new experiences related to that culture in a variety of ways, depending on the forms of culture they consume. On the other hand, Littrell writes that culture can be defined as a set of attitudes, beliefs, ideas and values, models of normative behavior, or lifestyle and by people's artifacts such as works of art and cultural products. From this point of view, therefore, cultural tourism does not only concern the visit of places and monuments, but more than anything else it could be understood as the experience that the visitor has by coming into contact with the culture of the place, or with the attitudes, beliefs, ideas and values, patterns of normative behavior, or lifestyle, and from people's artifacts such as works of art and cultural products. These activities involve gathering new knowledge and experiences. Cultural tourism therefore includes not only the consumption of cultural products of the past, but also of contemporary culture or the 'lifestyle' of a group of people or region.

Various dimensions of culture are used in the context of tourism, although each has its own position independent of its mobilization for economic purposes. Therefore the key concepts that emerge in the context of cultural tourism are: cultural heritage, cultural diversity and cultural creativity. However, as regards a greater interest in consumption, it should be noted that the growing presence at cultural attractions does not in itself constitute proof that people are increasingly interested in culture. In fact this could be due to the fact that there are more people traveling or hiking and this phenomenon could lead to a greater number of people visiting cultural attractions simply because there are more visitors present in a particular location. Furthermore, various studies have underlined how there are various levels of consumer motivation towards culture which can be schematized as a concentric circle where at the center there is a category of people whose cultural motivation is very strong, at the opposite extreme a category which has no cultural reasons for visiting, while in the center we can highlight a very high percentage of people motivated in part by culture or for whom the cultural aspect is an addition to the motivation for the trip. However, a phenomenon of recent decades is the exponential growth of cultural offerings and tourist attractions.

6. Conclusion

This article aims to emphasize the necessity to obtain a perception at the level of national of a regional entity but also at the level of visitors and hosts in order to clarify the importance of socio-cultural values in the tourism sector. In cases where these values are not clearly discernible, it is time to take a plan of actions with decisions that will grant a durable character to each regional unit of study in order to be integrated with its tourism identity. Such actions are the environmental transformations which do not focus exclusively on the formations of green but also on the formations of materials and intangible values of the area. In addition to this for all the actions that have to deal

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with the economic impact of tourist activities, it must be clear that the form of sustainable tourism also has dictated limits, for example, from the growing differentiation within communities, from social conflicts, from problems deriving from the decision-making process adopted, from the lack of technical knowledge and training or from changes that have occurred to the social structure. Although it is difficult to recognize it, especially in light of its characteristics, community-based tourism is part of the practical dynamics of the supply and demand of the market. The importance of perception necessarily develops with synergies both of the local users of a destination with potential touristic interest and with scientific groups of different scientific fields who are capable, through scientific knowledge, to strengthen and highlight the environmental and socio-economic background of the areas.

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Tourism Sustainability and Cultural Resilience on Mykonos Island: Rethinking the dynamics and the adaptation of a creative conceptual model for the resilience-sustainability network in tourism

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Extended abstract

The initial idea of this paper starts from the concept of connecting cultural resilience with sustainable tourism on Mykonos Island. The notion of resilience is attracting increasing awareness in many academic disciplines and sectors. Resilience, in sustainability terms, has recently become a notable aspect in tourism literature as a term that encompasses sustainability, while acknowledging multiple contexts such as touristic capacity, vulnerability, decolonization, post-development and detouristification. The global effects of climate change such as rising temperatures, rising sea levels and extreme weather events, combined with the ever-increasing tourist numbers, especially in Greek islands such as Mykonos, have a major impact on cities and urban life, but also in historic places and monuments, due to their basic construction materials and their different urban planning. Based on the above, the proposal concerns the connection of resilience, as a new parameter of the evaluation of the tourism sustainability of cities, through the creation of a conceptual model for assessing the impact of resilience in places. The main goal is to introduce, through bibliographic research, related projects and papers which reflect or discuss the role of tourism sustainability in resilience worldwide and propose a new model or potential activities as part of the change, thus an efficient complementary tool that supports tourism through the concepts of sustainability and resilience on Mykonos Island.

Keywords: *sustainability; tourism; open data; resilience; Mykonos*

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Towards a Design Framework for Slow Travel: Investigating Human Environmental Perception during Cycling

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Abstract

Slow tourism as an alternative form of tourism has gathering momentum in academic research in recent years, especially since discussions on environmental sustainability and human well-being intensified due to the COVID-19 pandemic. As part of a slow tourism experience, slow travel mobilities are commonly carried out through active modes of movement, such as walking and cycling. Slow and active mobility for commuting purposes in urban settings has been extensively analysed by scholars, yet little research exists on its experiential and affective dimensions for leisure and tourism purposes in non-urban contexts. With the aim to lay the foundations for a comprehensive framework that explores human environmental perception and related affective experiences during slow travel, this paper presents an ongoing study that investigates the case of cycling in non-urban contexts. Using the method of intercept survey, the study adopts a person-centred approach that values the diversity and subjectivity of human environmental perception, thus yielding findings of qualitative and empirical nature. A preliminary analysis of the findings illustrates the differences in environmental perception and affective experience according to the various speeds and purposes of cycling. By unveiling the salient environmental features that influence a cycling experience for tourism and leisure purposes, the ultimate goal of this research is to contribute to design guidelines for cycling routes and slow travel infrastructures.

Keywords: *slow travel; environmental perception; cycling; landscape; person-environment relationship*

1. INTRODUCTION

Over the past two decades, a shift in forms of tourism has been pointed out in academic research and beyond, as a result of diverse factors affecting tourist decisions: the widespread economic crisis in Europe and elsewhere as a trigger for more modest choices [1]; the inherent unsustainability of mass tourism and its negative impact on landscape, communities and tourists themselves [2]; which leads to a search for authenticity and sense of place [3]. Alternative tourism practices are advancing, as discussions on climate change, environmental sustainability and human well-being have particularly intensified due to the COVID-19 pandemic [4]. Within this context, *slow tourism* is regarded as a sustainable form of tourism that encapsulates a range of spatio-temporal practices, immersive modes of travel and ethical relations that stem from the tourist's will to connect with and experience territories and places [5]. While slow tourism broadly encompasses practices of both movement and immobility, tourist mobilities between destinations are described by the term *slow travel* and are carried out through active modes of movement. Despite the emphasis that scholars ascribe on the *experiential* dimension of slow travel, as well as its potential in fostering an interaction between tourist and landscape, little research exists on how such an experience is articulated and on its practical implications for the design of slow travel infrastructures. This paper is based on the hypothesis that slower speeds and active modes of movement enrich human environmental perception and generate affective responses, which impel individuals to experience and engage with the surrounding landscape. By exploring the person-environment interaction within the context of slow

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travel mobility, the purpose of this paper is to invite planners, designers and policy makers into the discussion for establishing a design framework for slow travel infrastructure that is measured around human spatial experience while on the move.

2. THEORETICAL FRAMEWORK

2.1 Slow travel

In order to define what is *slow*, it is crucial to refer to what is *fast* and to the effects of speed in everyday life, from mobility to tourism and from the human body to whole territories. As Tomlinson argues, “first of all, speed is fast” [6: 2]. Scholars have long argued that the high speeds of human mobility have eradicated the sense of distance and annihilated space and time: modern travellers battle against timetables, transit time, traffic and delays, but not against the obstacle of space [7, 8]. The operating speed of modern tourism alienates humans from landscape, transforming them into mere consumers of destinations [9] who experience “fewer and shallower interactions with the social and spatial environment” [10: 10]. The process of the journey is eclipsed by a redundancy of departures and an anticipation of arrivals [6], as if “to get there fast is better than to travel slow” [11].

Within the concept of slow philosophy [12], slow tourism emerges as an opposition to mass tourism and as a by-product of a life outlook valuing *slowness*. Although no clear definition of slow tourism exists, Pileri and Moscarelli [9] have attempted to describe its key characteristics along three main dimensions (additional references provided by the author):

1. Environmental dimension: As concerns for the environmental impact of air and car travel increase, slow tourism advocates for decarbonising practices through sustainable mobility and active travel modes [13-15].
2. Ethical dimension: Slow tourism aims to tackle the consequences of mass tourism and territorial marginality, by establishing socio-economic regeneration strategies and seeking to raise awareness on the impact of tourists within a place [13-17].
3. Experiential dimension: Experiential stimuli perceived through slow experience shape the relationship between an individual and their surroundings. In this context, slow tourism practices encourage active engagement with place and landscape [13, 15, 18].

The three dimensions under which slow tourism can be defined refer to both practices of travel (movement) and stay in a destination (immobility). As scholars highlight, travel mode and overall travel experience within a slow tourism framework are pivotal to the discussion [13, 19], and are more narrowly defined under the term *slow travel*. Leed [20] considers travel as a *process of passage*, that is a continuous change of place that differs qualitatively from departures and arrivals, since it entails movement. In other words, (slow) travel does not constitute a merely interstitial experience of seamless movement from A to B, but rather an experience with its own structure, logic and consequences [20, 21]. Adopting a critical stance towards the fact that slow tourism and slow travel are often used as synonyms [5, 9], we henceforth purposefully situate the research presented in this paper within the slow travel framework, by studying experiences of movement during the stage of passage.

2.2 Cycling, environmental perception and affective experience

Travel mobilities are an integral part of the tourist experience: what humans travel for is not necessarily the destination, but the experience of being on the road and in the world in a particular way. Slow travel mobilities are practiced through active modes of movement where the body itself generates motion, as in walking and cycling [22] and entail multiple benefits [23]: with regard to the environment, they contribute to reducing carbon emissions; on a human scale, the physical activity enhances individuals' health and well-being, and allows for a rich sensory experience and immersion within a landscape.

Active movement at speeds below 20 km/h is a form of multisensory perception of the environment, that involves an overlapping of visual, auditory, olfactory, tactile and kinaesthetic stimuli [9, 24-26]. The movement generated by a body in motion is a continuous encounter with the environment and a negotiation of the body's relationship with space [27]. This person-environment interaction is mediated simultaneously by environmental properties and by the person's perception, affective responses, purposes, preferences and culture [23]. Affective responses [23, 28] take place when an individual "evaluates an environment and attributes to it an emotional – and therefore subjective - quality, such as being pleasant, interesting, exciting, stressful, and so on" [23: 4]. Under the lens of slow and active mobility, cycling practices form an experience of affective nature, which strongly depends on the individual's sensory perception on one hand, and on the elements that constitute the physical environment on the other [23, 24, 29-32]. During cycling, an individual perceives different physical features and urban design qualities, which in turn trigger different affective responses towards the surroundings [23, 27].

To date, while research on slow travel has explored travel mobilities under an ethical lens with studies on individuals' motivations, goals and mode choice [33, 34], the experiential features of slow travel remain quite under-researched [35]. Slow and active mobility for commuting purposes in urban settings has been extensively analysed by scholars, yet little research exists, to the author's best knowledge, on its experiential and affective dimensions for leisure and tourism purposes in non-urban contexts. As Larsen argues, "unlike coercive everyday mobility, [travel mobility] is not only a trivial question of overcoming distance and reaching, it is also a way of being in, and experiencing various landscapes" [35: 81]. To better comprehend travel experiences, there is a need to assess individuals' subjective affective reactions in motion, with relation to the objective physical characteristics of the environment [27]. So far, there has been a lack of empirical evidence on individuals' environmental perception and affective experience during slow travel (for a few exceptions see: 27, 36, 37).

This paper aims to provide qualitative evidence on the environmental perception and affective experience of individuals during cycling for leisure in the North Italian non-urban landscape. Drawing from the hypothesis that different forms, purposes and speeds of movement give rise to different affective responses [27], we will examine the particularities of environmental and sensory perception (visual, auditory, olfactory and kinaesthetic) of cyclists and explore affective responses generated by physical features of the environment. Such an attempt calls for an interdisciplinary approach [38]: combining inputs from environmental psychology and urban design, we will address the multitude of factors at play in the person-environment relationship during slow travel.

3. METHODOLOGY

The study presented in this paper is part of an ongoing PhD research project that discusses the influence of different speeds and modes of movement on individuals' environmental perception and experience while being on the move. By collecting empirical information and comparing findings for three modes of movement (walking, cycling, driving) when used for leisure or tourism purposes in non-urban contexts, the research project aims to identify the physical features of the environment perceived by individuals at different speeds, as well as the respective affective responses they generate. For the purposes of the project, the author has conducted several studies that examine the spatial and affective experience of walkers, cyclists and car-drivers in peri-urban and rural areas in Northern Italy. Although the project is of comparative nature, a separate preliminary examination of the findings may provide insightful evidence to inform existing literature for each mode of movement. Aiming to contribute to a deeper understanding of human environmental perception during cycling for leisure and tourism, the focus is on the spatial experience of cyclists.

The person-environment relationship evidently involves two main variables: humans and space. Given that both participants and the environmental setting under investigation matter equally, specific locations were chosen, where the method of *intercept survey* was implemented to investigate

participants' perception of the surrounding landscape during a cycling activity. Cyclists passing from the chosen locations were randomly stopped by the author, who briefly introduced the subject and method of the survey and requested their participation. Participants were invited to complete a questionnaire composed of closed and open-ended questions, addressing their purpose and duration of cycling activity, familiarity with the surroundings, perception of speed during movement, environmental features perceived along the route, and demographic data. The questionnaire was administered *verbally* so as to enhance flexibility in participants' responses while maintaining a pre-defined structure. In several cases, participants were eager to provide additional personal observations in-between questions, thus rendering the data collection process similar to a semi-structured interview. The immediacy of this method reduces the risk of bias in participants' responses (as opposed to methods of prior recruiting, focus groups, or post-activity questionnaires), since participants are given the chance to voice their own experiences *in situ* [39]. The fact that participants were interviewed *while being on the move* allowed for documenting their experience in the most direct and unmediated way possible, considering that "all perceptions and interactions are influenced by motion and should be monitored while on the move" [27: 2].

The locations in which data collection was performed were chosen to accommodate the possibility of intercepting both long-distance and short-distance cyclists, thus assessing cycling activities that differ in duration (from hours to days) and purpose (leisure/ tourism, physical activity). As argued by Hannam et al., there is a need for more in-depth research concerning the embodied experiences of the particular *modalities* of cycling, which can be distinguished between "long distance autonomous self-propelled touring, long-distance package cycling tours, short distance exploration of urban sites and rurality" [18: 60]. The study took place on the embankments of Castelnuovo Bocca d'Adda and Piacenza along the Po river, and of Governolo along the Mincio river. On all three sites the embankments are accessible to bicycles and are part of or in proximity to national (Bicitalia, VENTO) and international (EuroVelo) cycling routes¹. While in close proximity to urban centres (and hence frequented by local cyclists as well), the three locations present a distinctive semi-rural landscape that is characteristic of the Po valley: running parallel to the river, the routes are marked by various types of vegetation, plains and crop fields.

4. FINDINGS

The intercept survey took place on the three locations in September-October 2023, always on a Saturday to ensure a higher number of participants. Out of 54 cyclists intercepted, 31 agreed to participate at the intercept survey (response rate = 57%). Seven participants are 65-74 years old, six are 35-44, six are 45-54, five are 55-64, four are 25-34, and three are less than 17 years old. Among them, 24 were men, while only seven were women. 16 participants were cycling alone, and 14 with a partner or in a small group. Most participants (n=23) reside in the provinces where the survey took place (LO, MN, PC); six reside in Northern Lombardy; and two participants are long-distance cyclists from abroad performing a touring holiday. When asked about the mode(s) of movement they use in their daily commuting routine, most of them stated that they drive (n=18) and/or cycle (n=16) and/or walk (n=8); only one participant uses public transport.

Closed questions

¹ It is important to note that the embankments are accessible to vehicular traffic; typically constructed in asphalt, they constitute secondary roads that are mostly used by local inhabitants. Although some of the locations investigated are part of a national cycling route, to date there exists no cycling infrastructure (except for signage) that separates vehicular and cycling traffic. Cyclists often choose the embankments because of lower vehicular traffic; yet their safety is often at risk, due to violation of speed limits (or even absence of road signs) and irresponsible driver behaviour [40].

Question	Multiple choice	Responses (N=31)	Branching question
<i>Which is the purpose of your cycling activity today?</i>	<i>leisure/tourism</i>	28	
	<i>physical activity</i>	3	
<i>For how long will you be cycling?</i>	<i><30 minutes</i>	3	
	<i>30 minutes – 1 hour</i>	3	
	<i>1 hour – 2 hours</i>	13	
	<i>half day</i>	6	
	<i>the whole day</i>	4	
<i>Have you cycled along this route in the past?</i>	<i>yes</i>	19	
	<i>no</i>	12	
<i>Did you pause during the cycling activity?</i>	<i>yes</i>	19	<i>4a. If yes, why?</i>
	<i>no</i>	12	
<i>Did you ever feel the need to accelerate or slow down?</i>	<i>yes, accelerate</i>	10	<i>5a. If yes, why?</i>
	<i>yes, slow down</i>	3	
	<i>yes, both</i>	12	
	<i>no</i>	6	
<i>Is there something you did not enjoy during the cycling activity?</i>	<i>yes</i>	23	<i>6a. If yes, what did you not enjoy? Why?</i>
	<i>no</i>	8	
Open-ended questions			
Name three elements (natural and/or artificial) that you perceived along the route and that remained in your mind.			
Which part of the route did you prefer? Why?			
Describe the context of the route in three words.			

Table 1. The questionnaire used for the intercept survey.

Closed questions and corresponding responses are illustrated in Table 1; branching questions prompt explanatory responses that will be discussed further below. The former are analysed in a quantitative manner, whereas the latter, together with open-ended questions are analysed qualitatively. A large number of participants cycling for leisure or tourism verifies the adequacy of the locations chosen for the intercept survey and suggests the accuracy of findings regarding the aim of this study.

Question 4 intends to explore a dimension of the cycling activity that is indirectly linked to the concept of immobility within the context of slow tourism: it stems from the hypothesis that slower speeds, as well as immobility, allow for engaging and interacting with the surrounding landscape and other individuals. Some participants who responded positively to question 4 further added that they paused cycling to “explore” or “observe the landscape”, “take photographs” or “visit friends” (question 4a). Nevertheless, most participants appear to have paused for reasons that do not regard the environmental setting along the route, but for satisfying instrumental needs [39] such as taking a break for coffee, lunch, or to rest.

Through question 5, the study attempts to contribute to the literature suggesting that perception and experience [23, 26], as well as perception of speed [9, 27, 29, 41] are highly subjective and experiential. Among participants who expressed a need to accelerate, we identified two participants that were cycling for physical exercise (question 1); responding to branching question 5a, they stated that they “like speed and adrenaline”. Others justified their response by a need to “see more of the landscape and cover a larger distance” or to “catch up with the rest of the group”. This last observation highlights the importance in distinguishing single cyclists from groups, as the latter implies a kaleidoscopic perception of speed that compels individuals to synchronise with the group’s rhythm. Participants that felt the need to both accelerate and slow down referred to a constant effort of adapting to their own needs, while others acknowledged that a difference in speed implies a different perception of the landscape. In this regard, one response conveys this message quite aptly: “by

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accelerating, it's possible to go further and keep up with the group; by slowing down, cycling is more of a stroll, an inner meditation with an outward gaze". Only a few participants expressed the need to slow down while cycling: one of them had previously reported a pause (question 4) in order to admire the landscape.

Unlike closed questions that mostly address instrumental factors of the cycling activity, open-ended questions were conceived so as to probe participants' affective experience with regard to the environmental setting. In this case, participants were free to choose their own wording and provide elaborate responses from a subjective point of view. Consequently, the analysis of responses was performed in a more flexible manner, either by grouping responses into categories of emerging environmental features or highlighting specific words or phrases mentioned by participants, which are of particular interest in relation to the research aim and hypothesis.

In question A, participants had to recall three *natural* or *artificial* elements that they perceived along the route (the question was thus structured to exclude possible references to other humans, that are beyond the subject of this study). As expected, most participants (n=25) mentioned the presence of water: the most recurring words were *river*, *water*, or the names of the rivers *Po* and *Mincio*. Secondly, participants referred to vegetation (n=16) (*grass*, *flowers*, *poplars*, *plants*, *nature*) and the built environment (n=14) (*churches*, *farmsteads*, *houses*, *factories*, or the *rowing club*, *bridge*, and *flyover* in Piacenza). At the intersection of natural and artificial elements we find references to the agricultural dimension of the landscape (n=10), such as *croplands*, *fields*, *plains* and *manure*. A few participants referred to animals (n=9) by naming the species they perceived (*pheasant*, *hare*, *goat*, *pigeon*, *mosquito*) or simply by stating "birds".

Question B aims to take findings on environmental perception to a further level, by encouraging affective responses that refer to an overall perception of the landscape rather than to separate elements. As has been shown, the concept of preference or likeability [41] is key for the interpretation of the perceptual process for it is closely related to an individual's purposes [42] (in our case we might claim that, for instance, a long-distance cyclist has different purposes with regard to the environmental setting than a local participant cycling for less than an hour). Once more, the importance of the river stands out among participants' responses: most (n=15) preferred that part of the route was "along the river", "on the embankment" or "on the floodplain", while three participants referred to the meanders of the river as a "panorama" of "invaluable landscape quality" where "the field of view widens". By cross-referencing responses with demographic data, we note that local participants refer to specific localities, as for instance the Bocca dell'Adda "where people go for fishing and to be in contact with the river".

Similarly, question C seeks to unveil affective interpretations regarding the whole environmental context of the routes traversed by participants. The question was intentionally conceived so as to direct participants' responses and choice of wording the least possible: according to Russell [28], when asked to describe an environment, individuals choose wording that might refer to the physical (objective) components of the environment perceived and/or their own affective (subjective) judgements towards it – yet most responses combine both [22]. It was therefore expected that in responding to question C participants would use the first words that crossed their minds, without consciously distinguishing between objective and subjective meanings. A variety of adjectives and nouns in participants' responses equally refer to the physical and affective components of landscape: *relaxing* (n=10), *freedom* (n=5), *quiet* (n=5), *green* (n=4), *beautiful* (n=4), *horizon* (n=4), *flat*¹ (n=3), *serenity* (n=3), *happiness* (n=3), *stimulating* (n=1), *gratitude* (n=1), *peace* (n=1) but also *adrenaline* (n=1). Considering the fact that most responses contain both types of words, we might assume that,

¹ *Flat* here is intended literally: we noted that participants from Northern Lombardy, who are more familiar to mountainous landscapes, all referred to the fact that the landscape of the Po valley is flat.

even the ones referring to an objective interpretation of the environment might also imply subsequent affective judgements. For example, *green* might literally refer to vegetation, but in combination with *relaxing* and *serenity* the response acquires a subjective meaning that could refer to the restorative effects of nature [42]. Although participants were instructed to use only three words, many seized the opportunity to express opinions and affective judgements by elaborating on their thoughts. For instance, one participant characterised the environment as “beautiful, it makes you forget all the rest”; one described it as a “natural landscape with the effects of human life in it”; while one said, “beautiful but not as in older times: the river [Po] has lost its importance”.

In general, responses to open-ended questions reveal the influence of verbal expression and choice of wording on the findings. Firstly, we note that some participants simplify their responses by using generalising wording (e.g. *nature*, *landscape*, *panorama*), while others choose more refined words to express their perception of the environment. This is particularly noted in question A, where we discover the following differences in conveying a similar meaning: *plants* vs. *poplar*, *water* vs. *meanders of the river*, and so on. Firstly, this observation may relate to the fact that environmental perception is subjective and depends on memory and past experience¹ [27, 38], which mediate an individual’s capacity to recognise an environmental feature, (know how to) name it and recall it if needed [41]. Secondly, and more importantly, this process is also mediated by speed, through the hypothesis that slower speeds favour the intake of multisensory stimuli and allow an individual to notice, name and recall. Among participants with less elaborate wording, we find the ones cycling for physical activity and referring to adrenaline and speed: this may be justified by the fact that higher speeds narrow down individuals’ attention “to the essential activity of riding in order to avoid risks” [27]. On the other hand, participants who intended to slow down during cycling (question 4) used a more refined wording in describing the landscape, suggesting that they had the opportunity to closely observe their surroundings, recall their observations and express them by replying to the open-ended questions. Participants who identified specific animal species in question B claim to have performed stops during their cycling activity, hence verifying the assumption that slowing down or pausing favours environmental perception, immersion and contact with the landscape. Finally, the fact that in question B some participants used detailed wording to describe elements related to water, such as *locks*, *dockings*, *bridge*, *riverboat*, *embankment*, and *floodplain*, might imply either familiarity with such elements of the landscape or higher attention in environmental perception.

Vision predominates over the rest of the senses [27, 43] and the “fundamental visual nature of tourism experiences in general” has been acknowledged [35: 81]. While open-ended questions explicitly addressed visual stimuli, we nevertheless purposefully sought to leave room for references to diverse sensory stimuli. Participants named environmental features that do not only correspond to the visual system: one mentioned the *sound of the birds* (auditory), while another referred to *manure* (olfactory). A few participants provided insights on their kinaesthetic experience by referring to factors that may contribute to physical fatigue and consequently slow down the cycling activity: such factors were the *wind* (n=3), *low stamina* (n=1) and, in the case of a long-distance cyclist, the excessive *weight* of the bicycle charged with bags and luggage. Additional observations that relate to kinaesthetic experience can be derived from question A, in which three participants provide implicit affective responses of negative nuance, by arguing that “drivers do not respect cyclists” or that “there are too many lorries along the route”. More than half participants (n=12) reporting on what they did not enjoy along the route (question 6a) mentioned vehicular traffic. From another angle, some participants (n=3) express

¹ Overall, by cross-referencing responses to questions A and 3 with demographics for each participant, it is possible to determine whether the participant has prior experience within the particular environmental setting. However, inasmuch as such an analysis might yield interesting insights to individual behaviours, performing a case study on each participant’s responses was beyond the scope of the preliminary analysis presented in this paper.

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their preference for parts of the route with less traffic (question B), thus reiterating the intrusive nature of vehicles on the embankments. Specifically, one participant who alluded to *freedom* as an affective dimension of the cycling activity subsequently disapproved of the presence of vehicles, suggesting a hindrance to safety and sense of freedom. This observation is consistent with previous research in urban contexts, which has shown that the freedom experienced by urban cyclists “is stolen spatially and psychologically from the hegemonic regime of automobility” [25: 10]. We may infer that this kind of conflict is further intensified when it comes to leisure cycling in non-urban contexts, which appertains to purposes of leisure within a *relaxing* and restorative context and is associated with a variety of positive and even transformative experiences [42].

5. CONCLUSION

This study set out to explore the particularities of environmental perception and affective experience of cyclists during a leisure activity along the embankments of the Po valley. In addressing the person-environment relationship from an interdisciplinary standpoint, the research called for a qualitative method that is person-centred and respects social diversity and subjectivity. This was achieved through the intercept survey and the analysis of the findings in both quantitative and qualitative terms. Although at a preliminary phase, the analysis demonstrates that environmental perception and affective experience vary according to individuals’ background, purposes, and subsequent speeds of cycling.

The ultimate goal of the study is to advocate for the importance of studying human environmental perception and affective experience, and to emphasise that an interdisciplinary approach is crucial [38] for informing policies on slow travel infrastructures. By identifying physical features of the environment and individuals’ experience of landscape, as well as their continuous interplay, we pursue raising awareness and strengthening the role of this debate in the field of planning and design for slow tourism and travel. In this light, the method and findings presented in this study contribute to setting a framework for the study of perceptual and affective dimension of travel experiences, and provide evidence that can be applied in the design of slow travel infrastructures. Primarily, the study reveals that a dominant environmental feature in the landscape increases likeability and stimulates perception: in our case, the presence of water was mentioned by most of participants as a memorable and likeable environmental feature, while many of them noticed and referred to elements related to water. In terms of planning, the perceived continuity and cohesion of the landscape as a result of large-scale features of natural or cultural significance suggests an additional value of environmental and affective importance, that should be considered in the planning and design of slow travel routes in non-urban contexts. The findings confirm the hypothesis that slower speeds, as well as pauses during a cycling activity, contribute to an enhanced perception of environmental features and observation of the landscape. This relates to the definition of slow travel as part of an overall slow tourism agenda that comprises practices of both mobility and immobility: as suggested by the findings, environmental perception, observation and engagement with the landscape occur more than often during pauses from the cycling activity. This implies that, in planning for slow travel infrastructures, designers should provide for rest areas that do not merely satisfy instrumental needs, but also stimulate perception [21]. By extension, references to auditory, olfactory and kinaesthetic stimuli align with the premise that cycling and other forms of slow travel are part of a multi-sensory experience; planning for slow travel should hence account for all the senses and not solely vision.

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Methods and techniques for the governance of resilient territories: the case study of the City of Matera.

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Abstract

The new challenges related to climate change invite us to reflect on the choices to be made in urban areas. Technology and new scientific advances can not only be used to make the city function better, but also to achieve sustainability goals. To do this, new technologies must be added to 'ancient' knowledge, confirming that the objectives set must be able to exploit all available knowledge. Urban sustainability cannot ignore the recognition of the city as a public and social good, activating urban, infrastructural, and resource distribution policies aimed at consolidating density and intensity between physical space and the space of flows. The city is not just 'nature', which is why the urban ecosystem is assumed to be similar to 'an ecosystem in transition', the dynamics of which are determined by human action, the reaction of natural elements and mutual conditioning. The green and digital transition is based on sustainable development principles and should become an activator in enhancing the attractiveness of territories, also affecting the tourism sector worldwide. Tourism resilience implies providing unique cultural and natural experiences and digitally facilitated booking and travel planning, avoiding an imbalance in the tourism ecosystem. In 2022, the European Commission presented the 'Transition Pathway for Tourism', a plan jointly created with the tourism ecosystem players that details key actions, objectives, and conditions to be realised with the involvement of the tourism community. In this way, tourism and business development opportunities can be revealed in territories that contain, in their very marginality, new resources to bring about lasting change. Matera is known as the city built into the stone, an example of historical resilience, a UNESCO heritage site, and European Capital of Culture in 2019. In this area, humans have been able to adapt the territory according to their needs, exploiting the workability of tuff (Gravina calcarenite), a calcarenitic sedimentary rock that characterises the entire Murgia plateau and the Murgia Materana. However, the transformations of the territory combined with new climatic emergencies and large tourist flows entail risks to which it is necessary to respond with innovative targeted techniques. The surveying, mapping, and monitoring of the built environment are indispensable for understanding phenomena that develop on an urban scale such as water management in the light of climate change. A smart vision of the city is proposed inspired by the Sustainable Development Goals (SDGs), in particular the protection and eco-sustainable promotion of the territory (SDG 15), the availability and smart management of water resources (SDG 6), and the promotion of actions to combat climate change.

Keywords: resilient city; risk mitigation; sustainable and digital transition; smart tourism; Matera

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1. INTRODUCTION

The theme of the city is gaining more and more importance in the political debate because of the renewed planning attention imposed by urban policies, for their capacity to open up to the processes of European integration, and as far as the cities of the South are concerned, for their capacity to propose themselves as an anti-crisis factor investing themselves with an essential role in the success of territorial and social cohesion policies. Culture penetrates the life of the city and the social sphere, and discussions are held on the knowledge of space as a project of social anticipation, moulding sensitivities and thoughts on the city and the territory, as has happened in the past in the laboratory of the city of Matera.

Today, the relationship between city and territory is once again being discussed in Italy. Every time the structure of the economy and society changes, the urban issue returns to the foreground. Matera is an interesting observatory for studying several phenomena: it is a creative city, a destination for fast-growing national and international tourism and, therefore, continually subject to human action, but at the same time a city with a serious infrastructure deficit and a geomorphological conformation that is particularly exposed to hydrogeological risk. Matera can once again become a laboratory of policies to help understand what the role of a medium-sized European city can be at a time when the values of urbanity are being tested by the overwhelming force of global metropolises and post-metropolises: whether the heritage of a city's histories still has the capacity to structure larger territories, whether urban space can once again become a form of citizenship, an incubator of the city's civic value, and whether this value can be made visible in urban design and its forms [1].

The orientation of the ecological, digital and tourism transition in European programmes considers the fragility of our territories and the effects of climate change, adopting climate mitigation measures and investing in improved energy infrastructure.

Digital modelling can contribute to the creation of more resilient and adaptive cities, while recognising the challenges and limitations of implementing it in complex scenarios such as the one analysed. Urban resilience represents a crucial topic for the achievement of the Sustainable Development Goals (SDGs) proposed under the United Nations (UN) 2030 Agenda [2].

For the proposed case study, we examine available cartographic products and digital models from diverse sources and spatial scales, exploring their significance and discussing their role in achieving resilient sustainability.

2. SPATIAL POLICIES AND RESILIENT TOURISM

As cities rapidly expand, more infrastructure is increasingly needed. Considering it as an opportunity, the scale of global infrastructural development will be an unprecedented opportunity to reorient and rethink the urbanisation process from one that is inherently destructive to one that is sustainable and resilient [3]. This is the promise and challenge of smart cities as a key idea for building resilient urban structures. The vision and mission of smart cities are inspired by SDG 11 to "improve inclusive and sustainable urbanisation and the ability to plan and manage human settlements in a participatory, integrated and sustainable manner", such as the protection and eco-sustainable promotion of the territory (SDG 15), and the availability and smart management of water resources (SDG 6).

To overcome these challenges, the EU has adopted the European Green Deal, the new growth strategy that will transform Europe into a modern, resource-efficient, and competitive economy. The European Green Deal aims to make Europe climate-neutral by 2050, boost the economy through green technology, create sustainable industries and transport, and reduce pollution. In this way, opportunities for tourism and business development can be unveiled in territories that contain, in their very marginality, unprecedented resources to bring about lasting change. The approach known by the expression 'place-based' or 'place-oriented development' corresponds to the articulation of real phenomena and it is up to the local level to make concrete proposals to enhance the supply of services and identify development paths, overcoming the limits of both the top-down approach – the unreality

of a project established without involving local communities – and the bottom-up approach – the illusion that places have all the economic and cognitive resources required to implement effective development strategies [4]. The development potential that many areas of the country possess is largely under-exploited, consisting of significant natural, cultural, and human resources, whose activation could make an important contribution to growth. In fact, the abandonment of these areas or 'predatory' exploitation, i.e. exploitation that consumes local natural resources without creating significant benefits in terms of employment, income, and innovation, not infrequently produces negative outputs and, therefore, social costs for the entire nation, related to hydrogeological instability and the degradation of the cultural and landscape heritage [5].

The concept of resilience appears more and more in risk management strategies, specifically with the new European policy aimed at developing local-scale resilience plans by 2030. Risk-based approaches provide a rational method for weighing mitigation costs and adaptation measures. By contrast, starting from the uncertainties associated with natural hazards, resilience focuses on the ability of an affected system to absorb extreme shocks, restore good levels of functionality in the short term and plan improved services for the next phase [6].

The practices of sustainable urban tourism along the lines of the 2030 Agenda following Matera European Capital of Culture in 2019 look at temporary residences, management of public space and the old town, mobility for the fair distribution of tourist flows, and mitigation of natural hazards. Therefore, tourism is directly related to environmental and social safety and security, as well as to the importance of technological innovations for risk monitoring.

3. METHODS AND TECHNIQUES FOR RISK MITIGATION

Urban areas, particularly those with historical significance, face a range of risks, including natural disasters, environmental degradation, urbanisation pressures, and cultural heritage preservation challenges. According to Varnes' risk concept, the spatial and temporal probability of occurrence of potential damaging events, as well as the distribution of the elements at risk in space and time, considering also changing vulnerabilities, collectively, contribute to an elevation in overall risk levels. As climate patterns become more unpredictable and extreme, the susceptibility of urban areas to natural hazards amplifies [7, 8]. Moreover, the ageing infrastructure, which may not have been initially designed to withstand contemporary environmental stresses, becomes increasingly vulnerable. The rapid expansion of urban settlements further exacerbates the situation by exposing more people and assets to potential risks.

Therefore, it is imperative for urban planners, policymakers, and stakeholders to integrate comprehensive risk management strategies into urban development plans to mitigate these escalating risks effectively. This integration involves various aspects, such as incorporating resilient infrastructure designs, establishing early warning systems, promoting sustainable land use practices, and enhancing community preparedness and response capabilities. In this context, the surveying, mapping, and monitoring of the built environment are essential for the understanding of phenomena that develop at urban scale such as the management of historical sites in view of climate change. The current era provides us with important digital tools and the opportunity to test innovative workflows for sustainable city development and building resilient cities. The surveying of urban spaces is constantly increasing due to new technologies that have emerged for participatory planning such as drone mapping, photogrammetry, 3D modelling and digital twin construction. Aerial vehicles such as drones or Unmanned Aircraft Systems (UaSS), equipped with sensors such as cameras, LiDAR (Light Detection and Ranging), represent a fast-developing approach for urban context monitoring [9].

Recent developments in cartographic applications are leading not only to the implementation of accurate, up-to-date map bases with shared specifications, but also to new ways in which the traditional cartographic medium is now used. These include interactive maps and mobile applications

that can provide real-time information to visitors, such as recommended routes, trail conditions or sensitive areas to avoid, as well as to educate visitors about the importance of conservation. Cartography plays a major role in setting strategies for sustainable tourism, helping to balance the needs of visitors, environment, and local communities [10]. The key points are listed below:

1. **planning and management:** cartographic media provide detailed information about the area, helping organisers to better understand the natural and built environment, guiding tourism planning, helping to minimise environmental impact and maximise benefits for local communities;
2. **accessibility:** maps can show access routes to tourist sites, helping to manage visitor flows and reduce wear and tear on sensitive areas;
3. **education:** cartographic bases can be used to educate visitors about the importance of historical and cultural preservation, increasing awareness and appreciation for the environment and local communities, and promoting more respectful and sustainable tourism;
4. **monitoring and evaluation:** mapping techniques, through Geographic Information Systems (GIS), can be used to monitor changes over time, such as soil erosion or vegetation growth, helping to assess the effectiveness of sustainable tourism strategies and plan necessary changes.

4. MATERA, AN INTERESTING CASE STUDY

4.1 The urban context between present and past

Matera, the oldest urban settlement where life has been going on uninterruptedly since prehistoric times to the present day, a great little jewel in the deep South of Italy that has decided to defy time, winning its challenge by becoming a UNESCO World Heritage Site and European Capital of Culture in 2019. On 17 October 2014, Matera was designated to be European Capital of Culture in 2019, a historic achievement that represents the consecration of the city to culture and tourism.

The urbanised area of Matera comprises cores that arose at different times, such as the original Sasso Barisano and Sasso Caveoso, the plain, the consolidated city, the villages La Martella and Venusio, and the urban expansion areas. Each core retains structural and urbanistic characteristics specific to its historical development context. However, each has undergone transformations.

The first core of the built-up area of Matera, called the Civita, was built on a rocky spur jutting out with steep walls into the ravine and located at an altitude of about 400 m asl. The earliest settlements of the city were dug-out dwellings in which the limestone blocks removed by digging were used for the front parts of the housing units. As the years went by, a network of narrow streets and dwellings made up of housing units, neighbourhoods and hanging gardens began to stratify.

The layered terracing system ensured good surface water regulation, allowed the collection of outflows, the interception of drainage water and the accumulation of condensation water.

The ancient quarters, Sasso Caveoso and Sasso Barisano, are located within two small catchment areas in which a low-ranking hydrographic network is developed, with the two main river courses resting on V-shaped valleys, once used as real open-air sewers until their reclamation in the 1950s, and now drained (Figure. 1).



Figure 1. The main features of the Sassi Districts from OpenStreetMap (OSM).

The urbanisation of the modern city has obliterated the natural hydrographic network of the two creeks, whose main courses are morphologically recognisable only in their lower reaches, in correspondence with the roads Via Fiorentini and Via Buozzi. Nowadays, these roads serve as the primary destinations for tourists, hosting numerous activities catering to tourism and street furnishings. Other hydraulic works, mainly built to collect and store rainwater for self-consumption, are the cisterns carved out of calcarenite. The larger ones are located upstream of the Sassi at the boundary with the overlying clays. One of these is the Palombaro Lungo cistern, with a capacity of 5 million litres of water, built starting at the end of the 18th century in today's Piazza Vittorio Veneto. The complex system of cisterns and canalisation works ensured the storage of water resources and the fulfilment of the sanitary needs of the population of the time. In addition, these systems ensured good surface water regulation and protection from sudden runoff phenomena [11, 12].

Currently, the cisterns and the old drainage channels known as “grabiglioni” have lost their role in regulating the hydraulic flow. The cisterns have been diverted to other tourism-related tasks, whereas the “grabiglioni” coincide – as mentioned – with two roads, which nonetheless still serve as valley floor for the two creeks, with a consequent hydro-geomorphological hazard factor for the numerous tourist activities. More in general, for a large part of the urban area the issue of channelling rainwater during intense events is particularly relevant to mitigate hydraulic risk, also due to the insufficient outflow offered by the sewer network [13, 14].

4.2 Available cartographic products and potentiality

The available dataset of Matera city includes information provided by Basilicata Region on a geotopographic regional database (RSDI). Topographic data from a regional survey consist of a Digital Surface Model (DSM) and a Digital Terrain Model (DTM) with a resolution of 5 metres × 5 metres and dated 2013 for the whole region [15]. This regional aerial survey has been combined with building boundary polygons and street segments from OpenStreetMap to create a 3D model, augmented with varied semantic annotations [16].

Recently, with a view to equipping itself with adequate cartographic tools, to improve the functioning of the 'municipal machine' and at the same time provide the territory with a cognitive base that meets the changing needs of society, the Municipality of Matera has recently implemented a project to produce an evolved cartographic base of its territory, through services for optical photogrammetric and LiDAR acquisition.

The project involved the production of the Numerical Technical Map of the urban centre (scale 1:1000) and of the entire municipal territory of Matera (scale 1:2000), including 5 cm and 10 cm

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orthophotos, point clouds and numerical terrain models, with the intermediate products required for the purpose. The aerial imaging was carried out with a Leica DMC III camera by flying with 8-10 cm ground pixels over the entire territory and 4-5 cm over the urban centre.

The LIDAR was carried out with a RIEGL VQ-580 II sensor with a density of approximately 40 pts/sqm over the entire municipal area, while for the urban area the density was approximately 130-140 pts/sqm (Figure 2). The rendering involved the punctual application of the Shared Specifications in accordance with Italian Ministerial Decree 10/11/2011, which establishes the reference standards for cartographic productions at various scales.

Below are provided:

1. an example of a Digital Surface Model (DSM) extracted from the LiDAR point cloud in the Sassi area, where the density of buildings and the depth of drainage can be seen;
2. the optical image imprint acquired with the positioning of Ground Control Points (GCPs) used in the Aerial Triangulation phase.

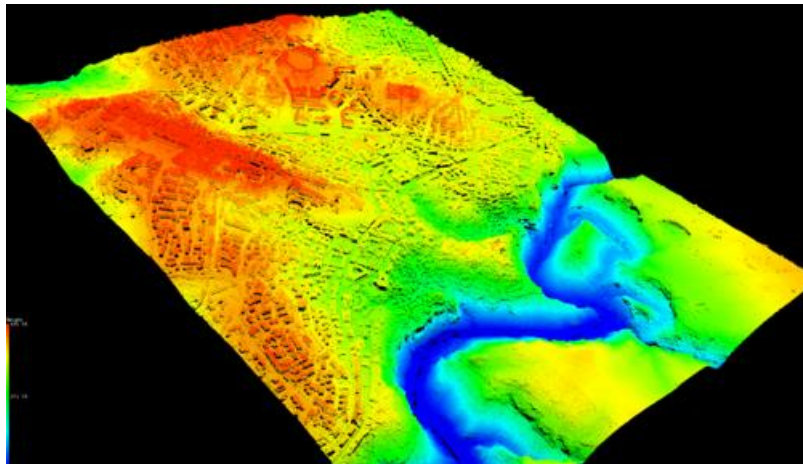


Figure 2. Elevation view of the LiDAR cloud of the spatial portion of the “Sassi” Districts.



Figure 3. Detail of the aerial photogrammetry mosaic with indication of the Photographic Points of Support, denser in the central area

The knowledge base created by the municipal administration is undoubtedly an extremely positive achievement, necessary for the understanding of territories and the proper management of urban and suburban spaces. However, the understanding of territories gained from aerial platforms produces a representation of the territory that is no longer considered sufficient today.

In fragile and complex territories such as the one in question, it is now necessary to implement a "Digital Twin" that models not only the terrain and the built blocks (external changes and roofs) as in traditional cartography, but the modelling extends, if necessary, to include the parts not reached by photogrammetric surveys with exhaustive "exterior/interior" models [17].

The implementation of a digital twin, extended to at least the Sassi area, would achieve the following objectives:

improvement of hydraulic modelling, including not only the terrain and the rooftops but also all water collection and regulation works both belonging to each unit and for collective use, even reaching the modelling of underground conduits;

visibility analysis starting from significant points in the context, up to creating virtual reconstructions of monuments, offering immersive experiences for research, education, and tourism while preserving the original structures;

analysis for predicting phenomena related to sunlight exposure, such as the presence of light/shadow on various days of the year and the prediction of heat islands, a phenomenon emphasised by the rocky nature of the territory and the intensification of issues related to global warming;

establishing the basis for continuous monitoring of monuments, providing real-time data on structural integrity, environmental impact, and potential threats such as erosion or vandalism, allowing for timely interventions and conservation efforts;

the production of "virtual tours" that allow immersive paths accessible remotely;

For the production of such databases, optical and LiDAR sensors are required, which can essentially be listed as follows:

Oblique cameras, which are photographic sensors integrating up to 5 appropriately angled cones, now available to be mounted on aerial drones.

Optical cameras with 360° lenses, for the creation of virtual tours.

LiDAR devices that utilise SLAM (Simultaneous Localization and Mapping) technology for accurate georeferencing of the shots: essentially, each position is estimated based on previous positions, thus obtaining the possibility of modelling even in environments where the GNSS signal is not available (inside buildings, caves, underground channels, etc.).

These aforementioned sensors can be mounted on unconventional supports (backpacks, robots, underwater and amphibious drones), ensuring the possibility of acquisition even in special contexts like the one under examination.

5. CONCLUSION

The city lives thanks to its inhabitants and over time space is shaped by human activity and natural processes. But along with this comes the invisible dimension of new technologies that pervasively influence the perception and accessibility of places.

The success of a European Capital of Culture is not only measured by what happens in the fateful year, but rather by whether it contributes to a significant and sustainable change in the development trajectory of the city and its territory.

The alteration of hydrological forcing due to climate change raises important questions about the availability of future water resources and the frequency of extreme events. In this highly uncertain context, it appears useful to reconsider the model of Matera as a resilient city in the past, through the recovery of the city's ancient catchment, storage, and transport infrastructures to rebuild the important land protection functions of ground and surface water regulation.

Therefore, the utilisation of innovative technologies in risk management represents a paradigm shift towards more proactive, efficient, and resilient approaches to safeguard cultural heritage.

The critical analysis of the different experiments highlights the heterogeneity of the topics dealt with and the countless points of view to be developed on the issue of city and landscape through the lens of complexity and digitalisation, with tools and methodologies that can be replicated in different

contexts to involve local communities in structuring and enhancing the territory according to the needs of residents and temporary inhabitants.

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Kos, a well-being destination based on the Hippocratic philosophy

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Extended abstract

Kos belongs to the complex of the 12 Dodecanese islands, the motherland of Hippocrates II (460-370 BC), named “Father of the Medicine”. A Philosopher, Scientist, Author, doctor, one of the great minds in the ancient Greek World.

Hippocrates was a contemporary of Plato (429-347 BC) and Aristotle (384-322 BC) and of some of the great playwrights of Athens. His therapeutic methods started with careful observation of the environment, nutrition, living habits. He had a holistic approach to diagnosis and treatment. “Healthy mind in a healthy body” was the milestone of the Hippocratic philosophy. Thus, he introduced principles of Science in the therapy of Man’s Body and Mind in Asklepieion.

HIPPOCRATES QUOTES

“Your foods shall be your “remedies” and your “remedies” shall be your foods.”

“Everything in excess is opposed by nature.”

“Natural forces within us are the true healers of disease.”

“Walking is man’s best medicine. If you’re in a bad mood go for a walk. If you are still in a bad mood, go for another walk”.

“Health is the greatest human blessing”.

“If we could give to every individual the right amount of nourishment and exercise, not too little and not too much, we could have found the safest way to health”.

THE HIPPOCRATIC GARDEN

The pharmacological knowledge reflected in the Hippocratic Collection is remarkable. They used herbs, minerals, leaves, flowers, juices, roots and plants which they regarded as having curative properties. Out of them, they prepared powders, tablets, drops, suppositories, vaginal uvula, crèmes, syrups, ointments, spirits, and many others.

At least 250 different plants are mentioned in the Hippocratic Collection. More than 220 different sorts have been planted in the “Garden of Hippocrates” of the International Hippocratic Foundation in Kos.

His Pharmacology is still the source to identify and isolate several modern medicaments like Aspirin against fever, Coumarines for anticoagulation, Ephedrin against cough, Vincristin against cancer, Tamoxiphen against breast cancer, and many others.

Kos is a famous tourism destination, with a coastline of 112 km approx. 2 million arrivals and 35.000 population. It is a mediterranean oasis for history enthusiasts, natural beauty, cultural landscapes offering genuine Greek hospitality. Bicycle is widely used by locals and visitors due to the infrastructure and the flat land.

The advantage of the Hippocrates heritage in Kos, is the unique KPI that transforms positively the inhabitants’ way of living. Also, transforms the concept of a holiday into a unique holistic well-being to experience offering: stress reduction up to revitalization, good sleep, mind stimulation, harmony between body and mind, fullness, calmness, happiness. Good habits, the sea, the gastronomy based on local products of high quality, the knowledge of Hippocratic philosophy starting from schools, can change Kos, improving lives in a sustainable way with ESG practices inspired by his philosophy for health and well-being for over 2.500 years.

Keywords: *transformation, Kos, Hippocrates, tourism, ESG*

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Green Tourism Infrastructure

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Extended abstract

In the realm of sustainable tourism, the development of green tourism infrastructure stands as a cornerstone for promoting environmentally responsible travel practices. This abstract explores innovative examples of green tourism infrastructure, encompassing eco-friendly accommodations, renewable energy solutions, sustainable transportation systems and AI Technologies.

Eco-friendly accommodations are at the forefront of sustainable tourism initiatives, offering guests an immersive experience in harmony with nature while minimizing environmental impact. These accommodations showcase innovative design features such as passive heating and cooling, rainwater harvesting systems, and utilization of recycled and locally sourced materials. Case studies from around the globe demonstrate how eco-lodges, treehouses, and green hotels are redefining hospitality through sustainable practices.

Renewable energy solutions play a pivotal role in powering green tourism infrastructure, reducing carbon footprints and dependence on fossil fuels. From solar panels and wind turbines to geothermal heating and biomass energy, renewable energy technologies are transforming tourism destinations into models of sustainability. Success stories highlight the integration of renewable energy systems into resorts, campsites, and remote eco-tourism destinations, demonstrating their feasibility and efficacy in achieving energy independence.

Sustainable transportation systems are essential for reducing emissions and mitigating the environmental impacts of tourism-related travel. Green tourism initiatives are embracing eco-friendly transportation options such as electric vehicles, bicycles, and public transit networks powered by renewable energy. Case studies showcase innovative transportation solutions in tourist destinations, including bike-sharing programs, electric shuttle buses, and zero-emission ferries, enhancing mobility while minimizing environmental harm.

Through the presentation of innovative examples and case studies, this abstract aims to inspire stakeholders in the tourism industry to adopt green tourism infrastructure as a means of fostering sustainable travel experiences. By investing in eco-friendly accommodations, renewable energy solutions, and sustainable transportation systems, destinations can attract environmentally conscious travellers while preserving natural resources and protecting fragile ecosystems.

This abstract provides a comprehensive overview of green tourism infrastructure, highlighting its importance in promoting sustainable tourism practices and offering practical examples of its implementation. It serves as a foundation for further exploration and discussion on sustainable tourism initiatives focused on infrastructure development. Also presents how AI tools and ai technology can help in this transformation.

Keywords: *green tourism, AI sustainable tourism, green infrastructure*

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The revitalization of the thermal baths in Lesbos as a value for the development of sustainable tourism

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Extended abstract

This abstract delves into the nuanced narrative surrounding the revitalization of thermal baths in Lesbos, elucidating their potential as a cornerstone for sustainable tourism development. With a geological predisposition conducive to thermal springs, Lesbos has harbored a rich history of bathing practices dating back to ancient times. The island's unique topography and the existence of natural thermal sources have set the stage for the evolution of a distinct thermal bathing culture.

The early 20th century witnessed a concerted effort to leverage these natural assets for tourism development. Notably, the establishment of the Kourtzi Thermal Baths and the opulent Sarlitzza Palace Hotel exemplified an ambitious drive to attract spa tourism. These endeavors, however, faced challenges over the years, and the thermal baths gradually faded from the tourism spotlight.

In recent times, a resurgence of interest in the island's thermal heritage has emerged. A series of initiatives aimed at the restoration and enhancement of existing Ottoman hammams and baths showcase a commitment to preserving this cultural legacy. The integration of modern amenities with traditional architectural elements seeks to strike a balance between heritage conservation and contemporary visitor expectations.

The development of thermal tourism enhances the traveler's experience, fostering a closer connection with the natural environment and contributing to the dissemination of the broader cultural heritage of the region, such as production, trade, and the economy. The integration of thermal baths into the tourism narrative not only provides a rejuvenating escape for visitors but also becomes a conduit for a more profound engagement with the island's cultural and economic fabric. By immersing travelers in the therapeutic embrace of thermal springs, Lesbos not only offers a unique wellness experience but also creates a platform for them to explore and appreciate the local agricultural practices, trade traditions, and economic dynamics that sustain the island's vibrant community.

In conclusion, the revitalization of thermal baths in Lesbos emerges as a multifaceted initiative with profound implications for sustainable tourism. The integration of historical thermal assets with contemporary conservation efforts forms a unique tapestry that captures the essence of the island's cultural and environmental heritage. The intersection of thermal tourism, agricultural values, and traditional practices provides Lesbos with a distinctive competitive edge in the realm of sustainable tourism.

As we navigate the complexities of modern tourism, the revitalization of thermal baths stands as a testament to Lesbos' commitment to preserving its cultural identity, fostering sustainable development, and offering visitors an authentic and rejuvenating experience. In essence, the thermal baths become not just a historical relic but a dynamic force propelling Lesbos into a future where sustainable tourism takes center stage.

Keywords: *thermal baths; Lesbos; sustainable tourism development; cultural heritage; local economy*

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Typology of Environmental Conflicts - Classification and Modelization of Land-Use and Planning Conflicts in the Attica Region.

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Extended abstract

This paper analyses and classifies the environmental conflicts and disputes in the peri-urban area of Athens as part of a macroscopic analysis of land-use conflicts related on the environment for a period before and during the Greek Crisis” (2005-2014) in order to understand the evolutions of environmental and territorial policies in local, metropolitan and national level. In the postmodern context of the rise of “civil societies” and “environmental awareness”, as well as the postindustrial rapid transformation of urban and suburban space, territorial conflicts and disputes become a key factor that influences the development of territorial policies. Hence the study of the social, economic, political and geographical factors that make the conflicts occur and evolve is essential to understand the process of policy making.

Our research extends to the role of environmental protection in the formation of environmental policy, through the study of conflicts from many perspectives such as the macroscopic study of many diffuse and different cases at the regional level. More specifically, we investigate the spatial recording of conflicts related to the environment and land uses, in combination with the categorization and analysis of the actors of the defence of the environment, i.e. ecological organizations, associations and movements. The recording period covers the years from 2005 to 2014, a period in which, on the one hand, there is a simultaneous development of social demands that give particular importance to the defence of the environment and the quality of life, and on the other hand, new environmental defence actors are emerging as well as new environmental challenges. Through the recording, categorization and analysis of conflicts and environmental defense actors (citizen initiatives, organizations, etc.) an attempt is made to analyze environmental governance as a product of a process shaped, not only by general historical or structural rules, but by specific local conditions, as well as by specific more complex mechanisms of emergence and development of environmental conflicts. The research is part of the general international research approach of recording, classifying, categorizing and analyzing conflicts at the regional level, taking into account the method developed by the group of researchers of the French-speaking geographical community, under the coordination of the INRA’s research laboratory AgroParisTech, emphasizing the relationship of land use conflicts, with the ecological and environmental movement and public environmental policies.

The paper presents part of the outcome of the Ph.D thesis on “Environmental Conflicts and Governance in Athens’ suburban area: Macroscopic study of the environmental defence’s actors and environmental policies (2005-2014)” supported in Panteion University in December 2023.

Keywords: *land-use conflicts, environmental policy, social movements, Athens*

Developing an Environmental Comprehensive Sustainable Tourism Development Indicator (STDI) Integrating Earth Observation and Statistical Data

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Extended abstract

Tourism as sector of economy, faces nowadays an increasing pressure to align with environmental, social, and economic objectives, while at the same time, sustainable development forms the cornerstone of global initiatives. Sustainable tourism, as defined by the World Tourism Organization (UNWTO), aims to balance the immediate and long-term impacts of tourism activities, striving to meet the needs of tourists, the industry, the environment, and local communities. Although this equilibrium is essential for fostering the three pillars of sustainable development, assessing and maintaining this balance poses significant challenges, particularly in monitoring the environmental footprint of tourism and its effects on local and global ecosystems.

The adoption of environmental sustainability indicators has become a pivotal strategy for tracking progress towards achieving sustainable development goals. These indicators provide valuable insights into the environmental repercussions of economic activities within the tourism sector, offering a clearer understanding of how these operations affect a nation's environmental health. Our research leverages earth observation data to scrutinize the environmental condition in key tourism destinations and recognises the importance of informal decision-making in preserving critical tourism locales. Our research tracks Key Performance Indicators (KPIs) such as Air Quality, Green Spaces vitality, Urbanization trends, and Water resource pressures, aiming at offering insights into sustainable tourism practices.

It proposes a novel approach to the development of Sustainable Tourism Development Indicator (STDI). Our initiative seeks to address the lack of efficient and reliable tools for quantifying the environmental sustainability of tourism activities. In order to achieve this goal, we have used satellite Earth Observation (EO) data from the Copernicus program, added to detailed in-situ statistical data. The STDI provides a comprehensive, and economically feasible framework for evaluating tourism's sustainability. Our methodology encompasses data collection, preparation, analysis, and visualization, ensuring a holistic view of tourism's environmental impact. We aim at measuring the current sustainability of tourism practices and also advocating an environmentally friendly governance and facilitation methods. This paper presents the concepts underpinning the STDI, outlines the methodological rigor, and it highlights the advantages of the approach over traditional assessment methods.

As a valuable resource for governments, industry stakeholders, and conservation entities, the STDI facilitates a nuanced understanding of tourism's environmental consequences, identifies stress points, and aids in crafting sustainable development strategies. In addition, our research underscores the STDI's potential in enhancing decision-making processes and promoting environmental conservation, thereby playing a pivotal role in advancing sustainable tourism management. The integration of a well-constructed STDI ensures a balanced approach to human and environmental development, further contributing to the global agenda for sustainable tourism. This work offers a forward-thinking

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solution to one of the most pressing challenges in tourism today: achieving a sustainable harmony between tourism development and environmental preservation through the innovative deployment of the Sustainable Tourism Development Indicator (STDI), facilitating a deeper understanding of tourism's environmental impacts but also lays the groundwork for more sustainable tourism policies and practices globally.

Keywords: *Sustainable Tourism Development Indicator, Environmental Impact Assessment, Sustainable Tourism, Earth Observation Data, Statistical Data Integration*

Urban scale digital twins, sustainable tourism and resilience: Sustainability, Ecology and Ekistics in Constantinos A. Doxiadis and Adriano Olivetti's approaches to urban planning

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Extended abstract

Recently, within the field of smart cities, the notion of urban scale digital twin has acquired a central place. The term 'digital twin' refers to the digital representation enabling comprehensive data exchange and can contain models, simulations and algorithms describing their counterpart and its features and behavior in the real world. A 'digital twin' is a digital representation of a physical process, person, place, system or device. The term 'digital twin' firstly emerged in the field of manufacturing sector to refer to digital simulation models that run alongside real-time processes. Digital twins are digital replicas of physical entities. Their creation is based on the use of advanced technological applications, such as sensing, processing, and data transmission. Within the current debates, urban scale digital twins play a key role in the so-called smart and sustainable tourism. The paper aims to shed light on the concept of sustainable tourism, which is related to the intention of considering the environmental and social dimensions of a destination. Moreover, the paper analyses how smart tourism aims to integrate intelligence in various aspects, such as mobility, living, people, governance, economy, and environment. At the core of the paper is the objective to relate the role of sustainability in the ongoing debates concerning smart tourism to the concepts of 'ekistic grid' and 'entopia' in the approach of Greek urban planner Constantinos A. Doxiadis, on the one hand, and to the concept of 'concrete utopia' in the approach of Italian industrialist Adriano Olivetti. Particular emphasis is placed on exploring why Doxiadis was particularly interested in the environmental issues concerning architecture and urban planning. An important book for understanding the role of sustainability in Doxiadis's thought is his book entitled *Ecology and Ekistics*. Doxiadis completed the first draft of *Ecology and Ekistics* in the summer of 1975, shortly before his death. Gerald Dix became its editor and the final version was published in 1977. At the core of the book entitled *Ecology and Ekistics* is the argument that a condition of global ecologic balance is of pivotal importance for providing environments that can offer to man or *anthropos* satisfactory conditions. The paper examines the role of care and recreation in re-thinking heritage and city branding and the ways in which urban scale digital twins and other artificial intelligence applications can contribute to such endeavors. It pays special attention to how "city branding" can serve in establishing urban regeneration strategies, relating the ideas of Constantinos A. Doxiadis and Adriano Olivetti regarding urban planning strategies to the current debates around smart cities, smart tourism, resilient planning, and regenerative urban design. One of the main objectives of the paper is to shed light on how urban scale digital twins can contribute to the combination of "city branding" and sustainable development.

Keywords: *Constantinos A. Doxiadis; Adriano Olivetti; big data; urban scale digital twins; concrete utopias; artificial intelligence; digital universalism; Ekistics; smart tourism; ecology; sustainability; regenerative design; resilient cities; city branding*

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**EMERGING TRENDS IN CITIES IN THE POST-COVID ERA AND
IMPLICATIONS FOR URBAN DEVELOPMENT AND PLANNING
POLICY**



Changing Cities VI, Rhodes, 24 - 28 June 2024

Organized and chaired by Dr. Angelidou Margarita

Dr. Angelidou Margarita, Department of Spatial Planning and Development, Aristotle University of
Thessaloniki, Greece

The Future of Artificial Intelligence in Optimizing Urban Planning: An In-Depth Overview of Emerging Fields of Application

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Extended abstract

The application of Artificial Intelligence (AI) technologies in urban planning spans a broad spectrum of areas such as spatial planning, land use and zoning strategies, enhancing physical and digital accessibility, and the incorporation of citizens' perspectives and inputs into the urban planning process. The results can be used as a basis for optimizing the structural and functional aspects of urban environments, leading to the design and implementation of more inclusive, efficient, and sustainable urban plans.

More particularly, the emerging fields of AI application in urban planning include:

1. **Land use and infrastructure planning and forecasting:** AI plays a crucial role in allocating appropriate type and surface of land use, defining also the geometry of urban spaces, and predicting future population needs in infrastructure, housing and other urban functions.
2. **Citizen Participation and Consultation:** AI facilitates the presentation of proposed solutions in formats that are easily understandable by the general public, enhancing the public consultation process. Moreover, it analyzes extensive feedback and inputs from citizens, transforming them into actionable insights that inform and enrich urban plans.
3. **Optimizing Physical Accessibility:** In the context of innovative urban models such as the 15-minute city and superblocks, AI is instrumental in optimizing physical accessibility, ensuring urban spaces are more navigable and conducive to sustainable living practices.
4. **Adaptive Urban Planning:** AI supports the dynamic use of land and buildings, accommodating different activities and functional requirements throughout the day and across seasons.
5. **Sustainability and CO₂ Reduction:** Through the optimization of spatial layouts and building morphology, AI contributes significantly to the reduction of CO₂ emissions. This is achieved within the broader context of sustainable local development, aligning urban planning efforts with environmental conservation goals.

The above potential are ever more important considering the scarcity of urban public space in many cities, the emergence of in-between spaces introduced and partially remaining after the COVID-19 pandemic, some of which are significantly underutilized (e.g. pop-up bike lanes), as well as the need to accommodate newer smart charging and energy demand response requirements.

Keywords: *urban planning; urban policy; artificial intelligence; emerging trends; urban innovation*

The rise of remote work – implications for urban planning policy

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Extended abstract

With the increasing prevalence of remote work in today's workforce, it's crucial to examine how this trend is impacting our physical homes, workspaces, and urban infrastructures. This paper explores the need to adjust urban planning policies to accommodate the new reality of remote work, whether within or outside city boundaries.

Concerning residential land use, urban planning policy will be influenced by various factors. Areas planned in a way that favours mixed-use communities and offer a range of amenities and services within walking distance, will be more and more attractive to residents. The rise of remote work also prompts a rethinking of transportation in cities, possibly leading to neighborhood designs prioritizing walking, biking, and public transport over car-centric layouts. Home locations may shift due to decreased dependence on proximity to workplaces, resulting in increased demand for homes in suburban or rural areas, that provide more space and affordable living options. The need for larger living spaces will grow as people will increasingly create home offices, requiring a reevaluation of the established planning standard of around 40 m²/person (in Europe). Architectural and urban planning standards should also adapt to support outdoor workspaces in balconies, porches, and yards. Energy consumption in homes will likely increase, necessitating infrastructure upgrades for high-speed internet connectivity and increased use of renewable energy.

In terms of workplaces within urban planning policy, the shift to remote work means a change in how workspaces are designed and used. Many companies may move away from large, centralized offices to embrace smaller satellite locations, coworking spaces, and home offices. This transition enables companies to reduce their energy, real estate and operation costs, diversifying demand for locations, sizes and other characteristics of working spaces. Additionally, remote work is driving demand for more flexible workspaces that are designed to accommodate remote workers. This means that there will be a rise in the popularity of coworking spaces that offer flexible leases, shared amenities, and the ability to work in a community environment.

Funded by the European Union Horizon Europe project R-Map (GA101132497), this research is in its early stages, starting in February 2024. At this point, the paper primarily relies on a literature review, with the expectation of enhanced insights from the first findings to be presented at the CCVI conference in June 2024.

Keywords: *remote work; urban planning; urban policy; urban design; use of land*

Advancing Environmental Protection Planning in Cities: A Comprehensive Approach for Sustainable Urban Development

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Extended abstract

Urbanization, while driving economic growth and social progress, poses significant challenges to environmental sustainability. As cities expand, so do their ecological footprints, leading to pollution, habitat disruption, and resource depletion. In response, environmental protection has emerged as a critical strategy to mitigate these impacts and promote sustainable urban development. This abstract advocates the integration of environmental protection planning into urban development discussions, emphasizing its importance in the context of the special session on emerging trends in cities.

At the heart of this discussion is the presentation and demonstration of an innovative Environmental Protection Planning tool developed for cities and regions. The tool was developed in the context of the EU funded project “ROBIN - Deploying circular BIOecoNomies at Regional level with a territorial approach” (European Commission, Horizon Europe G.A. 101060504) and will be also utilized for “RIBES - Regional Inclusive Biobased Entrepreneurship Solutions” (European Commission, Horizon Europe G.A 101134911). This tool, designed to prevent and control pollution while enhancing habitat preservation, offers a systematic approach to assessing environmental conditions, identifying barriers, and improving performance across various urban development sectors. The tool encompasses 32 indicators spanning key environmental management sectors, including solid waste, liquid waste, air emissions, water sources, energy sources, green entrepreneurship, natural ecosystems, and sustainable processing. Each sector addresses specific challenges and opportunities, such as integrating circular and bio-based practices to combat climate change and promote sustainable practices across urban and regional administration.

Through the demonstration of this tool, participants will gain insights into practical strategies for enhancing environmental protection within urban contexts. They will learn how to leverage data-driven approaches to identify priority areas for intervention, implement targeted policies and initiatives, and monitor progress towards sustainability goals. Moreover, the tool's emphasis on regional circular bioeconomy integration underscores the importance of aligning environmental protection efforts with broader economic development objectives. By promoting such principles cities can foster innovation, create green jobs and enhance the resilience of their economies while safeguarding the environment.

All, in all, advancing environmental protection planning in cities is essential for achieving sustainable urban development in the post-COVID era and beyond. This paper provides a platform for dialogue, knowledge sharing, and capacity building, empowering stakeholders to drive positive environmental change and build more resilient, inclusive, and livable cities for future generations.

Keywords: *urban policy; environmental policy; circular cities and regions; sustainable urban development*

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The dynamics of remote work in changing cities across Europe

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Extended abstract

This paper will originate out of the R-MAP project which seeks to analyze the impact of remote working arrangements on urban and rural disparities in Europe. It aims to develop an Integrated Impact Assessment Framework and visualization platform to monitor and assess the individual, social, economic, environmental, and spatial impacts of remote working arrangements. The project examines current remote working trends in six regions, forecasts future impacts over the next 5-10 years through scenario building and provides tailored policy recommendations for local governments in urban and rural settings.

Our paper focuses on the collected data and its analysis from a minimum of 20,000 individuals across Europe through Prolific. Our endeavor is to ensure representation across gender, age, and nationality as comprehensively as possible. The survey aims to gather insights into workers' perceptions, intentions, and needs regarding remote working arrangements. The survey covers various aspects related to remote work, including geolocated data on past, current, and future working and living conditions. We will randomly assign individuals to three groups: one group will answer questions about remote conditions in the past, another about the present, and a third about the future. The survey also addresses concerns such as extra costs, job security, productivity, career advancement, health and safety risks, family and care arrangements, and overall well-being. Participants' input will help identify individual and societal needs, including the right to disconnect, financial support, and support for specific groups like women.

The analysis of the data will provide insights for policy advice on analyzing the impact of remote working arrangements on urban and rural disparities in Europe. This information will be instrumental in understanding the dynamics of remote work and its effects on different regions.

Keywords: *remote working arrangements; open data; large scale survey*

Effects of COVID 19 on Environmentally Sustainable Development Goals (SDG)

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Extended abstract

The onset of 2020, designated by the United Nations as the commencement of the 'Decade of Action' for achieving the Sustainable Development Goals (SDGs) by 2030, was significantly disrupted by the economic and societal impacts of the COVID-19 pandemic. This has notably hindered the capacity of developed nations to advance these objectives, with immediate repercussions on environmental indicators. The pandemic underscored the vulnerability of the SDGs to various global challenges. Constraints on human movement and supply chain interruptions have precipitated labor shortages in local agriculture and food sectors, leading to considerable losses and an increase in perishable food waste, particularly due to the diminished demand from closures of food service industries (impacting SDGs 6, 12, 14, 15). On a positive overview a shift towards locally-sourced production and digital services has promoted sustainable consumption practices, however demanded increase in the local agroindustries effecting climate changes, use of agrochemicals, use and/or pollution of local water resources (SDGs 11, 12, 13, 15). However, the surge in online deliveries has escalated plastic packaging waste, exacerbating municipal waste management issues. The pandemic also generated significant biomedical waste and intensified the generation of electronic waste due to a higher reliance on telecommunication devices, as remote work became more prevalent (SDGs 7, 11, 12, 13, 15). Although lockdowns led to a temporary decrease in water pollution due to reduced industrial activities, this is not a sustainable solution. The pandemic-related disruptions in waste management systems, including staff shortages and operational constraints in treatment and recycling facilities, have impeded waste processing efforts (relating to SDGs 12, 13, 14, 15). Additionally, the breakdown of plastic waste into microplastics poses a severe threat to marine life and, by extension, human health through the food chain (impacting SDGs 14, 15).

Keywords: COVID 19; environment; single use plastics; sustainability goals; wastes

1. INTRODUCTION

The purpose of the Sustainable Development Goals (SDGs) was to focus worldwide attention and unify societal efforts to monitor and enhance progress toward achieving the 169 specific targets underpinning the 17 goals. These goals exemplify various aspects of development, with the success of the SDGs based on two critical elements: sustainable economic growth and globalization. However, COVID-19 inhibited the ability of industrialized nations to support the development of others, revealing the SDGs' vulnerability to global crises. According to Naidoo and Fisher, 2020 [1], nearly two-thirds of the SDG targets were either threatened or poorly equipped to combat the pandemic's effects, and about 10% could potentially worsen in future pandemics.

The long-term economic impacts of COVID-19, which relate to factors like labor, capital stock, and productivity, as well as distributional effects, introduce uncertainties [2]. These challenges disrupt the progress of the SDGs, which can be directly or indirectly impacted. Directly affected goals include 1, 2, 3, 4, 8, 10, and 12 (Fig.1), while goals 5, 6, 7, 9, 11, 13, 14, 15 (Fig.1), and 16 are indirectly impacted due to shifts in priorities [3]. Goal 17 (Fig.1), remains crucial for reinvigorating global efforts and regaining lost momentum in advancing the SDGs post-COVID.

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Figure 1. Sustainable Development Goals - (The logos of the SDGs are sourced from www.un.org/en/sustainable-development-goals)

The COVID-19 pandemic has significantly increased the generation of biomedical waste (BMW). Items such as facial tissues, gauze, masks, oxygen masks, test tubes from nasopharyngeal swabs, cotton swabs, saline bags, disposable syringes, and needles used in treating COVID-19 patients, all were increased up to 25% on a daily basis. The existing facilities, like incinerators, are often inadequate to handle this increased volume of waste, raising the risk of hazardous waste being disposed of improperly [4,5] (SDG 14). Additionally, the health risks from mishandling infectious COVID-19 waste are particularly acute for sanitation workers in developing countries who lack access to proper safety equipment (SDG 3, 8).

The pandemic's associated restrictions have led to a global shift towards working from home, dramatically increasing the demand for electronics, such as laptops, mobile phones, and digital thermometers. A survey by Blancco and Joensuu found that 97% of companies purchased new laptops, and 77% of Americans acquired new devices to facilitate remote work [6]. This shift is expected to persist post-pandemic, as companies continue to upgrade digital technologies and home office setups, contributing to a significant rise in electronic waste (SDG 3, 11, 12).

Despite the United Nations' SDG report for 2020 predicting a 6% decrease in greenhouse gas emissions due to COVID-19, the "United in Science 2020" report noted atmospheric CO₂ levels remained above 410 ppm in the first half of 2020, with no signs of decline attributable to the pandemic. However, global fossil CO₂ emissions were estimated to have decreased by 4-7% in 2020 due to confinement policies, with a drop of 17% in April 2020 compared to 2019, though by June they had nearly returned to 2019 levels, within a 1-8% lower range [7,8]. While the reduced industrial and commercial activity during lockdowns led to a significant decrease in water pollution, this was just a temporary side effect. During the lockdown, the cutting down of certain major industrial operations significantly reduced the input of industrial effluents on surface waters. However, disruptions in waste collection services may have led to poor solid waste management, resulting in increased dumping into water bodies [8,9] (SDG 6). Although there was a temporary reduction in direct marine pollution due to decreased activity at sea [10], the pandemic increased the use of single-use plastics which has a direct effect in marine pollution. It is estimated that nearly 75% of these masks will end up in landfills or as marine litter, Oceans Asia reported finding at least 70 face masks along just a 100-meter stretch of Lantau Island's beach, with an additional 30 washed up onshore at the end of February. Moreover, the breakdown of bio/oxodegradable plastic waste will be turned into microplastics entering agricultural soils and marine ecosystems and potentially enter the human food chain [5].

2. MAIN POST COVID FACTORS AFFECTING ENVIRONMENTAL SUSTAINABILITY

2.1 Food Waste

In the post – COVID era, the goal of "Zero Hunger" (SDG 2) needs to be reconsidered in the context of interplay between the economic and environmental dimensions of food systems. This can be achieved by developing sustainable solutions that integrate the circular economy model and food waste management. Efficient policies should promote circular economy-based applications such as material and energy recovery, development of secondary products, green solutions, infrastructure development, industry interactions, and job creation, all contributing to the achievement of the SDGs. Applying circular economy principles across supply chains and production processes could also create additional economic opportunities (SDG 8). The 'Farm to Fork' strategy could be considered to speed up the transition towards sustainable food systems that aim for a neutral or positive environmental impact, help mitigate climate change, reverse biodiversity loss, and ensure food security, nutrition, public health, while preserving affordability and promoting fair trade. This transition will help governments achieve multiple SDG indicators, including SDG 2 (end hunger, malnutrition, food security, agriculture, fair trade), SDG 6 (water use efficiency, wastewater treatment), SDG 8 (economic growth; productivity, employability), SDG 12 (food loss and wastage), SDG 13 (climate change adaptation measures), and SDG 15 (forest and land degradation, loss of biodiversity, natural habitats). Additionally, food waste contributes to 8% of annual anthropogenic GHG emissions; hence, developing circular economy strategies could lead to annual savings of 1.7 billion tonnes of CO₂ [11]. Enhanced collection, redistribution, and valorization systems will further develop economic opportunities from organic materials. Valorization mechanisms such as composting, anaerobic digestion, and hydrothermal carbonization for inedible food and unavoidable food waste may facilitate resource recovery but also create job opportunities [12,13]. Repurposing waste into new products also presents substantial economic opportunities.

Establishing food banks and distribution centers plays a critical role in alleviating hunger and enhancing food security.

2.2 Biomedical Waste

The use of single use disposable items has been crucial in reducing viral transmission and controlling the spread of the virus. However, the increased demand for healthcare during the pandemic and the acceleration of vaccination drives globally have led to a significant increase in biomedical waste (BMW) generation. Addressing health issues (SDG 3) requires safe and reliable methods for the segregation and disposal of BMW due to its high infection and injury risk. Typical BMW generation is estimated about 0.5 kg per patient per day, while in developing countries is 0.2 kg per patient per day [14]. According to the World Health Organization, 85% of BMW is non-hazardous, but the remaining 15% includes potentially infectious waste [15]. These values were increased at least 25% on a daily basis during the pandemic. Improper handling and disposal of BMW can lead to soil and groundwater contamination, destruction of beneficial microbes in septic systems, and physical injuries from sharps, with these issues more prevalent in developing countries due to inadequate infrastructure [12]. During the pandemic, accessing appropriate treatment facilities and ensuring safe waste disposal are critical to managing health and environmental hazards [16]. Effective healthcare waste management can accelerate progress towards multiple UN Sustainable Development Goals, particularly SDG 3 (Good Health and Wellbeing), SDG 6 (Clean Water and Sanitation), SDG 8 (Decent Work and Economic Growth), SDG 12 (Responsible Consumption and Production), and SDG 13 (Climate Action). Minimizing waste, segregating at the source, avoiding incineration, and recycling conserve resources and energy. Organic wastes can produce methane, a potent greenhouse gas, but controlled biodigestion allows for methane capture and use as biofuel, reducing CO₂ emissions and aiding climate change mitigation. Sustainable waste management technologies like biodigestion and autoclaving can enhance healthcare system resilience (SDG 12). Developing a

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regional network to share experiences and lessons learned can improve BMW management systems during and beyond the current pandemic.

2.3 Plastic Waste

Plastic pollution has been a considerable global environmental problem due to its pervasive presence in the environment. The COVID-19 pandemic has increased this problem, leading to an estimated generation of 1.6 million tonnes of plastic waste per day since the outbreak began [17]. Addressing plastic pollution not only reduces environmental harm but also curtails fossil fuel consumption—20% of total oil production goes into plastic manufacturing [18]. Initiatives like bioplastics derived from organic waste streams exemplify the shift toward renewable resources, reducing reliance on fossil-based plastics [19].

Recycling creates local jobs and builds regional economies. However, recycling faces technical challenges and higher costs compared to conventional waste disposal methods. Moreover, transitioning to sustainable technologies like pyrolysis, which can produce commercially valuable by-products, enhances material and energy recovery following circular economy principles [5].

Developing waste handling capacities and infrastructure, along with policies focused on material and energy recovery, and integrating the informal sector, can enhance economic activity and create jobs. Extended producer responsibility, boosting investor confidence, and encouraging responsible consumer behavior support the long-term economic sustainability of plastic recycling. The 2018 amendment to the EU directive on packaging waste promotes the recycling and reuse of packaging, facilitating a transition to a circular economy. The EU directive on single-use plastics is also advancing separate collection systems for specific waste streams like beverage bottles to improve recycling rates. While mismanagement of plastics was about 41% in 2016 and is projected to rise by 2040, integrating plastic recycling with circular economy strategies can reduce GHG emissions by 25% [20].

2.4 Electronic waste

The increasing consumption in electronic devices sector, reduced product lifespans, and limited repair options, global e-waste production was estimated to double by 2045 from a baseline of 53.6 million tonnes in 2019, equals to an average of 7.3 kg per capita [6, 21]. Additionally, the shift towards remote working increased the need for robust technical infrastructure and digital transformation, further boosting e-waste volumes due to the pandemic [6]. Given the high demand for raw materials in the production of electrical and electronic equipment, e-waste is also closely linked to SDG indicators on material footprint and domestic material consumption (SDGs 8.4.1, 12.1.1, 8.4.2, and 12.2.2). The pandemic's associated restrictions have led to a global shift towards working from home, dramatically increased the demand for electronics, which will be disposed by the end at their life cycle.

Improper disposal of e-waste poses significant health and environmental risks due to toxic substances such as hazardous additives, which are usually toxic metals. Annually, around 50 tonnes of mercury and 71,000 tonnes of plastics are released into the environment from undocumented e-waste flows, posing serious health risks to exposed workers [21] (SDG 3). E-waste management is crucial for achieving several SDGs, including decent work and economic growth (SDG 8), good health and well-being (SDG 3), clean water and sanitation (SDG 6), and protecting aquatic life (SDG 14).

3. DISCUSSION

Yuan et al. [22], calculated the combined shock loss and growth delay loss across all countries, weighted by their populations, under COVID-19's impact on global progress towards the Sustainable Development Goals (SDGs), as depicted in Fig. 2. The goal most severely impacted is SDG 1 (No Poverty), second only to SDG 9. This severe impact is primarily due to the pandemic-driven

economic lockdowns that threaten to increase extreme poverty (i.e., SDG 1.1 and 1.2) in many countries, and the interconnectedness with other goals amplifies these effects and hampers progress towards achieving SDG 1 that was previously on track. Following SDG 1, the goals of industry, innovation, and infrastructure (SDG 9); sustainable cities and communities (SDG 11); quality education (SDG 4); strong institutions (SDG 16); good health and well-being (SDG 3); and affordable and clean energy (SDG 7) are next in line in terms of impact. Notably, the impacts on SDGs 4, 7, 9, and 11 are significant.

The SDGs that were most effected have indirect effects on all the environmental SDGS due to their high degree of interconnectivity. The possitive effects that are shown in Fig.2 are just short term and profound during the lockdowns. The increase of wastes and their disposal, the exsessive amounts of single use plastics along with inadequate management practices pose a ongoing environmental threat. Moreover, the increase of industrial activiaties in order to compensate with the losses occurred during the pandemic increased the amounts of industrial effluents.

In conclusion, the overall findings indicate significant, albeit less visible, impacts on SDG development beyond the immediate effects. These results suggest that the impact of COVID-19 on global progress towards the SDGs could be substantially underestimated if both the growth delay loss and the indirect shock loss from cascading effects are not fully considered.

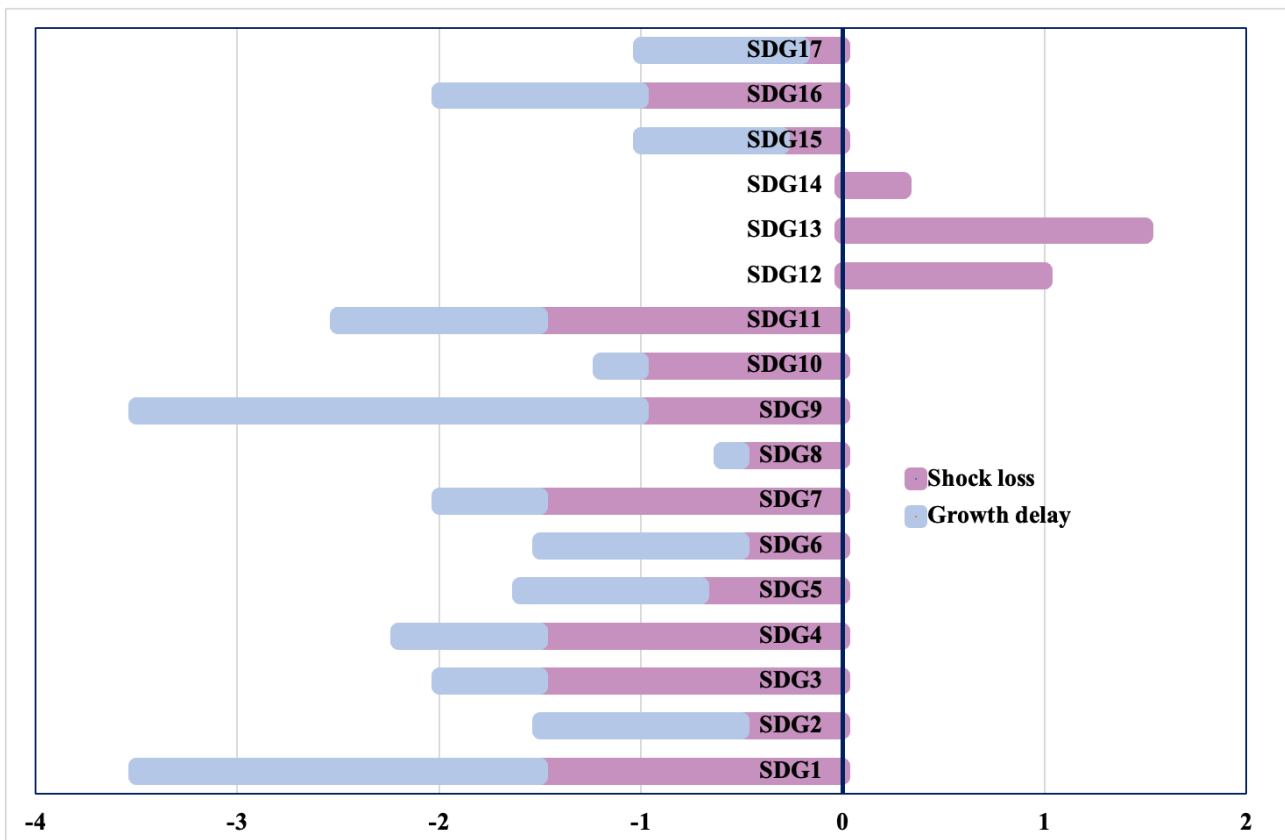


Figure 2. Effect of COVID-19 impacts expressed as shock loss and growth dealay on SDGs (adapted from Yuan et al., 2023).

4. CONCLUSION

The COVID-19 pandemic has significantly disrupted progress towards achieving the UN Sustainable Development Goals (SDGs). In particular, deficiencies in waste management systems, which are closely linked to various SDGs, have raised health and environmental concerns, thus drawing urgent attention from policymakers. The need for incorporating circular economy principles such as

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recovery, recycling, repurposing, remanufacturing, refurbishing, repairing, reusing, reducing, is essential in order to accelerate SDG achievement in a post-COVID world. Furthermore, the importance of different waste components—food, plastic, biomedical, and electronic waste on the environmental SDG, is highlighted as there was a dynamic change in their quantities and management practices. These efforts could support both the public and private sectors in achieving short- and long-term SDG objectives. Although adopting circular economy-based waste management presents challenges, the study suggests that post-COVID economic recovery measures could catalyze a global shift toward its full implementation, thereby ensuring the timely achievement of the environmental SDGs.

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Mapping the impact of remote working arrangements in urban and rural areas: the R-Map approach

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Extended abstract

The outbreak of the pandemic in 2020 resulted in a significant increase in remote work, a trend that has continued even as conditions have improved. This shift has had far-reaching implications for living and working conditions and has further accentuated the urban-rural divide. Although remote work has become more widespread, its social implications and impact on the urban-rural divide are still not fully understood.

The R-Map project aims to investigate, predict, and propose solutions for the impact of remote work on the urban-rural divide in Europe. Through advanced research methods and collaboration with stakeholders, R-Map seeks to improve our understanding of the consequences of remote work. The project aims to accurately predict future trends using multiple data sources and advanced modelling techniques. By focusing on the spatial, economic, and social dimensions, this aims to address the ongoing challenge of bridging the urban-rural divide. It recognizes the complexity of the issue and the impact of remote work on these different aspects.

The key objectives of this project are to comprehend current trends in remote work, evaluate their social, economic, and spatial impacts, present trends clearly and concisely for decision-makers, forecast future impacts, involve stakeholders in policy discussions, and communicate research findings effectively. The methodology involves an exploratory phase that includes a literature review, the creation of a statistical model to analyse the impact of remote work on the urban-rural divide, the development of a platform for policymakers, and the examination of six case studies in Europe. The case studies are from Greece (Thessaloniki), Italy (Milan), Turkey (Istanbul), the UK (Surrey), the Netherlands-Germany (cross-border case), and Austria-Switzerland (cross-border case).

The project's expected impacts include scientific advancements in evaluating the impact of remote working arrangements, economic benefits such as improved digital infrastructure, increased digital literacy, and job opportunities, as well as social benefits such as increased flexibility for businesses and workers, improved health and well-being, and the creation of a platform for policymakers.

Keywords: *remote work; urban-rural divide; spatial impacts; statistical model; case studies*

Architectural Innovations for the Modern Workplace: Envisioning the Future Office

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Abstract

The COVID-19 pandemic has triggered a significant change in urban development, legislation, and planning, bringing out unique difficulties and opportunities. Simultaneously, the transition from conventional office environments to remote work cultures has occurred in recent years, fundamentally altering the nature of collaborative work. Engineering teams, once limited by geographical closeness, now work in different locations, requiring sophisticated digital tools to collaborate effectively. However, current toolsets frequently neglect the incorporation of virtual environments and human interaction, impeding genuine creative collaboration in distant work contexts.

The paper examines the most recent studies and advancements in workplace design, specifically examining adaptive architecture and extended reality (XR) environments through virtual and augmented reality (VR and AR) technologies as transforming factors. Adaptable architecture utilizes adaptable design concepts to fit changing work settings, while XR spaces AR show potential in improving worker satisfaction and creativity as well as productivity. To ensure optimal interaction between humans and digital environments and promote effective collaboration, it is crucial to optimize office interior design and human-machine interfacing (HMI) for remote work, regardless of physical location.

Furthermore, the paper outlines the future course of office design, highlighting the significance of establishing workplaces that not only foster innovation and collaboration but also emphasize the well-being of employees. The forthcoming office will utilize advanced technologies and innovative architectural methods to create stimulating and efficient workspaces that cater to individual requirements. This will foster creativity and productivity within evolving remote work cultures.

Keywords: *remote work; Adaptive architecture; Augmented reality (AR); Collaboration*

1. INTRODUCTION

Working remotely has become an established standard all over the world. It offers many advantages, such as reducing travel and promoting a prosperous globalized society that is mindful of preserving the planet's resources and climate. It is crucial to develop a sustainable, human-centered and inclusive remote work culture that fosters creative solutions for future challenges, benefiting all industrial ecosystems and contributing to a prosperous European and worldwide society. However, the commonly used tools for collaboration among distributed teams are still heavily reliant on 2D computer screens for interaction and information presentation. While this method is suitable for decision-making, it presents a significant obstacle for co-creative collaboration, idea generation and design, as there are radically different when experienced in 2D and require proper spatial and social cues conveyance and rich channels of perception [35][36]. Therefore, teams still often have physical meetings for creative work, even though not all members can always attend, which leads to a loss of creative potential. extended reality (XR) technologies have the potential to solve this problem, enabling interaction and immersion in future online and distributed workplaces. Multimodal and flexible design of these workplaces will allow for inclusiveness and openness to all members of society, including those with handicaps limiting their physical access to the workplace.

Additionally, recent times have also seen the rise of hybrid working scenarios, where participants join remotely and physically have the same experience [37][38]. For physical participants, XR technologies can enhance the physical space and create interactive experiences by using augmented reality (AR), such as for a product demonstration. For remote participants, XR technologies can take advantage of VR to create fully immersive experiences that can be accessed from anywhere in the world, such as a virtual conference or a VR game. Hybrid working environments combined with XR technologies have the potential to transform the way we work and interact with each other, by providing more flexibility and enhancing our digital experiences in terms of creative work.

2. IMPACT OF COVID-19 ON URBAN DEVELOPMENT FOCUSING ON WORK ENVIRONMENTS

2.1 Changes in Urban Development

The COVID-19 pandemic has had a major impact on work dynamics, both at individual and urban levels. This impact is primarily due to the fast and widespread shift to remote work, exemplified by the widespread use of Zoom meetings. These implications are expected to have both short-term and long-term consequences [2]. The pandemic compelled numerous industries to swiftly adjust to remote employment, prompting inquiries on the future of urban existence after the outbreak. Traditionally, urban planning and architecture have frequently prioritized the segregation of residential and commercial areas, especially to promote better well-being in industrial settings. Nevertheless, the discipline of Urban Design should allocate greater consideration to the intricacies of professional life and urban economies. In the past, the connections between office design, work organization, and the changing characteristics of workplaces have been explored in an architectural study [3]. In addition, more recent research on creative clusters has investigated the impact of the physical surroundings on economic activities [4], highlighting the importance of semi-public and public areas in contemporary work practices [5].

Considering these alterations, it is imperative to incorporate a wide range of productive and commercial endeavors inside metropolitan environments. This encompasses providing assistance to dynamic and rising sectors, such as technology, creative industries, and traditional manufacturing. To do this, it is crucial to have urban designs and architectural styles that can easily adjust to different activities, efficiently controlling the movement of commodities and individuals as well as seamlessly incorporating them with residential and other purposes. Further exploration is required in urban design research to examine the spatial functions of various productive activities [2]. Furthermore, there is a notable potential to create the physical surroundings in a manner that encourages industries which support both health and sustainability, such as green economy and circular economies, while simultaneously tackling disparities in work-related health. Urban construction in the future ought to focus on the quality of work the surroundings, guaranteeing access to green spaces and social facilities while also accommodating various commute patterns as work expands outside traditional office locations to include homes and public areas [2].

2.2 Opportunities and Challenges Presented by the Pandemic

The Covid-19 pandemic has accelerated emergent working practices and changes in work organization, presenting several challenges. Work is no longer confined to traditional office spaces but is extending into homes, semi-public spaces, public spaces, mobile environments like public transportation and ultimately in the autonomous driving car creating a need for new workspace typologies that integrate work with other purposes [1]. This shift necessitates the careful design of housing to accommodate homeworking, along with the articulation between workspaces and open spaces to support diverse commuting patterns. The demise and delocalization of offices are leading to more diffuse patterns of work locations, pushing work into residential areas [2]. This requires a rethinking of the role of offices and the mix of activities and services in residential areas to support

home and flexible working, as well as social needs like co-working spaces. The decreasing demand for traditional office space has significant implications for the future of business clusters, offering opportunities for creative reuse of freed-up built spaces [2]. The design of quality working environments must consider the wider neighborhood, ensuring access to open and green spaces, social amenities, and physical activities.

Data from the European Trade Union Institute (ETUI) in the 2023 issue of *Benchmarking Working Europe* [6] shows a significant increase in homeworking, with 24% of EU workers working from home at least sometimes in 2021, up from 12% in 2012. This trend is even more pronounced in some countries, such as the Netherlands, where 54% of workers teleworked at least partially in 2021. The growing preference for remote and hybrid work is influencing job vacancies and openings, with many employers offering flexible work arrangements to attract applicants [8]. However, these new working patterns also present challenges, such as job intensification and the blurring of work and personal time during homeworking days. Additionally, the increased managerial oversight and remote surveillance to monitor productivity can spill over into greater managerial control during office days. The blurring of home and office work lines has important implications for employers, who are now more regularly confronted with personal wellbeing concerns of their employees. Employers who fail to address these novel requests may face issues like "quiet quitting" or even the "great resignation," as employees seek better work-life balance and job satisfaction in the post-pandemic era [7].

2.3 Remote Work – Flexibility (Locally and with Respect to Time) – Positive Impact on Climate

The Flexible Office concept, which combines technical and organizational components, has significant potential not only to positively impact climate change by also promoting remote work flexibility [9]. Organizationally, it involves selecting suitable employees, designing adaptable office spaces, and defining roles and rules. This process includes ensuring employee willingness to participate through meetings that communicate the benefits and address any prejudices or fears. Technically, it requires equipping employees with mobile phones, laptops with mobile network access, remote access solutions, and virtual private networks. This setup allows employees to work effectively from home or customer offices, reducing the need for daily commuting and thus lowering carbon emissions from transportation [9].

While remote work's decoupling from traditional office spaces is transformative, it also brings about several positive environmental impacts. The reduction in commuting time directly decreases road traffic and pollution, aligning with early proponents' visions of telework as an eco-friendly solution. However, the overall environmental footprint of remote work remains complex, as it involves additional energy consumption for home heating, electricity, and IT equipment [10]. Despite these factors, the shift towards remote work can significantly reduce the urban carbon footprint by transforming consumption patterns and lifestyles, potentially leading to greener suburban and city center environments. By carefully managing the technological and organizational aspects of remote work, companies can enhance their sustainability efforts while maintaining productivity and employee satisfaction [9].

3. TRANSITION TO REMOTE WORK CULTURES

3.1 Evolution from Conventional Office Environments

Emerging trends within society have been shifting how we as humans work and adapt to new environmental scenarios through the quick integration of effective solutions to new human needs within a socio-economic context. Within the scope of work environments, globalization, digitalization, and evolving socio-economic needs have shifted how we achieve our tasks towards a remote work culture. In 2020 COVID-19 acted as a catalyst by forcing many organizations to adapt to remote work rapidly and reevaluate their processes to ensure safety for their workers [11]. Organizations have shifted how they operate as decision makers in the pursuit of new viable ways to

overcome bottlenecks produced due to the lack of physical available presence. Moreover, the pandemic brought to light the importance of considering vulnerabilities due to an outbreak and it now proposes a new layer for engineers and architects to consider when developing new spaces and products [12]. Infrastructures now need to ensure a proper environment to prevent the endangerment of their workers against the impact of possibly arising diseases without damaging creative or precise processes.

Enabling a remote work culture has become an established standard all over the world. It offers many advantages, such as reducing travel and promoting a prosperous globalized society that is mindful of preserving the planet's resources and climate. As organizations continuously adapt to current and new paradigms it is crucial to persevere in the exploration of creative environments, which break with conventional paths of reasoning – thereby facilitating the benefits of remote work while mitigating its drawbacks and ensuring a sustainable and productive environment for employees within an organization [13].

3.2 Impact on Collaborative Work Dynamics

In the workplace of the future, innovations shall be collaboratively created with increased dynamism and sustainability. People shall be able to work creatively, exchange ideas, and socialize in a subject-specific manner. To this end, compatibility with a global remote work culture is paramount. Yet the focus on exploring technology is not sufficient to ensure the practical relevance and diffusion of an innovation. Incorporating IT applications, such as collaboration systems, into core business strategies is becoming essential not only for transforming businesses but also for generating new business models. The key to sustained competitive advantage lies in leveraging high-level knowledge and dynamic capabilities to continuously innovate and maximize the use of tools, which aid collaborative work dynamics [14].

It is essential for engineers, designers, and architects to keep a holistic approach to find viable solutions, which cover the interaction needs presented during joint activities. Moreover, organizations require awareness of their limitations since they can redirect ideas towards noble solutions while following a human centered approach – thereby, leading to innovative solutions [15]. Therefore, allowing new layers of problem understanding to guide the improvement of collaboration dynamics within a work context is required. By incorporating collaborative dynamics, specific collaboration elements such as principled engagement and shared motivation can enhance systems change, equity, and sustainability. These dynamics interact to create causal chains that lead to improved collaborative outcomes, which consequently impacts the qualitative and creative outcomes of an organization [16].

3.3 Digital Tools for Remote Collaboration

One way to define a work collaboration is as the mutual work and communication between two or more people with the common goal to solve task-based problems. In the past, we have had the opportunity to collaborate through auditory communication and solve limited task-based problems, such as information communication and planification. However, with emerging technologies as enablers, we have opened the doors to transcend work through innovative solutions to inefficient problem-solving strategies[17]. This creative mentality has broken the barrier, not only to emulate office related environments, such as a collaborative whiteboard system [18] or the mutual creation of presentations [19], but it has also allowed designers to manipulate space through virtual realism. Thereby expanding the range of exploration towards an effective implementation of digital tools, which allow to explore, create, inform, and evaluate as well as to collaboratively envision new ways to transcend and increase the efficiency of the existing digital solutions.

Virtual work environments that enable new forms of communication and multimodal design can be examined through an active spatial exploration that looks at the future of work and situates it within a technologically enabled ecology of interfacing. Spaces such as an interface need to be defined

through the situated vs. virtual interaction context workers will face. Therefore, in the pursuit of hybrid space development, designers need to explore planes of work dynamics that can be understood through degrees of presence. This leads to a perspective shift on the concept of work itself: it will shift towards situated and virtual environments, which enable an exploration on the context of space through interaction scenarios that are experience-rich, time-based, and environmentally modelled.

However, we need to understand current limitations which can result in a lack of virtual environment integration. Current limitations to take into consideration are:

1. **Limited collaboration capabilities:** Remote or hybrid teams often face challenges in collaborating effectively due to limited social cues, emotion conveyance, and interaction tools. Videoconferencing puts participants on a screen, which leads to a narrower cognitive focus and hence cognitive cost for idea generation. On a personal level, there are limitations due to missing channels of perception. This can restrict creativity and problem-solving abilities. [20,21]
2. **Lack of physical presence:** Teams working on physical products may face challenges in visualizing and understanding the physical characteristics of the product, especially when working remotely. [13]
3. **Reduced engagement and motivation:** Remote or hybrid teams may face challenges in maintaining engagement and motivation levels, which can impact creativity and productivity. [13, 21]
4. **More pronounced inequalities among user groups:** studies show that remote and hybrid teams face inequalities based on factors such as education, age, gender, occupation, and income. [15, 20]
5. To overcome these limitations and innovate how we achieve work within society, designers require to leverage state-of-the-art technologies, including VR, AR, and MR environments – thereby enabling immersive and interactive environments for remote teams. These technologies allow teams to collaborate in a shared virtual space, where they can visualize and interact with physical products or cybernetic systems, thereby improving their understanding and problem-solving capabilities.

3.4 Human Interaction Deficits in Digital Workspaces

Human interaction deficits pose a significant challenge in digital workspaces. Despite the facilitation of functional communication through digital tools, these often fail to replicate the depth of human connection formed through in-person interactions. This deficit can lead to negative mental states among remote workers, fostering feelings of isolation and disconnection, which in turn affect job satisfaction and productivity [22]. Additionally, the frequent use of remote work environments reduces spontaneous, informal interactions, such as hallway conversations and lunch breaks, which aid creativity and innovation.

To address these challenges, the development of digital workspace environments must prioritize fostering social interaction and community-building [22]. This involves creating digital platforms that encourage informal communication and the development of relationships among remote workers. To develop new solutions to current limitations, designers require considering holistic procedures to achieve sustainable, human-centered, and inclusive remote work cultures, which foster creative solutions for future challenges, benefiting all industrial ecosystems, including large industries as well as small and medium-sized enterprises [13]. However, the commonly used tools for collaboration among distributed teams are still heavily reliant on 2D computer screens for interaction and information presentation. While this method is suitable for decision-making, it presents a significant obstacle for co-creative collaboration, idea generation, and design. These activities are inherently different when experienced in 2D and require the conveyance of proper spatial and social cues, as well as rich channels of perception.

While digital workspaces offer numerous advantages, addressing human interaction deficits is critical for maintaining employee well-being and fostering creativity and innovation. There are six individual factors, which serve as moderators for negative effects of interaction deficit: personality, age, gender, work and technology presences, computer self-efficiency, mindfulness [22]. It is the responsibility of the organization to integrate these factors within the design of new solutions to guarantee noble results. By developing more immersive digital tools and adopting organizational practices that emphasize regular, meaningful communication, remote work environments can become more effective and supportive of their workforce.

3.5 Overview of Emerging Digital Toolsets for 3D Representation and Engineering

The range of digital tools has expanded towards all megatrends within a society. To review how VR and AR as well as any combination of it (MR) are used in a physical environment, e.g. the future office, it is important to explicitly fulfill remote collaboration on physical tasks [20]. The use of a head worn AR display and camera can allow a remote expert to give feedback, while the integration of AR technology enables them in real-time to almost seamlessly merge and interact with virtual and physical objects. This collective operation between real and computer-generated virtual environments is one example of many emerging solutions, which digitally increase the range of dynamics for their application [20].

However, these tools often have technical limitations, such as bandwidth constraints or technological immaturity, that can impede teams' effectiveness [13]. One significant challenge is the absence of natural 3D representations of real humans and the difficulty in naturally manipulating virtual 3D objects. In hybrid environments, achieving a seamless integration of physical and virtual elements can be problematic. For instance, in virtual meetings, accurately displaying participants as 3D representations that mirror their physical appearance remains a complex task. Additionally, challenges such as balancing task-specific productivity with creativity and learning, navigating uncertainty, and the lack of support in decision-making processes are still present in multiple areas of the industry [13].

To address the previously mentioned challenges, various exemplary solutions and toolsets have been developed across the industry:

1. **Apple Vision pro:** An advanced AR headset that enhances remote collaboration through immersive experiences with lifelike 3D visualizations and interactive environments. [23]
2. **Meta AI and Meta Quest 2:** Meta's AI-powered tools and VR headsets enable natural and intuitive interactions in virtual spaces, boosting collaboration and engagement in remote work scenarios. [24]
3. **Nvidia Omniverse Platform:** A collaborative platform that facilitates real-time teamwork among designers and engineers on intricate 3D simulations and digital twins, seamlessly integrating physical and virtual processes. [25]
4. **Eve - Cloud Simulation Platform:** Cloud-based platform built on open-source components, which allows for easy development of different simulation scenarios to enable iterative development and testing of products. [26]
5. **Tronis[®] & GenVis[®] - Immersive Adaptive Virtual Workspace:** A toolset as basis for creating an immersive adaptive virtual workspace which allows for multi-user interfacing. A product can be placed directly in its virtual operational environment. The tool shall be enhanced by distinct virtualized 2D interaction surfaces leveraging the co-creative potential of teams. [27]
6. **Collaborative Telepresence Tool:** Collaborative telepresence tool to enable real-time communication and information exchange between remote teleworkers and physical workers. The tool will provide near-real spatial awareness by incorporating a highly advanced stereographic camera and surround microphones that provide an accurate and detailed representation of the

physical environment. The robot will be controlled remotely through the 5G network using a Meta Quest 2 headset. [28]

7. **CoVR Platform:** CoVR, a flexible, secure, multi-layer, client-agnostic protocol and software platform for local and remote collaborative MR. To meet data security requirements of most industrial use cases, the server layer is strictly separated from the data provider layer which handles the actual contents of the MR environment (e.g., CAD models) in which users are collaborating. [29]
8. The current body of tools available either targets a specific use case or serves as an aid tool to facilitate targeted tool development. However, it is necessary to intentionally direct the future innovation of workspace environment through distinct lenses of design. Although innovation can be methodologically viewed under three scopes (feasibility, viability, and desirability) [30], it is necessary to keep a holistic consideration of different scopes, which commonly affect connected megatrends within a society.

4. INNOVATIONS IN WORKPLACE AND FUTURE DIRECTIONS IN OFFICE DESIGN

4.1 Technology: Emerging Trends and Technologies - Simulation, Virtual Reality (VR), Augmented Reality (AR) Environments, Mixed Reality (XR), Visual and Interactive Haptic Surfaces, AI.

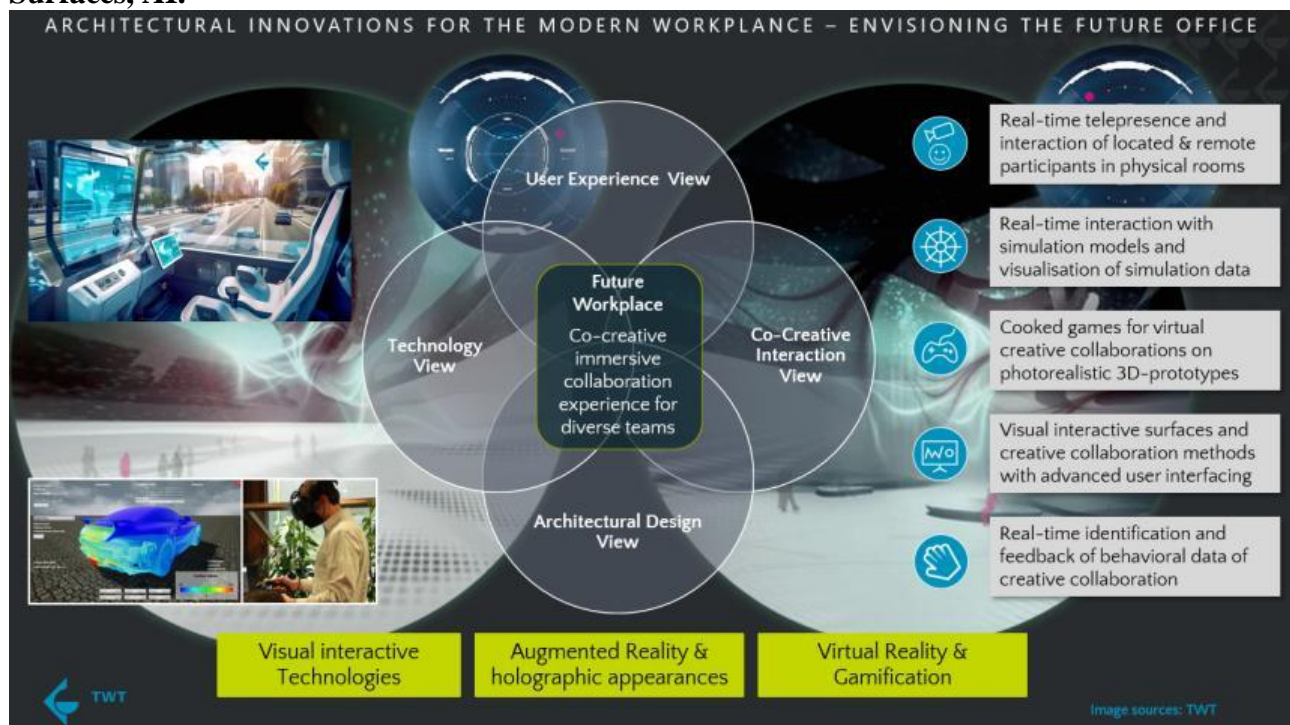


Figure 1. Overview of the four interrelated views, which are to be examined in the paper, i.e. Technology, User Experience, Social Interaction Experience and architecture design. In green color the extending reality technologies to be explored.

The first perspective revolves around technology, specifically AR and VR devices that utilize interactive surfaces and create holographic representations in real-world environments. Virtual places can be created to closely resemble real environments using advanced technologies and game design techniques, allowing for interactive and immersive experiences. Virtual worlds can be accessed remotely and may incorporate three-dimensional items and avatars that can manifest as holograms in actual areas. Actual individuals or critical communication attributes such as facial expressions may

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be depicted as avatars within virtuality. These technologies aim to create a smooth and immersive experience of AR and VR technologies by developing, improving, and implementing them. The current technologies must be examined to see how they might be improved in terms of presenting information, enhancing user and social engagement, and increasing the complexity of architectural design to foster creativity. Innovative algorithms are also required to develop adjustable virtual 3D photorealistic items for AR, holographic appearances, VR avatars, and VR spaces. These algorithms compute the creative state of the user and the team based on inputs from implanted sensors [29]. To achieve this objective, it is crucial to investigate the capabilities of artificial intelligence algorithms. Additionally, recent times have also seen the rise of hybrid working scenarios, where participants join remotely as well physically and while needing to have the same experience to successfully and equally work together. For physical participants, XR technologies can enhance the physical space and create interactive experiences, e.g. by using AR technologies for product demonstrations. For remote participants, XR technologies can take advantage of VR to create fully immersive experiences that can be accessed from anywhere in the world, such as virtual conferences or VR games. Hybrid working environments combined with XR technologies have the potential to transform the way we work and interact with each other by providing more flexibility and enhancing our digital experiences in terms of creative work.

Collaborative technologies will enhance the use of XR technology for creative collaboration in engineering design, professional training, and innovative product strategy with a focus on an immersive user experience. When designing creative collaborative workspaces, it might at first be helpful focus on two of the critical high-tech sectors in Europe - automotive and robotics - which require innovative and sustainable product developments that enable distributed teams to creatively work together at a distance. These sectors tend to be especially open to innovative technologies. Afterwards, the concepts can be adapted to other industries. It is essential that the multimodal and flexible design of the designed workplaces allows for inclusiveness and openness to more members of society, intersectional with gender, age, ethnicity or education.

4.2 User Experience: Role in Enhancing Workspaces, Potential Benefits for Worker Satisfaction and Productivity

From a user experience perspective, enhancing workspaces focuses on the user's interaction with technology in a creative approach, determining the most effective method of conveying information to foster creative output. It is crucial to recognize that not all technical solutions are universally applicable across different requirements and industries. To boost creativity and user acceptance, it is crucial to systematically integrate human considerations into technological innovation. This approach involves a comprehensive analysis of both individual and collaborative experiences, accounting for diverse team characteristics such as technological affinity, gender, age, origin, and cultural background. By doing so, the aim is to understand the effects arising from these variables and their combinations, offering a unique opportunity for personal growth and learning.

To achieve these objectives, an agile participatory co-creation method should be implemented by involving adaptable user groups and both homogeneous and heterogeneous teams from the outset of the development process. This user engagement follows a funnel methodology, starting with a broad investigation into existing knowledge of innovation processes in various sectors. It is supplemented by qualitative interviews with research and development (R&D) personnel about their experiences with online innovation processes and enhancement needs. Diversity in gender, age, origin, and disciplinary background is emphasized during the interview partner selection process. In generating technological concepts and prototypes, the mobility, energy, and architectural sectors should be prioritized, involving users at every stage. After establishing procedures and prerequisites for R&D collaborations in these sectors, case studies are to be conducted for deeper user involvement, testing early prototypes, and observing the real-world usage. Users from other industries will be regularly

involved at crucial development stages to provide feedback on mockups, early prototypes, persona workshops, and final prototype evaluations, ensuring the technology concepts and prototypes are refined for broader application.

Creating genuine breakthroughs requires collaboration among individuals from diverse knowledge domains and backgrounds, utilizing well-curated information sets and digital tools. The optimal level of creativity is achieved when individuals or teams face a balanced challenge that is not too easy to be unengaging, nor too difficult to be overwhelming. Additionally, immediate well-being and the ability to transition between states of creativity, relaxation, or leisure are significant for maintaining high productivity and satisfaction. This holistic approach ensures that it not only enhances productivity and innovation but also contributes positively to overall worker satisfaction and well-being, providing a secure and confident environment for innovation.

4.3 Social Interaction Experience

The third view is a more detailed look into the social interaction experience view which is about bringing together more than one user to work creatively. One of the most important questions is how to represent remote users in the physical representation of the workspace to collaborate effectively and efficiently while creating a realistic and immersive feeling for all involved users during interactions. Apart from real time communication, the interaction shall appeal to all senses with respect to cognition possibly in terms of audio-visual, haptic, and olfactory aspects and allow all users to feel like equals independent on whether they joined the meeting physically or remotely.

4.4 Architecture Design: Adaptive Architecture, Definition and Principles

The fourth view is the architecture design view. Creativity is profoundly influenced by the environment in which it happens. Therefore, behavioral design in terms of architecture will consequently be applied and creative ergonomic working in an environment that promotes creativity will be researched. As in architecture, we are trying to transit from one digital space or tool to another. Using the Voronoi method, we connect rooms with each other not just through a single point but through a surface (Figure 2). This method gives us the opportunity to identify and create smaller spaces through the system and to design transitions that are important to provide the right information, timing, and experience for the users. This system adapts for everyone individually and can always be transformed and reconfigured. The bubbles represent different actions, spaces, and tools that can be used in the digital creative workspace. At the same time, a specific topic can occur in different profiles, but the size of the bubbles defines the use, the importance, but also the involvement of users. As the bubbles burst, they create space for new ones, leading to a completely new system and organization. To be able to design a system like this, it is important to use the right tools and explore different technologies like artificial intelligence.

The four interrelated views are applied to case studies of creative work from different fields of industry branches and societal contexts. For the industry branches, the focus is on the automotive industry as well as the energy, the architecture, and construction sector. The aim is to get both a large variety in peoples' backgrounds as well as different types of creative work and being ultimately able to transfer these results to a large variety of different industries or societal contexts.



Figure 2. Representation of different spaces / rooms using the Voronoi method. From left to right different user profiles may be associated with the different spatial formations. This idea of spatial design serves as one of the basic concepts exploring the architecture design view

5. CASE STUDIES

To further explore as well as show promising implementations of innovations for the future office to enhance creativity, productivity, and well-being, we are describing specific case studies of work experience. To this end, we are bringing together the crucial inter-related aspects in designing the future workplace, i.e. architectural design of physical and virtual spaces, virtual and digital technologies in terms of immersive XR experiences, and interactive surfaces, user-experience, and social interaction as well as collaboration. We are staging these aspects in three case studies in which the company *TWT GmbH Science & Innovation* together with its international scientific partners is successfully pushing digital transformation and virtual product development for the research and development departments of global automotive players such as Mercedes-Benz, Porsche, BMW, Audi, and Daimler Truck for more than 35 years. This puts TWT in an excellent position in exploring relevant specific work scenarios for developers of high-tech products, systems, and components in terms of the needs and conditions for being creative, productive, and collaborative on a global scale. The following three case studies will be presented:

- a. Product engineering conducted by a world-wide distributed engineering team
- b. Expert training on virtual prototypes
- c. Mobile work in an autonomously driving vehicle

In our exploration of the different case studies, we are aiming for giving a framework for elaborated research and development programs on future offices especially in terms of consequently bringing together the potentials of immersive VR and AR technologies and the need for well-designed physical spaces.

5.1 Product Engineering Conducted by a World-wide Distributed Engineering Team

We assume a globally developing and operating commercial vehicle manufacturer. The vehicle platforms to be developed are designated for European, North American, and Asian markets fulfilling the specific needs of customers locally as well as on a global scale. The commercial vehicle manufacturer runs research and development sites in metropolitan areas in Europe, North America, and Asia. The engineers shall be enabled to co-creatively optimize the vehicle characteristics, e.g. aerodynamics, weight, installation space, thermal aspects, fuel efficiency, and sustainability using computer aided design technologies and simulation. While optimizing the products, systems, and components for every market the engineering teams shall seek for commonality on a global scale. For this scenario the future office space shall be envisioned for an engineering team with two experts on each site in Europe, North America, and Asia. To get the best co-creative engineering results, it is very important that every team member is enabled to engage optimally for providing ideas. Therefore, the best situation would be if this team of engineers meets in one room directly interacting with each other as well as with the component they want to optimize. They shall be enabled to place the component of interest literally in the center to visualize as well as directly adapt certain aspects in terms of optimizing the characteristics of it. Furthermore, it is very important that the engineering team is enabled to generate, enhance, reengineer, or redesign the component of interest iteratively while visualizing the respective results in real-time. Therefore, what is needed is an elaborate virtual representation of the component in 3D which can be interacted with equally by every engineer at every site through VR techniques. The engineers shall be able to immerse into this 3D-environment interacting with the component and with each other at the same time. To this end, gaming engines as well as interaction concepts from multiuser computer games are very promising solution candidates.

In terms of architectural aspects for this scenario, a standardized physical space at every research and development site, one in the European, one in the North American, and one in the Asian metropolitan area is needed. The standardization needs to be given both with respect to physical dimensions and with respect to technical installation. We envision such VR hubs as a must in modern workplaces.

5.2 Expert Training on Virtual Prototypes

Good training experience, both on individual and on team level, depends on engagement between the participants as well as with the topic to be learned. To this end, the immersive co-creative experience which comes along with different modes of XR is unprecedented.

When taking training and XR into consideration, three use cases come to mind: 1. training users to handle XR technology; 2. using XR technology to train experts, 3. using XR to train safety and health topics, and 4. using XR to familiarize potential users with new topics and tools.

1. Training to use XR: With any new technology and tool, there needs to be an introduction for the users. Thus, the first use case to explore and work on is the training and onboarding of all users who will be working with immersive XR technology. The training program can be conducted remotely, using an interactive XR simulation to teach trainees the technical skills and best practices for using XR tools. Trainees can be given hands-on assignments and challenges to develop their skills and apply their knowledge to real-world problems. Moreover, artificial intelligence or adaptive learning can be used to create optimal user experience and learning.

2. Using XR to train experts: Imagine an engineer who is new to a specific topic of optimizing certain physical properties of a component or a whole vehicle and therefore will need training on complex industrial systems. In this scenario, XR technology will enable engineers to remotely access and interact with a virtual representation of the component or vehicle, allowing them to learn how to diagnose and optimize issues without having to physically be on-site. This is particularly useful for companies with facilities spread across multiple locations, as it would eliminate the need to send trainees on long, expensive trips for training. In group settings, remote training utilizing XR technology can include elements of social interaction and collaboration, enabling workers to communicate and work together as a team despite being in different locations. This can help to foster a sense of connectedness and promote the wellbeing of trainees, which is important for employees who may feel isolated or disconnected due to remote work arrangements.

3. Using XR to train safety and health: To ensure safety and worker wellbeing, the virtual training environment should be designed to simulate real-world conditions and potential hazards, allowing trainees to practice their skills in a controlled, risk-free environment. XR technology can also provide real-time feedback and guidance to trainees during the training sessions, helping them to develop their skills and identify areas for improvement. For example, if trainees were learning how to operate a large robotic arm, the XR environment would simulate the arm's movements and behavior, as well as any safety protocols that need to be followed when working around it. Further, risky scenarios can be experienced without risking the health and well-being of the trainees. Additionally, the XR training would be structured to promote trainees wellbeing by minimizing the physical and emotional strain of traditional training methods: Trainees would be able to access the XR environment from their own homes or a designated training facility, rather than having to travel to a remote location. The immersive and interactive nature of the XR training would also help to keep trainees engaged and motivated, reducing the risk of burnout or disengagement.

4. Using XR to familiarizing: Another use case for remote training scenarios in the robotics/automotive field utilizing XR for immersive co-creative experiences could be in the training and showcasing of new manufacturing processes and technologies to stakeholders who are not specialists in the field. For example, a robotics company may want to train their sales team on the new features of their latest robot model, but they may also want to showcase these features to potential customers who are not familiar with robotics. To accomplish this, they could create a remote training

scenario using XR technology that allows different stakeholders to participate in an immersive co-creative experience. In this scenario, the sales team and customers could join a virtual environment where they would be able to interact with the robot in real-time. The XR technology would allow them to explore the robot's features and capabilities in a way that feels as if they were physically present with the robot. They could also receive guided training from the company's robotics experts on how to operate and maintain the robot. During this immersive experience, the sales team and customers could work together to decide on the type of robot and its features needed to meet the customer's specific needs. This would allow the customer to see firsthand how the robot could be used to improve their manufacturing processes and ultimately increase their bottom line.

5.3 Mobile Work in Autonomously Driving Vehicles

As the automation of vehicles progresses, they are becoming increasingly interesting as workspaces. Viewing automated vehicles as work environments opens new possibilities on designing the interior and using innovative technology. In the following section, a description of the methodological approach along the defined views of technology, user experience, co-creative interaction, and behavioral design in future car offices will be presented.

MoHAFe is a research project which focusses on Mobile Hybrid Working in Automated Vehicles [33]. The project started in 2023, is funded by the Ministry of Economics, Labor, and Tourism Baden-Württemberg/Germany and is realized by TWT GmbH Science & Innovation, who has strategic partnerships in terms R&D with automotive premium OEMs (Mercedes-Benz, Porsche, Audi, BMW) since more than 35 years, in cooperation with Fraunhofer Institute for Industrial Engineering, which is contributing both scientific and R&D expertise in the aforementioned areas. The aim of MoHAFe is to research and demonstrate hybrid working in cars with SAE automation levels 3 to 4 [34], which will become even more attractive and more frequently applicable as a result of the planned new EU regulation that allows automated driving at speeds of up to 130 km/h [32]. The technical and organizational goal is to use the car as a workplace and to adapt to the developments towards sustainable mobile work promoted by the Covid pandemic. Use cases have been developed which address work scenarios for one or more people in the vehicle, including training tasks and collaboration with remote users who are each involved in one or more tasks. Further, personas have been created based on research and surveys conducted to define the possible range of future users. Different innovative technologies were analyzed, and VR and AR technologies are used as required, with a special focus on user needs in terms of a positive overall experience. Within the scope of the project, both a virtual as well as a physical prototype will be developed. By developing the virtual prototype of a future car office using the simulation tool Tronis®, TWT GmbH is expanding its expertise as an innovation provider in the mobility sector in order to make innovative progress in the further development of the vehicle within the automotive and supplier industry in Baden-Württemberg/Germany. Through Tronis®'s VR interface the future car office can later be experienced in XR scenarios and further be discussed and adapted in creative XR meeting environments.

In 2023, at the world's biggest tech fair, the Consumer Electronics Show (CES) in Las Vegas, the BMW Group presented its new vision vehicle for the first time. This vision vehicle enables a completely new kind of interaction and communication between humans and vehicles. [31] This example illustrates the potential for innovative and interactive designs in automated vehicles, aligning with the objectives of the MoHAFe project to transform cars into dynamic work environments.

6. CONCLUSION

Creativity is about generating new ideas, concepts, or products based on a given body of knowledge. The body of knowledge of society, economy, and manufacturing industry may be different, but it is getting more and more complex and versatile for all spheres where creative work happens. To this end, creative work producing true innovations is about bringing together people from different knowledge disciplines and backgrounds to work collaboratively to be supported by adequately composed sets of information as well as digital tools. The most effective and efficient amount of creativity of the individual or a team evolves at the threshold of being underchallenged to being overwhelmed with the problems to be solved. Moreover, immediate well-being and the possibility to change and adopt new perspectives or even switch from a state of being creative into a state of recreation or leisure is of paramount importance. Therefore, office spaces as well as workspaces in general need to be designed in a way that allows for these effects to happen. As hybrid and virtual teams become a standard in many industries, workspaces need to adapt to these new conditions. XR environments enable a variety of work scenarios, including training opportunities. In addition, innovations are expanding the spaces in which work is possible and must therefore also be considered, such as autonomous vehicles.

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Small-Town Renaissance: Bridging Technology, Heritage, and Planning in Shrinking Italy

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Extended abstract

Throughout the past decades, large metropolitan areas have been extensively equipped with advanced digital infrastructures, while rural towns have often been left behind. In the Italian contexts, for example, the lack of infrastructural investments combined with an aging population and migration trends of economically active people are some of the most tangible effects of a long-lasting depopulation problem.

As a result of the recent COVID-19-induced digital transformations, such as online learning and remote working, an interdisciplinary academic investigation at the intersection of city planning, digital technologies, and cultural heritage preservation is particularly relevant to examine the development trajectories of small towns in Italy. On the one hand, this research aims to understand how digital technologies can help us monitor at a granular level the shrinking towns of Italy. On the other hand, it aims to understand how digitization can offer new development opportunities while leveraging small towns' heritage and local productions.

Firstly, our research team employed a series of large spatial datasets to visualize the rich complexity of the Italian countryside in geographic information systems from two angles of inquiry: digital access and cultural heritage. Secondly, proposals for digital platforms supporting better conservation and use of local cultural heritage and products were developed. Thirdly, a series of data-informed and spatially relevant policy recommendations were elaborated, accompanied by design guidelines on how to foster collaborative workspaces in inner areas.

We believe that digitization can be a powerful force for change – as long as it is adapted to the rural context and implemented with the involvement of local communities themselves. Various stakeholders have been involved in the research development, such as regional and municipal authorities and small business owners, in order to better understand the problems to face and address them.

The research project is the result of a collaboration between Massachusetts Institute of Technology (MIT) and Politecnico di Milano (PoliMi) faculty members and students who integrated computational and visualization skills with regional planning frameworks in the Italian Alps and Sicily.

Keywords: *shrinking towns; small towns; Italy; demographic decline; spatial analytics.*

**CITIES' CULTURAL HERITAGE MANAGEMENT IN TIMES OF
CLIMATE CHANGE**



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Organized and chaired by Prof. Nikolaos Samaras

Prof. Nikolaos Samaras, Department of Planning and Regional Development, University of Thessaly,
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Cities' cultural heritage management in times of climate change. The contribution of the conservation of the built heritage of Historic Center of cities in the direction of using the climate factor in planning. Case study: Larissa, Greece.

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Extended abstract

Although cultural and urban environments are seen separated from the natural environment in planning and development by local authorities and governments, a transdisciplinary approach to cultural heritage seems to be necessary, at least could be an alternative, nowadays, when we are facing serious global risks, with climate change being the main one with climate change being the main one. This view must include important dimensions of intangible heritage, such as practices, knowledge, skills that communities, groups, and individuals recognize as part of their cultural heritage, transmitted from generation to generation, in response to their environment, their interaction with nature and their history. In this framework, knowledge, skills, and practices concerning climate, been applied traditionally, could become an object of safeguarding, aided by the existence of old buildings, as records of the historical continuation of the city and the successful management of the climatic factor, as well.

As climate change is expected to increase the frequency and duration of severe heat stress events, there are studies examining the relationship between urban geometry and microclimate within a city center, particularly through the 'heat island' and 'urban canyon' effects. Built heritage conservation, in a historic center, contributes to local sustainable development both by preserving the historical character and by keeping the urban geometry. Trying to turn the threat to opportunity, the climatic factor can be seen as the privileged field of interrelationship between the natural, urban and cultural environment of a city. This cannot be ignored in the pursuit of sustainable development by cities like Larissa, where the most negative aspect of its climate -high temperatures occurring during summer- makes it unattractive for residents, visitors or investors.

Keywords: *Built Heritage Conservation; Interrelationship between Natural, Urban and Cultural Environment; Urban Geometry; Historic Center*

Lake Karla: exploring ecotourism development opportunities, walking tourism with points of cultural interest and how it was affected by the floods of the storm named Daniel and Elias

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Abstract

Lake Karla, a natural lake that dried up by human factor and as is turned out for the wrong purposes, restored in the decade of 2000 bringing a message of hope to the area where it is located. With a not entirely clear coastline in the past, the future lake restoration was a broad term used for different techniques aiming to bring a lake back to or closer to anthropogenically undisturbed conditions. In various ways it can be offered as a tourist destination with great development potential through the alternative form of tourism, ecotourism.

In addition to the potential and capabilities of the area, is examined walking tourism as a form of activity next to the lake with variety of stops and points with cultural interest, animal and bird watching and connection with wild flora.

After the European windstorm and later medicane hit Thessaly (Daniel and Elias), witch after turned into category one hurricane, caused catastrophic damage all over the region. The environmental footprint was huge and brought uncertainty about the future.

Keywords: ecotourism, coastal tourism, cultural tourism, impacts of extreme weather conditions.

1. INTRODUCTION

In Greece, Lake Karla, examined as a case study in this paper, until the year 1962, was a natural lake known by the ancient times by the name of Boibeis (Ancient Greek: Βοιβηϊς, modern transliteration Voivis) and considered an important ecosystem of the Mediterranean region, acting as a natural reservoir that provides water storage and recharges groundwater [1].

The need for flood protection and more agricultural land led to the drying up of the lake. As a result, the area of the lake has decreased and the wetland has been degraded creating a series of environmental problems such as groundwater depletion, groundwater pollution, floods, extreme weather events, etc. In the year 1981 a final decision to restore part of the former lake was taken by the Greek government and today the reservoir and its complementary works have been built [2].

The new lake is an artificial reservoir located in the same 50 point where the oldest natural lake was located and received the designation of vital water ecosystem. It is a Natura and Ramsar site that diverts water from Pinios, protects the surrounding plains from flooding, helps to irrigate the crops grown in the surrounding areas, while part of the city of Volos is watered from it or at least it was watering before storms hit the area on September 2023 [3,4].

The local population was forced to change their profession twice since they were always engaged in fishing while after the drying of the lake they were forced to engage in agriculture. In the year 1962, when the lake was drained, 60,000 acres of land became available for cultivation, which fueled the residents with hope that their lives would improve, but they received neither title deeds nor any related compensation or financial support [5], a fact that that when in the middle of 2000 it was decided by the state to reconstitute it, the relevant legislation now compels the former fishermen who were forced to become farmers, to leave their fields and not to sow their properties without any compensation at

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all after a legal dispute and an appeal to the European Court of Human Rights (ECHR), finally, at the end of the summer of 2016, the beneficiaries disbursed their awarded compensation [6].

In conclusion, the area had no tourism, but its potential could support different types of tourism development such as that of ecotourism.

2. ECOTURISM DEVELOPMENT OPPORTUNITIES, WALKING TOURISM WITH POINTS OF CULTURAL INTEREST

The goal of ecotourism is to ensure that tourism and conservation are interdependent—not just that they can coexist, but that they should. The assumption that ecotourism can help wildlife and biodiversity, create incentives for landscape conservation and help local communities is explicitly stated in all definitions of the term [7]. Ecotourism is now defined as “responsible travel to natural areas that conserves the environment, sustains the well-being of the local people, and involves interpretation and education”. Education is meant to be inclusive of both staff and guests and some of its basic principles are:

1. Minimize physical, social, behavioral, and psychological impacts.
2. Build environmental and cultural awareness and respect.
3. Provide positive experiences for both visitors and hosts.
4. Provide direct financial benefits for conservation.
5. Generate financial benefits for both local people and private industry.
6. Deliver memorable interpretative experiences to visitors that help raise sensitivity to host countries' political, environmental, and social climates.
7. Design, construct and operate low-impact facilities.
8. Recognize the rights and spiritual beliefs of the Indigenous People in your community and work in partnership with them to create empowerment. [8].

Lake Karla has a privileged geographical position, since the lake is located approximately in the middle of the country and in the middle the main road of the country: the Athens-Thessaloniki Road, but also between two large cities of Volos and Larissa, which gives it an easy access. The agriculture around the lake is mostly about cotton crops, a fact that provides harmony and beauty to a future visitor. The climate of the wider area of Karla is characterized as Mediterranean with dry and hot summers and cold and wet winters. It is a Natura2000 site with a variety of flora and fauna ready to get discovered [9,10].

The area includes the restored Lake Karla, thirteen reservoirs, a small artificial wetland, low hills and a small part of the foothills of the adjacent mountains, the supply of canals and thirty settlements. Most of the plain (80%) is used for extensive agriculture with a variety of annual crops, fallow, pastures and a network of irrigation and drainage channels. Fauna such as 20 reptiles species, 4 amphibians [11], 13 fish species and 2 cyprinid species [12] and more than 30 bird species such as the rare Spur-winged lapwing bird species [13], flamingos [14,15], and the legendary heron specie witch one species of heron that lived in Karla Lake was the Starling heron, which had a strange croak, was 69 to 81 centimeters long, had short legs, a thick neck, and a brownish tint to its wings, and black stripes on its back. Locals called that bird ‘swamp beast’ and had a hole myth beyond it that still is heard [16,17].



Figure 1: Flamingos in lake Karla
Alexandros Oikonomidis



Figure 2: a flying heron
Alexandros Oikonomidis

In 2014, at Lake Karla, following a request - proposal of the Management Agency of the Ecodevelopment Area of Karla Mavrovouni Kefalovrisos Velestinos, in 2014, signs prohibiting hunting were placed in the reserve, according to Official Gazette 459/D/6.9.2010. The twenty signs

that were installed provide continuous information, positively activate the public, raise their awareness and all together attempt to achieve environmental protection in order for the reserve to be managed as well as possible [18].

According to the definition of ecotourism, Karla Lake as an ecotourism destination should provide the visitor with enjoyment and help them appreciate nature while promoting any accompanying cultural features of the past and present, and to provide beneficially active socio-economic participation of local populations. Ecotourism can include either cultural or environmental tourism and, in addition, benefits to the local population should be an integral part of the activity. ecotourists typically seek experiences that provide a sense of closeness to the natural attractions and local communities that first brought them to a destination [19,20]. The area where Lake Karla is located meets the characteristics of the destinations necessary to develop ecotourism such as:

1. Natural features preserved in a protected landscape
2. Evidence that tourism does not harm natural systems such as waterways, coastal areas, wetlands and wildlife areas;
3. Low-density development, where natural areas are abundant and the built landscape does not dominate,
4. Designated outdoor recreation areas that protect fragile resources (cycleways, footpaths etc.) for both locals and visitors
5. Thriving small community businesses owned by local residents such as food stalls and other craft businesses;
6. Locally owned hotels, restaurants and hospitality businesses with friendly staff,
7. Friendly interaction between locals and visitors,
8. Basic public facilities for shared use by tourists and locals (e.g. public showers, toilets, etc.),
9. Local festivals and events that show an ongoing sense of pride in the natural environment and cultural heritage of the local community [20].

In the area of Lake Karla there are certainly ten recommended routes of ecological and cultural importance. For each specific route results have been provided regarding their cultural value, ecological value, others for education, and protection for different uses such as walking, cycling and horse riding. About the total value of each route, the route concerning the regions Armenio-Achilion-Kalamaki-Elafos-Sklithro-Polidendri forest (royal estate in the past), shows a greater preference than the route Kanalia and walks next to the lake.

The following image and table provide a thematic map of the proposed eco-cultural routes. It seems that the most routes are located in the east and southeast of the area, with reference to Lake Karla and the surrounding wetlands. Nevertheless, a significant part of the routes crosses natural, semi-natural and rural areas, documenting the ecological and cultural character and the cultural importance and ecological value of the proposed routes, represented and highlighted by the scores of the respective categories.

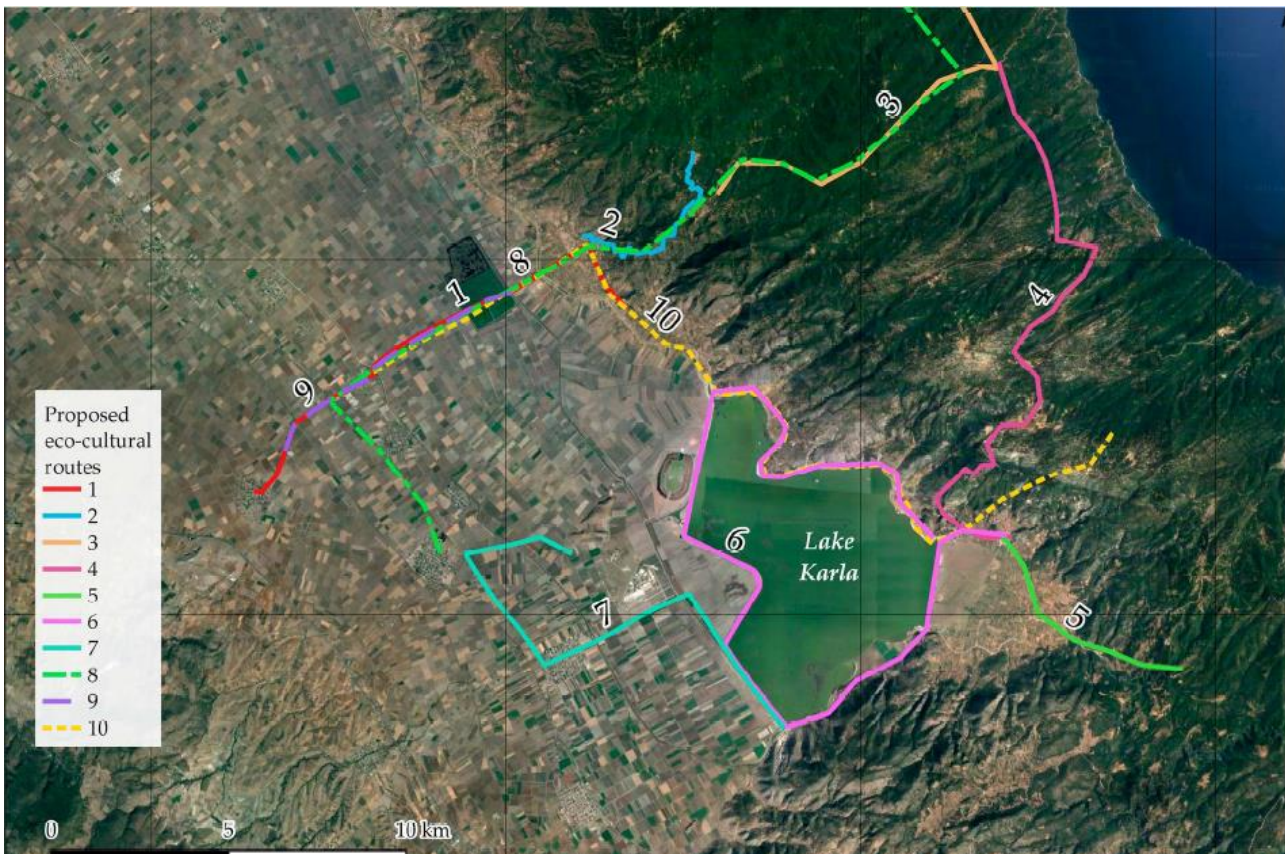


Figure 3: Thematic map of the proposed eco-cultural routes is presented. Route numbers follow table 1. Baseline map source: Google Earth [21].

Route Number	Route Description	Cultural Importance (a)	Ecological Value (b)	Opportunities for Education (c)	Accessibility for Different Uses, i.e., Hiking, Cycling and Horse Riding (d)	Total Rating
1	Farmer Monument Kileler-Achillio-Kalamaki-Paleoskala	5	3	4	4	16
2	Kalamaki-Elafos-Panagia Kampana	5	4	5	5	19
3	Elafos-Skiithro-Rakopotamos	3	5	5	5	18
4	Skiithro-Keramidi-Kanalia	3	4	4	5	16
5	Kanalia-Kerasia	3	5	5	4	17
6	Kanalia-Trail around lake Karla	5	5	5	4	19
7	Lake Karla-Stefanovikio-Panagia Armeniou-Panagia PetrasSotiriou	4	3	3	3	13
8	Armenio-Achillio-Kalamaki-Elafos-Skiithro-DasosPolidendriou (former Royal estate)	5	5	5	5	20
9	Kileler greenhouses-Farmer Monument-VIOLAR-Achillio-Kalamaki reservoirs	4	3	4	3	14
10	Achillio-Kalamaki-Paleoskala-Lake Karla observatory-Ancient Oak forest park	3	5	5	5	18

Table 1: Rating scale: 0: Not important, 1: Very low, 2: Low, 3: Medium, 4: High, 5: Very high Proposed eco-cultural routes followed by expert judgment rating, under the criteria of: (a) cultural importance, (b) ecological value, (c) opportunities for education, and (d) accessibility for different uses, i.e., hiking, cycling and horse riding [21].

In the wider area of Lake Karla there are not only these ten trails for walking, cycling or riding, but these ten suggested ones take the visitor up to the mountains, along the top of the ridges or to the shores of the lake. Suggested routes vary in terms of the degree of difficulty and depending on the area chosen by the visitor, the length and points of interest also vary. It should be noted that some

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trails are easy while others are more demanding, while many trails start or end from/in places that are not accessible by public transportation. The selection of these trails was based on a variety of criteria, such as: (a) promotion of hiking, (b) outdoor recreation, (c) natural and cultural interest, (d) popularity, and (e) use [22].

In terms of degree of difficulty, altitude, availability of drinking water, signposts, parking and other useful information are presented in Table 2 below:

Route	Degree of difficulty of the route	Maximum altitude	Lower altitude	Signs	Safe drinking water	Bus routes	Parking	Tips
Ano Kerasia-Kerasia	Easy	657 meters (Ano Kerasia)	133 meters (Kerasia)	Red signs-signs	Kerasia	Volos – Kerasia	Kerasia-Ano Kerasia	Distance of Kerasia from Volos 36 km. Distance Ano Kerasia from Volos 43 km
Flamouri Monastery	Medium	776 meters	569 meters	Red signs-signs	Flamouri monastery	No	Ano Kerasia	Possibility of transportation to Flamouriou Monastery, with available vehicle or motorbike
Kerasia – Sourvia Monastery	Difficult	705 meters (Sourvia monastery)	133 meters (Kerasia)	Red signs-signs	Kerasia-Panagia Leschani	Volos – Kerasia	Kerasia	More hiking required, narrow paths, ups and downs
Keramidi – Paleoskala	Medium (single way) Difficult (with return)	683 meters	50 meters (Paleoskala)	National Trail marking-Red signs	Keramidi	Volos-Kanalia, Volos-Keramidi	Keramidi	Keramidi is 52 km from Volos
Ano Kanalia - Pargos (39°30.489 S - 22°48.252 E)	Difficult	568 meters	49 meters	Red signs - signs	Kanalia	Volos – Kanalia	Kanalia	Distance of Kanalia from Volos 34 km.
Glafyra – Agios Nikolaos	Easy (single way)	423 meters	52 meters	Red signs-signs	Glafyra Kanalia	Volos-Kanalia	Kanalia Glafyra	Distance of Kanalia from Volos 34 km.
Kanalion	Medium (with return)					Volos-Glafyra		Distance Glafyra from Volos 14 km.
Kanalia-Drakopigado	Difficult	434 meters	63 meters	No	Kanalia	Volos-Kanalia	Kanalia	Pay attention to the separation of paths and paths for sheep and goats
Stefanovikeio (39°27.510 S - 22°44.309 E)	Medium	102 meters	47 meters	No	No	Volos-Stefanovikeio	Parking at Stefanovikeio	Distance of Stefanovikeio from Volos 25 km
-Agios Athanasios hill								
Stefanovikeio-(Petra) Skala (39°30.316 S - 22°45.310 E)	Medium	87 meters (Petra)	47 meters (Skala)	No	Stefanovikeio	Volos-Stefanovikeio	Parking at Stefanovikeio	Distance of Stefanovikeio from Volos 25 km
Kato Kalamaki-Karlas wetland	Easy	55 meters (Kato Kalamaki)	44 meters (pumping station)	No	No	No	Kato Kalamaki-Paleoskala-Shallow artificial wetland	Distance Kato Kalamaki from Volos 50 km, and from Larissa 43 km

Table 2: Compiled by the author of this paper from data drawn from Med-INA [22]. (Position that don't exist on Google maps are provided with coordinates)

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To avoid more people - visitors on the paths and eco-routes than the carrying capacity allows, the time required for each activity should be taken into account. For example, for walking, which is the most common activity, the time required to walk one kilometer is set at twenty minutes and the maximum number of visitors is forty walkers per kilometer, which means that if more than forty visitors, within a period of twenty minutes, the carrying capacity will be exceeded, despite the fact that this number is less than the carrying capacity of the routes. one proposal is to allow twenty hikers, every twenty minutes to enter each route, in order to maintain the number of people per kilometer, a number significantly lower than the carrying capacity, supporting not only the use of ecological and cultural resources, but also the satisfaction of visitors, as the hike will take place on a route without people [21].

Beyond the enjoyment of a hike on the lake, the options for starting, stopping and more broadly in the area of the above routes, contain elements of tangible and intangible cultural heritage. examples of these are:

- Agios Nikolaos Kanalion on the eastern shore of the lake with construction dates back to the end of the 12th to the beginning of the 13th century, while the use of ancient stone plinths on its walls is characteristic
- The prehistoric settlement at Paleoskala at the foot of Mount Mavrovouni on the eastern shore of the Lake is also considered a cultural heritage monument. The settlement presents many periods of habitation such as the latest, late Neolithic and early Bronze Age. The settlement was excavated in the years 2001-2002, while some buildings that were uncovered date back to the first half of the second millennium BC
- Karlas Lake Culture Museum (KE.ME.BO), The Museum is part of the museums of the Ministry of Culture, has a trademark registered with the Ministry of Development, develops collaborative ties with other museums, and participates in the museums of the Prefecture of Magnesia. The purpose of its establishment was to create a multi-cultural space in which visitors of all ages can learn about the history of Lake Karla, through their participation in speeches and workshops as well as musical theater events. In order to achieve this goal, the association of Friends of the Museum was created at the same time, and with their voluntary participation, they offer their services
- The first Lake Karla festival, modeled on the Prespa Festival, was organized in the summer of 2023 and established at the old Kanalia High School, with the participation of local clubs, well-known Greek artists and Karlas Lake cultural Museum that offers free guided tour for the public
- Folklore Museum of Stefanovikeio in the name of the great benefactor of the place, Pavlos Stefanovik Stylitsis
- Management body of lake Karla conducts environmental information programs for the public in order to sensitize visitors and turn them into aware citizens, who will understand what are the problems that facing the region in terms of the environment and will want to participate in the activities to solve them (Π.Ο.Κα.Μα.Κε.Βε)
- Wild Orchid Research and Protection Center (ΚΙ.ΠΙΟ.ΚΕ)
- Helias Lefousis Museum

3. HOW STORMS DANIEL AND ELIAS EFFECTED LAKE KARLA AND WHAT ARE THE PROSPECTS

Thessaly in just 3 years' time was hit by extreme rainfall phenomenon. Storm Daniel was an extreme weather phenomenon with heavy rains and storms that first hit Greece, Bulgaria and Turkey and then moved towards Libya, also causing heavy rainfall, resulting in massive property damage and the death of at least 11,500 people, after two dams burst, while tens of thousands of people in Libya are still missing. The bad weather Daniel started on September 4, 2023 from the Ionian sea, with a focus on

the wider area of Thessaly, causing enormous destruction and human losses. Other areas affected by the bad weather in Greece were Domokos in Fthiotida, and Evia [23]. The damages caused by Daniel from 5th of September until 12 of September 2023 were:

- Agricultural land: 292,652 acres (91.0% rate)
- Built-up areas (with urban/residential use and technical infrastructure): 4,834 hectares (1.5% rate)
- Forest and grassland: 1,311 hectares (0.4% rate)
- Water surfaces, wetlands and others: 22,861 acres (7.1% rate) [24].

Storm Elias was the second major storm to strike Greece within a short span, causing heavy rainfall that led to the overflowing of rivers and widespread floods in the Thessaly region. Satellite imagery captured the significant amount of sediment carried away by the floods as the Pinios River discharged into the Aegean Sea. On September 27, 2023, Volos experienced an extraordinary 298 mm (11.7 inches) of rainfall within a 14-hour period due to Storm Elias, surpassing the city's September average by more than eightfold.

These events underscored the pressing need for a centralized Water Basin Authority capable of making effective decisions for water management. Additionally, it exposed the detrimental impact of unauthorized construction by farmers, who built dams and roads to shield their crops without properly maintaining waterways. This lack of maintenance exacerbated the devastation caused by the floods, highlighting the urgent requirement for comprehensive and coordinated water management strategies. [25,26,27].

Lake Karla that after its restoration was 35.000km²-38.000km² after the storms of September 2023 returned to its original size of 180.000 km [28].



Figure 4: before & after the storm [29]

All the cultural and historical sights didn't affect and remained untouched and ready for future visiting. Recovery in the disaster area is expected to take two years, requiring a strategic plan to prevent and manage similar events in the future. Building 100 to 250 smaller check dams in valleys and gullies, along with nature-based solutions, can reduce peak surface discharges and soil erosion. Despite these efforts in the mountains, additional flood prevention measures are needed in valleys. Lake Karla's capacity is insufficient for future extreme weather events, necessitating smaller artificial infrastructures to manage water flow and mitigate flood risks [27].

The municipality of Thessaly proposes the following measures as a solution to the problem that occurred in the area:

- Repair and upgrade of flood protection embankments.
- Redesign of bridges aimed at configuring the necessary space for the Pinios River.
- Deepening of the riverbed of the Pinios and its tributaries, including the complete clearing of flood-prone areas from crops, especially perennial crops, and the removal of any obstacles hindering the free flow of water.

Creation of overflow retention areas with controlled flooding and drainage of the area between flood protection embankments [30].

We have recently conducted a visit to the archaeological site of Paleoskala and are pleased to provide our observations. Following the recent storm event named "Daniel," concerns had arisen regarding potential inundation of the site. However, our examination revealed that Paleoskala remains unaffected by rising water levels, indicating its resilience in the face of natural adversities.

Paleoskala's strategic location and meticulous planning have evidently shielded it from the impacts of environmental challenges, particularly in a region prone to flooding. This observation underscores the importance of foresight and careful consideration in the preservation and accessibility of archaeological sites.

Our visit reaffirmed the significance of strategic planning in ensuring the continued preservation and enjoyment of cultural heritage sites such as Paleoskala. Despite external factors such as adverse weather events, the site's design and positioning facilitate its accessibility to visitors, allowing for the appreciation of its historical significance.

In conclusion, our experience at Paleoskala serves as a poignant reminder of the importance of archaeological preservation and the benefits of thoughtful planning in safeguarding cultural heritage for present and future generations. We encourage interested parties to visit this remarkable site and witness its rich history firsthand.



Figure5: photograph taken by the author on March 2024, Trees inside lakes water where it used to be dry



Figure 6: photograph taken by the author on March 2024, A closer look of the figure 5



Figure 7: photograph taken by the author on March 2024, Prehistoric settlement Palioskala: entrance



Figure 8: photograph taken by the author on March 2024, Prehistoric settlement Palioskala: Historical site



Figure 9: photograph taken by the author on March 2024, Walking signs that were damaged by the storm

4. CONCLUSION

This study explores the potential of Lake Karla as an ecotourism destination, aiming to harmonize tourism with conservation efforts and local community well-being. Lake Karla's geographical significance and rich biodiversity offer opportunities for immersive nature experiences. Efforts to protect the region, including hunting prohibition and environmental education initiatives, underscore the commitment to conservation. Proposed eco-cultural routes showcase natural and cultural heritage, supporting local businesses and cultural institutions. Key attractions, including historical sites and festivals, enrich the visitor experience. Collaborative efforts enhance sustainability. Lake Karla exemplifies ecotourism's potential to promote conservation, support communities, and foster cultural appreciation in Greece.

After the “Daniel” & “Elias” storms, the whole picture changes. A new challenge was in front of this plan that needed a strategy to address flood risks in Thessaly, emphasizing the principle of "built back better."

Key elements include identifying flood-prone areas for strategic relocation, implementing flood protection infrastructures like controlled zones and check dams, and expanding water retention capacity. To ensure effectiveness, the proposal calls for the establishment of a dedicated working group and coordination committee. Additionally, it highlights the need for a 24/7 alert system and the involvement of the National Observatory of Athens for essential data and expertise. This approach aims to bolster Thessaly's resilience against future floods while fostering sustainable development.

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Urban Governance Tools integrated with cultural heritage planning: The case study of Ceramics Allatini, in Thessaloniki, Greece

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Extended abstract

As cities face challenges of climate change and urban decay, understanding how to effectively manage cultural heritage in the midst of these crises becomes crucial. A broader range of motivations related to the public interest is now evident in influencing the design of new developments. These motivations vary in scope and priority based on local circumstances and identity. Carmona (2016: 707) outlines nine primary motivations that to varying degrees will inform the operation of urban design governance. Specifically, he refers to environmental imperatives in the light of climate and ecological crises: these have impacts across the scales and associated regulatory regimes, from the strategic design of cities and decisions over where new development is located, to the detail of building and landscape design and construction. In the meantime, the work of the EU Member States' expert group summarized in a report entitled "Strengthening cultural heritage resilience for climate change", among its recommendations, proposes that national-/regional-level and local-level administrations must include cultural heritage and the cultural domain in all actions and plans addressing mitigation of and adaptation to climate change. Actions must be undertaken to fully integrate culture and cultural heritage issues into environmental sustainability and climate policymaking both at national/regional/local levels and international level. It is quite interesting to investigate which urban governance tools and in what way are taking into consideration the factor of cultural heritage through the lens of climate crisis. By attempting a quick literature review it seems that public participation tools could be integrated in the field of cultural heritage planning and management, concluding to an inclusive planning system, prioritizing the factor of resilience to climate change/crisis. The case study of the building complex of Ceramics Allatini at the east part of the city of Thessaloniki is examined in order to investigate which urban governance tools are used, in what way, how participatory planning and public participation has taken place overall and which have been the conflicts and consensus regarding the project.

Keywords: *urban design governance, urban governance tools, climate crisis, climate change, cultural heritage, public participation*

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Serres Agricultural Research Station: new schemes for industrial sites of the past.

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Extended abstract

This paper aims at discussing new schemes potential for industrial heritage re-use. The Agricultural Research Station, in the city of Serres, will be the main focus, and it will be further argued as part of the former National Agricultural Research Institute.

Looking onto the Agricultural Research Station a significant aspect of the city's industrial past will be revealed, resting upon the industrial architecture history of the first half of 20th century in Greece. The case study belongs to a wider network of model farms that had been developed since mid-19th century, on a national level. This network promoted education and research on agricultural production and has gradually been expanding up until mid-20th century, in almost every prefecture across Greece. Each model farm unit was designed to take advantage of distinct local agricultural production characteristics. The Station presented in this paper, has functioned as a model farm unit training young professionals, while combining agricultural education and livestock production methods. It was inaugurated in 1908-09 and had gradually adjusted to new technological demands and rapid economic changes, while preserving its distinct identity. The infrastructure lies derelict today. Its location on the city's southern edge, and its nodal position amidst road networks, has been and still is of importance. The size, the architectural features and the spatial relation to the city fabric provides the station with a great re-use potential. It is of significant importance for contemporary primary sector and future economic context. This derelict Station has received limited attention, so far, compared to other units within the same network.

The paper discusses different architectural scenarios for the reuse of Serres Agricultural Research Station. It attempts to investigate new schemes of re-integration and new views for integrating this industrial building into the city's life. All design schemes focus on re-use, and re-alignment of key and secondary elements (access, direction, axial accumulation, clustering, pathways, connectivity, adjacency, land use). All design-schemes focus on re-articulation of volumes (uniting, expanding, delegating, growing, restricting) and the re-configuration of interior, exterior and semi-open spaces and territories. This presentation aims at highlighting the importance in re-engaging with historical buildings, sites, complexes and territories. This paper argues for re-imagining architecture on the city's edge, as well as re-defining interface between old and new, future and existing, private and public, real and virtual, formal and informal, certain and ambiguous. All scenarios promote regeneration urgencies on pressing urban matters in medium sized cities of northern Greece.

Keywords: *architectural design; industrial heritage; re-use;*

The historic bridge of Sarakina in Thessaly under the Mediterranean cyclone Daniel. Reflections on the management of tangible cultural heritage threatened by extreme climate change events.

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Extended abstract

The bridge of Sarakina is located 8,5 km southwest of Kalambaka. It was built to connect Sarakina village to Diava village by bridging Pinios river (Salambria). Heading from Sarakina village to Diava, we come across a meteoric rock just before the construction of the first (left) abutment. This rock was the reason that the local villagers named the bridge as the "bridge of stone". The bridge is a monument of the post-Byzantine times; it dates back to 1520 AD and was built by Bishop of Larissa, Bishop Vissarion II. It is a remarkable monument of architectural heritage in the prefecture of Trikala with impressive form and stability preserved for many centuries. The original construction of the bridge consisted of six arches with the largest of them having a height of 9.70m and a length of 19.70m. At the beginning of the 19th century, probably due to the excavation in the middle, two arches of the bridge on the Diava side collapsed, resulting in the interruption of the communication between the villages for several years. According to evidence, it was roughly repaired and supported by wooden elements and later by reinforced concrete beams, as two new half-piers were constructed asymmetrically to bridge replacing the new structure with the original one. Following the decade of 70s, additional interventions were made in the bridge; it was widened, and new pavements were constructed. Because the modern bridge was part of a local road connecting Kalambaka with mountain villages until 2005. It was in the late 2010s, that a restoration study was contacted by the Ministry of Culture and the restoration of the bridge was financed by the Region of Thessaly. By the end of summer 2023, the restoration works were almost completed. But then, on 4th September "Daniel" - a Mediterranean cyclone, hit hard all the region of Thessaly with extreme rainfall. As a result, part of the original monument, the largest middle arch, collapsed.

Cultural heritage management in times of climate change requires research on climate change adaptation strategies and methodologies for safeguarding tangible cultural heritage from the constant pressures on it and the associated consequences that cause deterioration.

Keywords: built cultural heritage; restoration; climate change; monumental bridge of Sarakina; Thessaly;

Literature as a tool for creating cultural routes: The Example of the Historical Novel "Thrassa"

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Extended abstract

In recent decades, specialized alternative tourism has emerged to address the evolving preferences of travelers, filling gaps in tourism demand. Specifically, there has been a discernible shift from 'mass' to 'personalized' tourism experiences. This transition has spurred the development of innovative tourism products tailored to meet the specific needs of modern travelers (Kokkosis, C. et al., 2020). Cultural tourism, in particular, has witnessed a notable increase in market share within the global tourism industry. This growth can be attributed largely to socio-economic changes that have elevated the living standards and educational levels of tourists (Richards, G., 1996).

Cultural routes represent a specialized and branded form of cultural tourism product, integrating monuments, local businesses, institutions, and communities into a cohesive and functional network (Berti, E. et al., 2015). The value of cultural itineraries in promoting tourist destinations and enhancing their competitiveness is recognized both within Europe and internationally (OECD, 2009). The European Commission's establishment of the Cultural Routes of Europe in 1987 marked a pivotal moment, highlighting cultural routes as an innovative tourism product that contributes significantly to local development and fosters a shared European identity (Council of Europe, 2019).

Acknowledging the significance of the "tourist experience" as a driving force in tourism development (Y. Stamboulis, P. Skayannis, 2003), this paper utilizes literature as a foundation for crafting a memorable cultural route (Chen, Rahman, 2018). Specifically, the historical novel "Thrassa" will serve as the narrative thread linking tangible and intangible elements of cultural heritage mentioned within its pages. Visitors will have the opportunity to explore locations depicted in the novel, immerse themselves in the atmosphere of Byzantine Thrace, and engage in participatory activities to learn about the region's history and traditions.

This proposal seeks to develop a high-quality cultural product aimed at attracting new visitors while extending the tourist season and increasing daily tourist expenditures.

Keywords: *cultural routes, cultural heritage, experiential tourism*

Cultural heritage in times of transition. Typical ways of managing monuments, in history, under political or religious expediency, during changes in political or religious power.

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Extended abstract

In this paper, tangible cultural heritage in times of transition refers to monuments that have undergone transformations or have been completely destroyed, in history, as the political and cultural context has changed during their long-term construction.

From the Egyptian monumental architecture of the Pharaohs and the Forum Romanum of the Emperors to the Renaissance temple architecture of the Popes and the unwanted communist heritage of former Eastern Europe, there are typical examples of monuments that have fallen victims of political or religious expediency.

Examples of temples modified during construction to meet new ambitious plans or temples of past gods demolished and their building materials used to build new ones, statues of the vanquished whose facial features were forged to resemble the victors, symbols of an unwanted heritage removed in order to be replaced by others that would serve a new political narrative, are the subject of study in this paper.

By analysing monuments of different historical periods that have undergone significant alterations with greater or lesser damage during their long-term construction, the aim of this paper is to demonstrate the different modes of management followed, in relation to the political or religious considerations that dictated these choices, considered in their historical context.

The search for information about these aborted phases, or censored versions of the life of the monuments, in written sources or in excavation research is a challenging field of study, which is not only limited to its historical and archaeological interest, but aspires to discover the key to understanding and interpretation, also, of similar phenomena in the present and future.

Keywords: *cultural heritage, tangible heritage, in transition, under political or/and religious expediency*

**CITIES AT THE DAWN OF AI: A DISCOURSE ON URBAN
REVOLUTIONS, FUNCTIONS AND RISKS**

**CHANGING
CITIES**



Changing Cities VI, Rhodes, 24 - 28 June 2024

Organized and chaired by Assis. Prof. Kalergis Dimitris

Assis. Prof. Kalergis Dimitris, Department of Planning and Regional Development, University of Thessaly,
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Place Promotion and Artificial Intelligence: A Framework of Basic Principles for Image Generation Practices

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Extended abstract

Place promotion is an important element of urban strategy, of multiple scopes, that aims to form a marketing profile of a specific location, city or region, and enhance in many ways its attractability usually at a global scale. This effort usually emphasizes a certain destination and its distinct characteristics to attract visitors, tourists, investors, and residents to a particular place and destination. This promotion of uniqueness involves a variety of attractions and living experiences to stimulate economic growth, enhance reputation, and foster local development. Traditional promotion practices incorporate a wide range of marketing initiatives, including advertising campaigns, digital media strategies, event organizing, tourism partnerships, and a vast number of promotional materials such as brochures, websites, and social media. The key objective is to create a compelling narrative and symbolic imagery that will highlight the places' distinctive features, local heritage, cultural attractions, and other aspects of an attractive profile. Central to most of promotional strategies is the "image" of the place, the visual understanding and conception of this unique location.

Today, place promotion faces several challenges mainly from rapidly evolving consumer preferences, technological advancements, and a growing evolution of global socio-economic dynamics. These challenges that affect the urban sphere and, in this sense, apply to place promotion include: a) digital transformations (machine learning, social media algorithms, etc.), b) intensified competition (differentiation stress), c) sustainability and responsible tourism (socio-cultural impacts), d) crisis management and resilience, e) authenticity issues, f) accessibility and inclusivity, and g) regulatory and legal restraints.

This paper attempts to theoretically integrate artificial intelligence (AI) in place promotion strategies as a game-changing opportunity in this field of marketing. More precisely, it explores the principles of image generation using AI tools and techniques that present the ability to produce captivating representations of places, focusing on promotion, as well as cognitive distinction. It also initiates a critical framework of visual content, brand identity and destination interest. Additionally, it examines ethical considerations and challenges associated with AI-generated content in place promotion, emphasizing the importance of the authenticity of a place.

Finally, the paper examines the opportunity of AI functions that may boost place promotion tactics like: i. Content creation efficiency, ii. Personalization and targeting, iii. Enhance creativity and innovation, iv. Accessibility and inclusivity, v. Data-driven insights and vi. Ethical and regulatory considerations.

Keywords: *place promotion; Artificial Intelligence; sense of a place; image generation, authenticity*

Participatory Planning and AI: A tool for negotiating common interests.

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Extended abstract

Participatory urban planning and artificial intelligence (AI) represent a dynamic intersection of technology and community engagement in shaping the future of cities. In recent years, the complexities and challenges associated with urban planning have grown exponentially, necessitating innovative approaches to accommodate diverse interests and foster sustainable development. The concept of participatory urban planning involves actively involving residents, stakeholders, and community members in the decision-making processes that impact their surroundings. This approach emphasizes inclusivity, transparency, and collaboration to ensure that urban development projects reflect the needs and aspirations of the people they serve.

Artificial intelligence, on the other hand, offers unique capabilities to analyse vast amounts of data, extract insights, and optimize decision-making processes. By leveraging AI technologies, urban planners can gain valuable insights into population dynamics, traffic patterns, environmental impact, and infrastructure requirements. AI can help identify trends, predict future scenarios, and inform evidence-based planning strategies that are responsive to the evolving needs of urban populations.

When combined, participatory urban planning and AI create a powerful synergy that can transform the way cities are planned, designed, and managed. AI tools can facilitate community engagement by providing accessible platforms for citizens to share their feedback, preferences, and suggestions for urban projects. These insights can then be analysed using AI algorithms to identify patterns, preferences, and priorities among diverse stakeholders.

Moreover, AI can assist in scenario planning, risk assessment, and decision support, enabling urban planners to evaluate the potential impacts of different development scenarios and make informed decisions. By integrating AI into participatory urban planning processes, cities can enhance efficiency, transparency, and equity in decision-making, ultimately leading to more sustainable and inclusive urban development outcomes.

In conclusion, overcoming our "techno-phobia" and not being seduced by "techno-latria", the integration of participatory urban planning and artificial intelligence holds significant promise for creating smart, responsive, and mainly people-centred cities. By harnessing the collective intelligence of communities and the analytical power of AI, urban planners can navigate the complexities of urban development with greater foresight, precision, and inclusivity.

Keywords: *Participatory urban planning; community engagement; Artificial Intelligence; scenario planning; risk assessment*

Urban Governance through the lens of Artificial Intelligence: Literature review of the tool of digital twin city

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Extended abstract

Smart cities are considered, by many countries and governments, to provide solutions to crucial contemporary urban issues and challenges such as climate change and population growth. Later logical and innovative progressions changed the information wildernesses, giving rise to another wave of troublesome advances with profound impacts on urban society. Tools like the Internet of Things, blockchain, artificial intelligence technology etc. offer extraordinary potential within the change of the current urban administration worldview toward smart cities. This paper focuses on the tool of the digital twin city concept marking a paradigm shift in urban governance of contemporary cities, while helping cities deploy real-time remote monitoring and enable more effective decision-making. DT can be defined as “a virtual representation of a physical system (and its associated environment and processes) that is updated through the exchange of information between the physical and virtual systems” (VanDerHorn and Mahadevan, 2021). A digital twin consists of three parts: physical products, digital products and the connections between them, while integrating data, models and digital entities. Reviewing the literature, it appears that the use of the tool helps cities deploy real-time remote monitoring and enable more effective decision-making, while it serves both citizens and decision-makers, by enabling participation in urban governance processes and monitoring government decisions, from the one side, while urban governance can be achieved in a more orderly manner, on the other side. Findings/conclusions will serve to better understand the concept and how it relates to urban governance and future issues arising from the use of the tool in urban planning and planning as well.

***Keywords:** digital twin, urban governance, artificial intelligence, smart city*

Funding

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Facial Recognition in Cities: A Catalyst for Political Polarization and Local Media Dynamics

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Extended abstract

In 2019, during carnival season, the city of Nice in France transformed into an unprecedented technological laboratory: the municipal authority of the city decided to pilot a facial recognition system, which was installed at one of the entrances of the carnival. The images collected were processed in real-time by the Israeli software AnyVision, with the aim of testing whether they could recognize specific faces. While other cities like Marseille and the small town of Moirans implement as well biometric surveillance applications to enhance security in the city, many reactions were manifested in the public sphere concerning the potential perils of this technology. This involved activists, citizens, stakeholders related to the regulation of artificial intelligence (AI), as well as political parties. In reality, the implementation of facial recognition technologies in cities was the first application of artificial intelligence to cause political polarization in the French public sphere.

In our study, we analyzed 27.530 articles from national and local press, as well as 3.599.000 tweets discussing AI. In the national press, we observed a political polarization, with the entry of new actors criticizing facial recognition. This criticism was mainly linked to the Global Security Law, voted in 2021, which allowed police live-feed access to body cameras and drone footage. The concern focused on the possibility of the collected images being processed using facial recognition software. On Twitter, this criticism involved left-wing and far-right actors and political parties, who heavily criticized biometric surveillance applications, as well as conspiracy theorists. In contrast, in the local press we did not observe political polarization regarding this issue. Our analysis indicates that in the local press, the discourse around artificial intelligence -even after the installation of facial recognition software in some cities- focused on the practical applications of this technology, on innovation, on events related to artificial intelligence, and on funds allocated to local businesses and research centers for further AI technology development. The local press avoided to set on the agenda the political implications of the application of facial recognition in cities, as well as the stakes posed by such applications for the protection of citizens' data, the preservation of their rights, and the maintenance of city public space as a foundation for democracy.

The local media provide the informational backbone of what people know about social life in their city, ensuring social cohesion and contributing to "imagining the city". At the same time, discourses around Smart Cities, including applications of artificial intelligence, become more prevalent in the public sphere. However, the implementation of such applications may foster political polarization and raise ethical questions. The role of local press could be pivotal in intermediating city infrastructure planners and citizens, aiming not only to reduce polarization but also to spotlight concerns such as the protection of citizens' personal data and rights, which should be considered by city planners and local authorities.

Keywords: *facial recognition; artificial intelligence; cities; local press; France*

Artificial Intelligence in Redesigning Urban Space: Case study the region of Thessaly, Greece

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Extended abstract

The present paper aims to investigate the way Artificial Intelligence (AI) interferes with urban space matters as long as urbanization proceeds along with digitalization, leading humanity to a different way of living space. Nowadays, the typical model of cities is thought to be old-fashioned, while smart cities evolve rapidly in terms of their built environment, infrastructure and population. Moreover, climate crisis affects urban, rural and suburban space, so it is critical to clarify the way AI could help prevent natural disasters through the case study of Thessaly, which is the main purpose of this paper.

Specifically, AI could initially lead to green urban space creation by applying sustainability, taking into consideration legal, ethical and public health issues. In this way urban planning could be differentiated from recent planning methods, emphasizing on forming microclimate and integrating plants and greenery in living space. Would that be sufficient enough for preventing physical catastrophes in a building environment? That could be examined through the case study of Thessaly, a region in central Greece, with reference to the recent wildfires and flooding incidents in 2023.

It is important to mention that the methodology followed in the present paper, consists of the analysis of field research results besides a literature review of Artificial Intelligence in urban space. Specifically, we intend to examine the way AI could have prevented the devastation Thessaly has suffered, due to the recent wildfires and floods, through a hypothetical planning scenario after using AI analyzing and planning methods.

Last but not least, the results will be discussed in terms of a paper, taking into consideration human living in contemporary urban space. Upgrading human life status is expected to go along with creating more interesting urban space, through changes in urban design i.e. more spacious public places, easy transportation means or use of sustainable energy sources, which AI would suggest.

In conclusion, this paper intends to analyse results emerging from Artificial Intelligence use in urban space in a contemporary digital era. It would be interesting to indicate various ways for urban evolution, always thinking about human existence in living space. The case study of Thessaly could assist in this way, so that mistakes and omissions are not replicated and a better built environment for conscious citizens is built.

Keywords: *Artificial Intelligence, urban space, built environment, infrastructure, climate crisis*

Urban (r)evolution and tech optimism: The dialectic of city and utopia

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Abstract

This paper examines the factors shaping contemporary ideas of urban utopia and the characteristics of the ideal city, how these concepts are approached in the context of the environmental crisis, and our current urban planning capabilities. The research explores current trends, practices, and tools in urban planning, illustrated through examples and a case study in a particular neighborhood of Athens, Greece. After a brief overview of urban evolution, highlighting utopian proposals and movements influencing urban planning, we examine the digital revolution and the environmental crisis as key forces shaping contemporary urban design. The research demonstrates how these forces define the modern city through innovations such as digital twins, MIT CityScope, dynamic, incentive-based, and algorithmic zoning, and the MIT Radar Plot is calculated as a case study in Exarchia, Athens. The findings suggest that addressing the climate and energy crisis requires developing technology-integrated, sustainable urban solutions.

Keywords: *sustainable resilient equitable cities, smart technologies, climate change.*

1. INTRODUCTION

The modern city faces significant challenges that influence urban architectural vision and planning. This study addresses two questions: What determines the contemporary ideas around urban utopia, and what does the ideal city appear to be? How is it approached through the lens of current capabilities in urban planning that have emerged through the digital revolution and the environmental crisis? The study discusses current trends, practices, and planning tools through examples and a case study at the center of Athens, Greece.

At the beginning of the 21st century, cities have developed unprecedentedly, leading to intense social inequalities and severe environmental problems. However, they also offer opportunities for a future of greater prosperity, environmental sustainability, and social justice. According to a United Nations report, 70% of global greenhouse gas emissions are produced in cities, and two out of every three people will live in urban environments by 2050. [1] Managing city life requires attention and demands a paradigm shift in our urban planning and development approach.

This study begins with a concise review of significant ideas on contemporary urban trends, followed by a brief historical overview addressing urban evolution in association with select utopian proposals and movements that influenced urban planning. It then focuses on the digital revolution and the environmental crisis as the driving forces shaping current conditions, contemporary practices, and visions in urban design. Specific examples of emerging technologies and their applications are discussed to illustrate these points. Singapore, a model of a sustainable, smart city, is examined as the world's first example of a Digital Twin. Innovations developed at the MIT Media Lab are highlighted, including CityScope and the Dynamic, Incentive-based, Algorithmic Zoning in Kendall Square. Some of these principles

are applied in a case study at the center of Athens by calculating a Radar Plot in the Exarchia district. Utilizing this methodology from the City Science research group at MIT Media Lab, the results are compared with the “model city” of Barcelona to better evaluate the urban conditions in Exarchia.

Modern cities emerge from the digital revolution and the environmental crisis. The challenges, goals, and regulations associated with the climate and energy crisis, technology evolution, globalization, and the shifting economic and political landscapes necessitate developing technology-integrated, sustainable cities. Cities must progress towards enhanced living conditions while minimizing their environmental footprint. They must rely on dynamic tracking and response to various real-life conditions. Responsiveness, adaptability, resilience, density, proximity, diversity, sustainability, livability, collectivity and equity are central themes of the new ideal urban paradigm narrative. The modern city is envisioned as a sustainable, compact, walkable, and user-friendly urban environment infused with nature. It is well-connected, embraces sociocultural diversity, and features mixed-use neighborhoods. It needs to be resilient, capable of promptly embracing economic, social, and environmental changes, responding to them, and adapting quickly and efficiently. The development of this type of city is the only direction toward achieving the United Nations' sustainable development goals and attaining the objective of "net zero" by 2050. [2] To accomplish this, involving communities in the design and decision-making processes is essential while promoting substantial behavioral changes.

2. BACKGROUND

Michael Batty's "The New Science of Cities" (2013) and "Inventing Future Cities" (2018) books provide a framework for understanding cities as complex, dynamic systems. Batty emphasizes networks, flows, and interactions, advocating for new scientific approaches to address the complexity of urban development in the digital age.[3][4] William J. Mitchell's "City of Bits" (1995) and "Me++: The Cyborg Self and the Networked City" (2004) books explore the impact of digital technologies on urban environments. Mitchell's insights into networked communities and "Electronic Agoras" challenge traditional notions of urban space, highlighting the transformative potential of digital connectivity.[5][6] Antoine Picon's "Smart Cities: A Spatialized Intelligence" (2015) book focuses on integrating digital technologies into urban environments. Picon's analysis of geolocation, augmented reality, and digital urban awareness underscores how technology can enhance urban intelligence and responsiveness, while advocating for a balanced approach to technological integration, recognizing both its benefits and ethical challenges. [7]

By the early 20th century, electricity and internal combustion engines further altered cities, enhancing city safety and efficiency, with centralized resources, infrastructure, and suburban expansion marking this period. In 1898, Ebenezer Howard's Garden Cities aimed to blend urban and rural benefits but faced criticism for impracticality and environmental impact. [8] The City Beautiful Movement (1890-1930) sought to beautify cities but was criticized for prioritizing aesthetics over public health. [8] The first mobility revolution in 1908 introduced diverse transportation modes, and a pivotal shift occurred in 1927 with the adoption of zoning regulations and the mass production of automobiles. [9] Le Corbusier's Radiant City (1920-1940) proposed strict zoning and tall buildings but was criticized for lacking livability. [8] Post-World War II, the New Towns Movement aimed to decentralize population centers but was seen as lacking character. [8] Meanwhile, cities faced reconstruction, deindustrialization, and suburban migration, becoming globalization hubs by the 1960s. [9] Furthermore, the third industrial revolution marked the rise of digital technology. Since the late 20th century, New Urbanism has influenced U.S. urban planning, advocating for pedestrian-friendly spaces and

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community cohesion, but it has been criticized for creating artificial environments. [8] Simultaneously, the Fourth Industrial Revolution transformed communications, work, and daily life through advancements in technology and information systems. [9] The digital revolution's ability to provide computing power and internet access to every individual generated vast amounts of data, leading to the development of "smart cities" in the early 21st century.

This study argues that the environmental crisis and the digital revolution are key global forces shaping urban development and the vision of a modern urban utopia. Cities produce 70% of global greenhouse gas emissions, and by 2050, two-thirds of the population will live in urban areas. [1] In 2023, NASA reported the highest average surface temperature on record. [8] Managing urban life requires immediate attention and a paradigm shift in urban planning and development. The 2022 IPCC Synthesis Report states that how cities are designed, managed, and powered will determine future urban GHG emissions.[9] Sustainability is crucial for balancing the environment, economy, and social interaction, enhancing residents' well-being. The challenges of climate and energy crises, technological advancements, globalization, and evolving economic and political landscapes necessitate developing sustainable, technology-integrated cities. These cities aim to enhance living conditions while minimizing environmental impact, characterized by dynamic monitoring and response capabilities. Key concepts of the new urban paradigm include resilience, responsiveness, adaptability, density, proximity, diversity, sustainability, livability, collectivity, and equity. The modern ideal city is envisioned as a sustainable, compact, walkable, and user-friendly environment integrated with nature. It will be well-connected, culturally diverse, and feature mixed-use neighborhoods. [11] Additionally, it will be resilient and capable of swiftly adapting to economic, social, and environmental changes. Developing such cities is essential for achieving the United Nations' sustainable development goals and reaching "net zero" emissions by 2050. [2]

Leveraging city data alongside emerging technologies such as Artificial Intelligence (AI), Machine Learning (ML), the Internet of Things (IoT), and Blockchain can provide valuable insights and promote sustainable development. [12] These advancements enable the creation of data-driven and agent-based simulation platforms and methodologies like CityScope and Digital Twins to effectively address the complex challenges of contemporary urban environments. Additionally, technologies like Building Management Systems (BMS), Management Automation Systems (MAS), and agent-based modeling (ABM) facilitate real-time monitoring and optimization of energy consumption, resource and waste management, traffic flow, and mobility. Technological innovations such as MIT's Ori Living architectural robotics, [13] LO3 Energy's decentralized smart microgrids, [14] and Waymo's autonomous electric vehicles may contribute to sustainable urban development and environmental and energy crisis mitigation. However, technology alone cannot solve the challenges faced by today's cities.[16] Achieving the ideal urban environment requires changes in behavior, lifestyles, and the design and decision-making processes.

A digital twin is a digital representation of the physical urban landscape, encompassing its infrastructure and dynamic interactions. This pioneering urban planning approach incorporates real-time data and informed predictive simulations. Singapore is the world's first example of a digital twin city. The "Virtual Singapore" (Figure 1) is a dynamic, interactive, and user-friendly 3D digital model of the city, integrating data from various sources. Technologies such as GIS, satellite imagery, LiDAR, photogrammetry, AI, ML, and IoT, offer a comprehensive view of infrastructure, environment, and social interactions. Its goal is to enhance living conditions, public infrastructure, disaster resilience (Figure 2), and energy efficiency. [17]

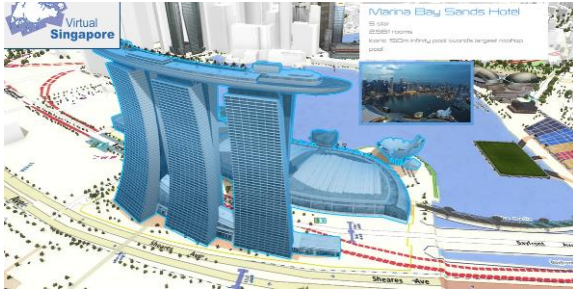


Figure 1: Virtual Singapore, Marina Bay Sands Hotel,
<https://www.youtube.com/watch?v=y8cXB SI6o44>

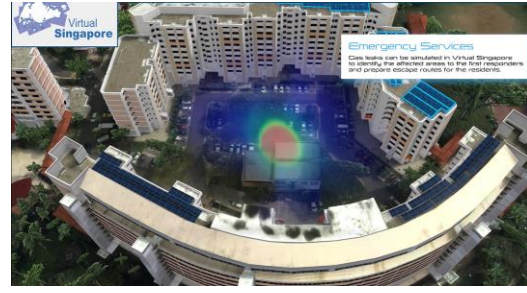


Figure 2: Virtual Singapore, Emergency Services,
<https://www.youtube.com/watch?v=y8cXB SI6o44>

Positioned at the intersection of urban planning, human-computer interaction, and social sciences, the CityScope of the MIT Media Lab City Science Group facilitates evidence-based discussions about built environments. It aims to enhance community engagement among diverse stakeholders—government, industry, academia, and civilians—promoting collaborative decision-making. Given cities' social and political challenges, such as inequality, police brutality, and safety concerns, the City Science Group reconsiders well-being in this context. CityScope combines models, simulations, and platforms to tackle spatial design and urban planning challenges. This data-driven platform simulates the impacts of interventions on urban ecosystems before detailed design and execution. Comprising computational and physical layers, CityScope features a screen and a tangible input table with projection mapping using LEGO modules. Real-time data updates are displayed in the Radar Plot, showcasing key performance indicators like proximity, diversity, density, innovation potential, public health, building energy consumption, mobility, and safety. (Figure 3) The CityScope methodology involves five stages: Insight: Analyzing urban data to understand current conditions and trends, resulting in a Radar Plot that assesses aspects such as density, diversity, proximity, and energy. Transformation: Implementing interventions to enhance city performance based on these insights. Prediction: Forecasting the impacts of these changes, modeling effects on behavior and resource use to develop effective strategies. Consensus: Ensuring citizen participation by making data and proposals accessible through the CityScope platform. Governance: Regularly updating these processes with community input. This advanced methodology offers a pioneering, data-driven approach to urban planning. [18]

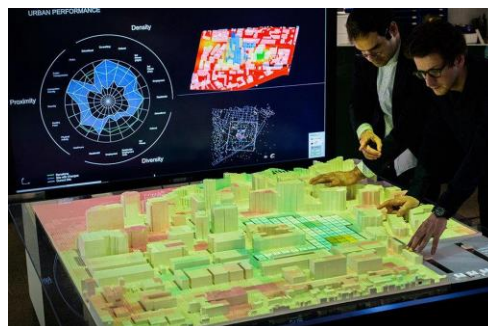


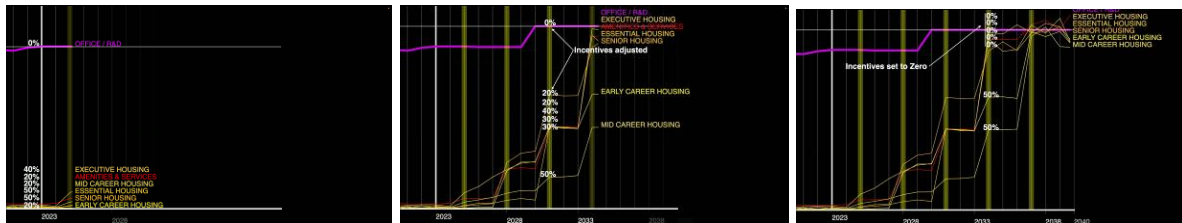
Figure 3: CityScope: A Data-Driven Interactive Simulation Tool for Urban Design, MIT Media Lab “Beyond smart cities: Emerging Design and Technology” course, Module 1, 2021

The algorithmic zoning developed by the City Science group involves a commission under a new zoning ordinance that evaluates each community's current economic, social, and

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environmental performance, identifies deficiencies, and maps incentives to address these needs. Developers then select from this list, with a predefined pro forma determining the allowable floor area and benefits without negotiation. The incentives are algorithmically adjusted as each project is built, ensuring they remain optimal for the community's goals. For example, as of 2023, Kendall Square in Cambridge, Massachusetts, faces a significant imbalance between housing, amenities, and jobs. By dynamically mapping and adjusting incentives using this algorithm, shortages in senior, early career, and essential workforce housing can effectively be addressed. (Figures 4,5,6) [9]



Figures 4,5,6: Algorithmic zoning dynamic diagram progress, <https://www.youtube.com/watch?v=4RJJaQfPM0Y4&list=PLdxKi6kbAWz45Q6Ly4fduIIC3uIT9FqU5&index=2>

To secure community acceptance of significant density increases, such as the proposed housing for 42,000 people in Kendall Square along with necessary schools and amenities, it is essential to address the widespread global NIMBY ("Not In My Backyard") opposition to change. The primary challenge is to transform this resistance into a supportive "Yes, In My Backyard" attitude. One approach to incentivize community acceptance of increased density involves offering developers bonuses in exchange for contributions to a community endowment. This strategy can streamline approvals, reduce risks, and save time, making it attractive to developers. As density increases, a portion of the added value is allocated to the community endowment and distributed to community members based on proximity to the project, length of residence, financial need, and other relevant factors. Additionally, a voting process can foster a sense of ownership and equity. Developers can set minimum and maximum density thresholds for their projects, allowing the local community to adjust the density within these limits. If baseline density is maintained, no funds are added to the endowment, while higher densities result in greater contributions. This system gives the community a direct stake in the project, providing necessary assets and a share of the project's wealth, thus transforming NIMBY (Not In My Backyard) into YIMBY (Yes In My Backyard). Achieving this transformation necessitates significant technological innovations, such as mathematical models, advanced data analytics, smart contracts, simulation tools, and agent-based modeling. While innovations such as battery chemistry and autonomous vehicles are important, community-scale solutions can address a substantial portion of emissions. [9]

3. IMPLEMENTING RADAR PLOT IN THE CENTER OF ATHENS: EVALUATING THE DENSITY, DIVERSITY, AND PROXIMITY OF EXARCHIA

One of the key technologies within the CityScope project is the radar plot. This tool measures diversity, density, and proximity within a community or city, allowing for comparisons with a benchmark city to evaluate the effectiveness of proposed interventions. Essentially, it visualizes the degree to which an urban intervention creates an integrated community with respect to housing, commercial buildings, cultural facilities, and third places (cafés, restaurants, etc.). In Figure 1, the orange line represents the benchmark, Barcelona, Spain, renowned for its dense, walkable neighborhoods. The inner grey line compares the current site's metrics, while the outer black line illustrates changes following a simulated intervention on the CityScope table. [19] (Figure 7)

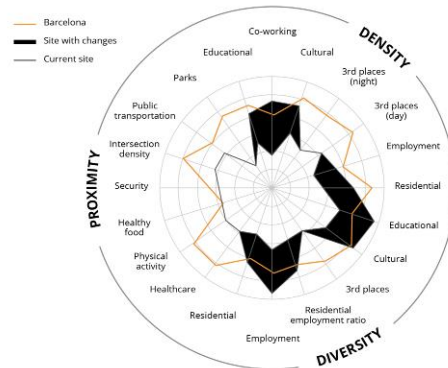


Figure 7: Radar plot, MIT Media Lab “Beyond smart cities: Emerging Design and Technology” course, Module 4 Unit 1 Notes, 2021

The radar plot integrates with land-use models and agent-based models (ABMs) like CityScope, requiring two key data types: static geolocated physical urban data (e.g., buildings, roads, infrastructure) and static geolocated urban-use data (e.g., amenities, land use, events, census data). In the Athens experiment, data was collected and manually inserted, as this technology is not yet available in Greece. Collecting quantitative and qualitative data at the community scale is crucial for gaining precise insights into local habits and movements, which larger-scale data cannot offer. Collaboration among academia, industry, government, and society is necessary to enable effective interventions that enhance community engagement, governance, and decision-making. This project aims to help districts achieve metrics comparable to Barcelona by improving residents' proximity to workplaces, reducing traffic congestion, and increasing area density and diversity. Cities are defined by the relationship between the population living and working in an area and the availability of nearby amenities. Balancing housing, commercial space, retail venues, cultural institutions, and other amenities is crucial. As urban density increases, this balance must ensure that benefits like enhanced idea exchange and more employment opportunities outweigh drawbacks such as traffic congestion, stress, reduced contact with nature, and pollution. While often seen negatively, if density is managed with effective urban design, it can enrich urban communities, creating a more vibrant and dynamic environment. [19] Well-balanced urban ecosystems require diversity, achieved through a mix of economic, spatial, and social characteristics, to ensure resilience and high performance. The Shannon index is used to evaluate this diversity. This index assesses ecosystems with numerous individuals by applying a formula to a representative sample.[20][21] Urban proximity assesses the availability and closeness of social, economic, and physical activities within urban environments. Future high-performing cities may feature compact urban districts with daily amenities within walkable communities. Metrics include

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walkable access to parks, housing, jobs, mass transit, schools, and amenities.[20] Cities are complex systems but using Agent-Based Models (ABMs) in simulations and representing data in radar plots allows diverse data to be presented on the same scale. The radar plot adapts to each city's unique challenges, considering key indicators based on Jane Jacobs's principles [22]: mixed primary-use areas to enhance diversity and support various activities, short blocks to increase pedestrian routes and economic activity, a mix of old and new buildings to accommodate various socioeconomic backgrounds, and high population density to foster cultural interaction. These factors collectively promote a thriving, diverse, and resilient urban environment. [19] To understand the impact of local data collection and modern tools on urban planning and decision-making, we used the MIT Media Lab's Radar Plot tool [23] in the center of Athens, focusing on the broader area of Exarchia, defined by Leof. Alexandra, 3rd of September, Panepistimiou, and Asklipiou streets. This area was selected for its significant historical and cultural importance and recent discussions surrounding creating a new metro station at the central square. The survey assessed the density, diversity, and proximity of a 1.2 km² area to analyze its urban characteristics and compare them to Barcelona, aiming to evaluate the district's quality of life through data, analysis, and visualization.

Step 1: Selection of a study area of approximately 1 km².

Initially, we used Google Earth to identify a central reference point in Exarchia and measured a 1 km radius around it. (Figure 8) We then delineated the final study area of 1.2 km² based on the MOHAP (Urban Spatial Analysis Units) defined by Panorama Census Data. (Figure 9)



Figure 8: The study area on Google Earth,
<https://earth.google.com/>

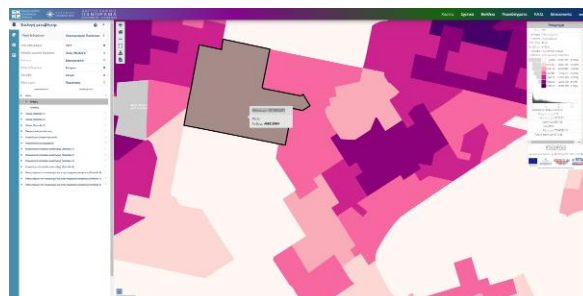


Figure 9: Study area's MOHAP,
<https://panoramaps2.statistics.gr/>

Step 2: Data collection.

We collected data for the region using the following sources:

GIS, Geographical Information System of the City of Athens [24]: This platform provides detailed spatial data, including land use and infrastructure. (Figure 10) Google Maps [25] was combined with the GIS database to identify and count land uses such as hotels, restaurants, banks, and supermarkets. (Figure 11) Greek Census Data Panorama (ELSTAT) [26]: This source provides statistical data on demographic, economic, and household characteristics of the area, such as population, gender, occupation, type of housing, and tenancy status, through CSV files, based on the most recently available 2011 census. (Figures 12, 13, 14)

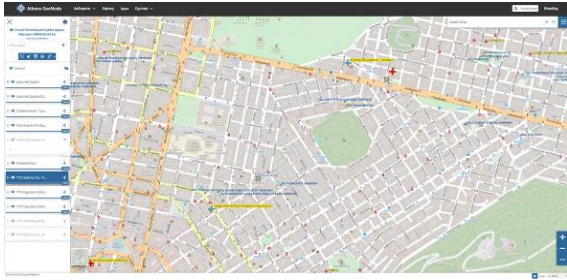


Figure 10: Study area on GIS Platform, http://gis.cityofathens.gr/maps/new?layer=geonode:parking_amea&view=True#/

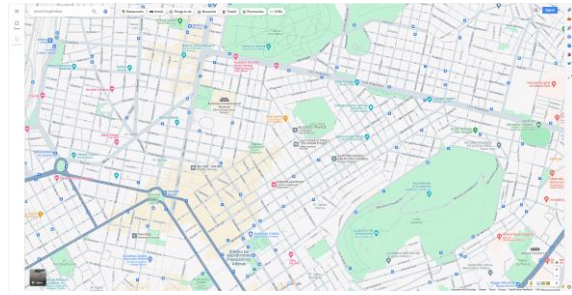
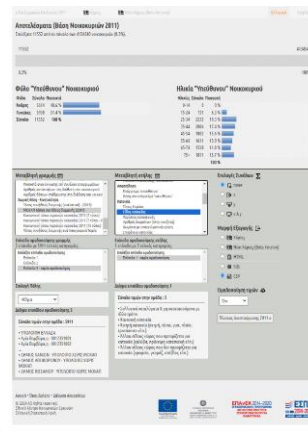
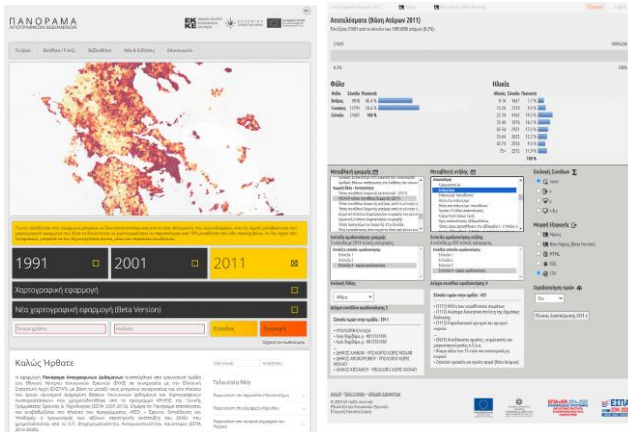


Figure 11: Study area on Google Maps, <https://www.google.com/maps>



Figures 12, 13, 14: Panorama Statistics Platform, <https://panorama.statistics.gr/>

Step 3: Data Entry.

We counted the number of different amenities and services in the study area. Using Google Maps, we identified and counted hotels, restaurants, banks, supermarkets, nightlife venues, leisure and wellness centers, cultural sites, fashion stores, luxury stores, shopping malls, technology stores, post offices, workplaces, safety and policing elements, health food outlets, sports facilities, and healthcare access. Panorama Statistics helped us count the male and female populations, public rented housing, owner-occupied housing subsidy, private permanent housing, non-domestic housing, temporary housing and other housing types. We also counted managers, administrators, professionals, associate professionals, administrative support staff, service and sales workers, craftsmen, and related workers, machine and plant operators and assemblers, unskilled workers, skilled agricultural and fishery workers, other arts-related occupations, and other occupations. GIS aided in identifying parks, schools, hospitals, social housing, public transport stops, and intersection density. Where data was unavailable, we made reasonable estimates or used a value of 0.0001, following MIT Media Lab guidelines. Subsequently, we entered the data into Excel in the relevant cells (Figure 15).

Name of your city	Athens			
Name of the district you've chosen	Exarchia			
	Data	Units	Output	Description
Area size	1,2	Km²	1,20	
People working in the area	10904	Number	10904,00	All people employed in area, including commuters.
Residents	7455,6	Number	7455,60	All people living in area, including those who work elsewhere.
Total people = District users			18359,60	
DENSITY				
Amenities	Number of amenities	Units	Output	Description
Hotels	314	Number	628,00	Hotels: Large and small.
Restaurants	22	Number	119,83	Restaurants: All public venues for breakfast, lunch, or dinner.
Nightlife	28	Number	244,01	Nightclubs, bars, live music, and other entertainment venues.
Leisure and wellness	59	Number	211,45	Pharmacies, dental care, eyecare, gyms, spas, clinics, doctors' practices, and hospitals.
Culture	61	Number	646,04	Libraries, museums, cinemas, bookstores, and art galleries.
Fashion shops	16	Number	16,00	Clothing only
Luxury shops	13	Number	13,00	Jewelry, perfume, tobacco, etc.
Shopping centers	7	Number	7,00	Any branded cluster of multiple shops and restaurants, shopping centers, malls, etc.
Technology shops	26	Number	26,00	Car sales, electronics, hardware stores, etc.
Supermarkets	19	Number	299,68	Supermarkets, markets, convenience stores, etc.
Banks	8	Number	8,00	Banks and ATMs.
Schools	25	Number	262,88	All grades K-12, schools, universities, kindergarten, and professional training.
Post offices	19	Number	19,00	Post offices, including FedEx, UPS stores, but not mailboxes.
Working places	35	Number	368,03	Offices and co-working spaces.
Infrastructure	Number of amenities	Units	Output	Description
Parks	5	Number	64,58	Parks: Green spaces that are publicly accessible and distinct from building and sidewalk landscaping.
Public transport stops	64	Number	103,06	Count all distinct lines at each stop, bus stops, bus lines, train stops, train lines, tram stops, etc.
Intersection density	152	Number	152,00	All street crossings, car, bike, and pedestrian. This can be difficult to calculate, so choose a number depending on how visually similar your district is to the following districts shown on the right.
Police and security elements	1	Number	20,00	Police stations and emergency alarm boxes.
Healthy food shops	18	Number	98,00	Distinguish from the more general restaurants: vegetarian restaurants, health-food stores, juice bars, etc.
Sports places	16	Number	595,66	Specifically gyms, sports facilities, and sports shops.
Access to healthcare	19	Number	319,38	Specifically hospitals, clinics, and pharmacies.
DIVERSITY				
Residential diversity				
Type of housing	Number	Simpson index	Shannon index	Description
Public rental housing	5480	-0,15	-0,1536	Apartment blocks or houses that are rented.
Subsidized home ownership housing	0,0001	0,00	0,0000	Housing subsidized by the government.
Private permanent housing	5507	-0,15	-0,1534	Houses owned by the inhabitants.
Non-domestic housing	4	0,00	-0,0012	Houses used for commercial purposes.
Temporary housing	0,0001	0,00	0,0000	Refugee camps or informal settlements.
Other	561	-0,06	-0,0638	Other types of housing that do not fall into the above categories.
Overall	11552		-0,3720	
Families/individuals			0,6280	
RESIDENTIAL DIVERSITY			37,2014	% of diversity
Employment diversity				
Occupation	Number	Simpson index	Shannon index	Description
Managers and administrators	468	-0,06	-0,0587	General managers, office managers, retail managers, etc.
Professionals	2785	-0,15	-0,1514	Lawyers, bankers, accountants, etc.
Associate professionals	1617	-0,12	-0,1229	Nurses, therapists, building inspectors, engineering technicians, etc.
Clerical support workers	995	-0,09	-0,0949	Paralegals, bookkeepers, etc.
Service and sales workers	872	-0,09	-0,0877	
Craftspeople and related workers	931	-0,09	-0,0912	Carpenters, artisans, construction workers, etc.
Plant and machine operators and assemblers	104	-0,02	-0,0193	Factory workers, power plant workers, etc.
Unskilled workers	1176	-0,10	-0,1043	Housekeepers, janitors, grocery store clerks, farm workers, etc.
Skilled agricultural and fishery workers	112	-0,02	-0,0204	Forestry workers, commercial fishers, livestock farmers, dairy farm supervisors, etc.
Other 1	460	-0,06	-0,0580	Other types of occupations that do not fall into the above categories.
Other 2	1384	-0,11	-0,1138	Other types of occupations that do not fall into the above categories.
Other 3	0,0001	0,00	0,0000	Other types of occupations that do not fall into the above categories.
Overall	10904		-0,9226	
Families/individuals			0,0774	
EMPLOYMENT DIVERSITY			92,2643	% of diversity
Cultural diversity				
Amenities	Number	Simpson index	Shannon index	
Libraries	6	-0,10	-0,1039	
Museums	10	-0,13	-0,1336	
Cinemas	18	-0,16	-0,1584	
Bookstores	14	-0,15	-0,1505	
Art galleries	8	-0,12	-0,1207	
Other	0,0001	0,00	0,0000	
Overall	56		-0,6672	
Families/individuals			0,3328	
CULTURAL DIVERSITY			66,7228	% of diversity

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Educational diversity			
Amenities	Number	Simpson index	Shannon index
Schools	8	-0,16	-0,1592
Universities	4	-0,14	-0,1398
Kindergartens	2	-0,10	-0,1000
Professional training centers	6	-0,16	-0,1569
Other	0,0001	0,00	0,0000
Overall	20		-0,5559
Families/individuals			0,4441
EDUCATIONAL DIVERSITY			55,5860 % of diversity
Gender diversity			
Gender	Number	Simpson index	Shannon index
Male	9810	-0,16	-0,1557
Female	11791	-0,14	-0,1435
Unspecified	0,0001	0,00	0,0000
Overall	21601		-0,2992
Families/individuals			0,7008
GENDER DIVERSITY			29,9201 % of diversity
DIVERSITY OUTPUTS			
Residential			37,20 % of diversity
Employment			92,26 % of diversity
Employment / residential (ratio)			146,25 % of diversity
3rd places			114,62 % of diversity
Cultural			66,72 % of diversity
Educational			55,59 % of diversity
Gender			29,92 % of diversity
3rd places (day)	282		64,68 % of diversity
3rd places (night)	39		30,23 % of diversity
Total amenities	652		96,59 % of diversity

Figure 15: Data on Radar Plot Excel Sheet

Step 4: Analysis of the Radar Plot and Evaluation of the Results.

After entering the data, the radar plot visually depicts the comparison between the study area (blue line) and the Barcelona model area (green line) concerning three key parameters: density, diversity, and proximity. (Figure 16)

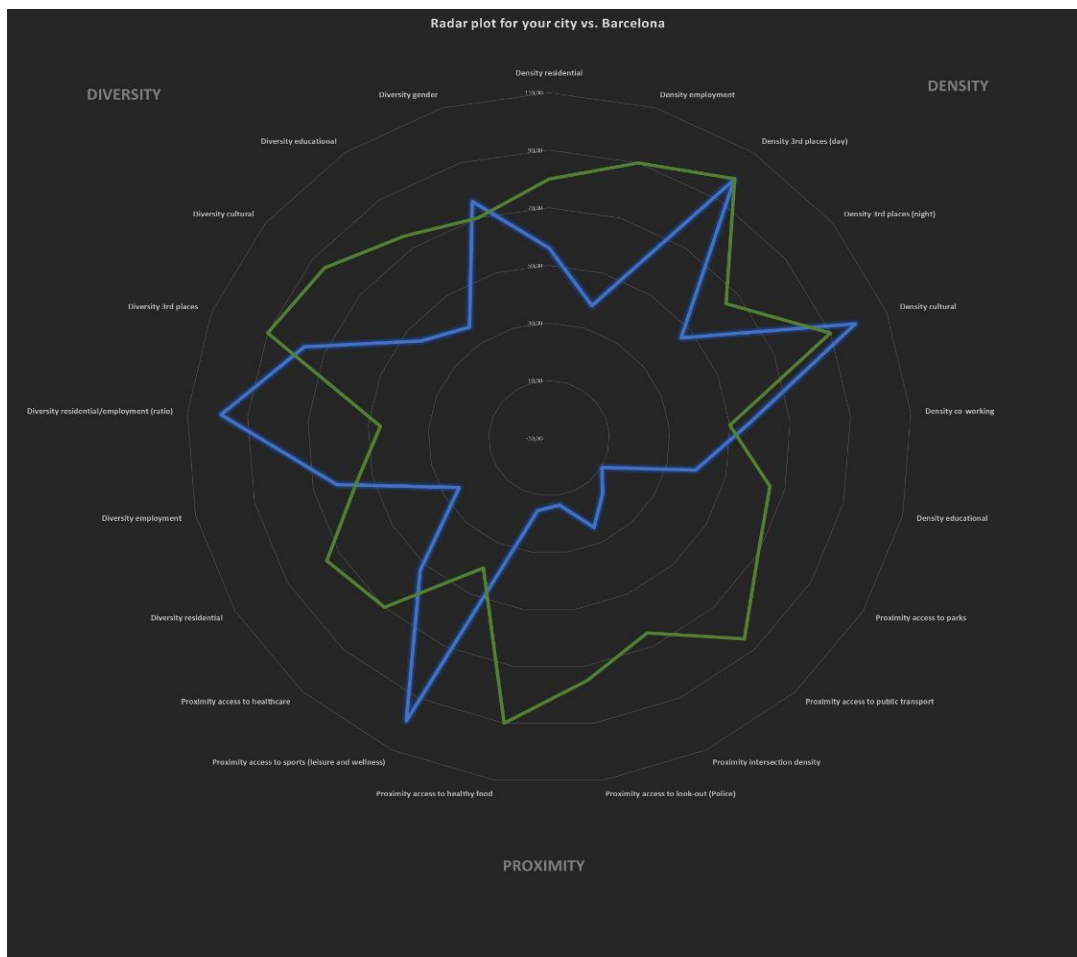


Figure 16: Radar Plot for Exarchia, Athens, Greece

4. RESULTS

- Residential Density: The study area has a lower housing density than Barcelona, suggesting fewer dwellings.
- Employment Density: Employment density in the greater Exarchia area is significantly lower, indicating fewer jobs and employment opportunities than in Barcelona.
- Density of Third Places: Exarchia shows mixed results for eating and leisure places. Daytime venues (such as cafes and libraries) have a similar density to Barcelona, while nighttime venues (such as bars and clubs) have a lower density.
- Density of Cultural Venues: Cultural density is higher in the greater Exarchia area, indicating more cultural venues such as museums, theatres, and galleries.
- Density of Co-Working Spaces: Exarchia has a significantly lower density of co-working spaces compared to Barcelona.
- Density of Educational Institutions: The density of educational institutions, such as schools and universities, is significantly lower in Exarchia.
- Gender Diversity: Gender diversity is relatively higher in the study area compared to Barcelona.
- Education Diversity: Exarchia has considerably lower educational diversity, indicating less diversity in educational backgrounds among the population.
- Cultural Diversity: Cultural diversity is lower in Exarchia, indicating fewer diverse cultural venues and activities.
- Dining and Recreational Spaces Diversity: There is less diversity in food and leisure venues in Exarchia than in Barcelona.
- Housing Diversity: Housing diversity is lower, indicating fewer housing types.
- Employment Diversity: Employment diversity is relatively higher, indicating a greater variety of job types and industries in the greater Exarchia area.
- Residential/Employment Ratio: Diversity in terms of the housing-to-employment ratio is higher in Exarchia, indicating a greater balance between available living and working spaces.
- Proximity Access to Health Care: Proximity to healthcare is lower in Exarchia, indicating more limited access to medical and care facilities for residents on foot.
- Proximity Access to Sports Venues: Proximity to sports and wellness facilities is significantly greater in Exarchia than in Barcelona, indicating direct access on foot.
- Proximity Access to Healthy Food: Proximity to healthy food is significantly lower in Exarchia, suggesting less direct access to nutritious food by walking.
- Proximity Access to Look-out (Police): Proximity to police stations is extremely lower in Exarchia, suggesting no direct access to security departments on foot.
- Proximity Access to Parks: Proximity to parks is significantly lower in the study area compared to Barcelona, suggesting limited access to green spaces for residents on foot.
- Proximity Access to Public Transport: Proximity to public transport is significantly lower in Exarchia, indicating difficulty in direct access to public transport.
- Road Intersections: Proximity to road intersections is lower in the study area.

5. DISCUSSION

The basic urban performance metrics we outlined earlier determine high-level key indicators, including innovation potential, building energy, mobility, public health and wellness, and safety and security. (Figure 17)

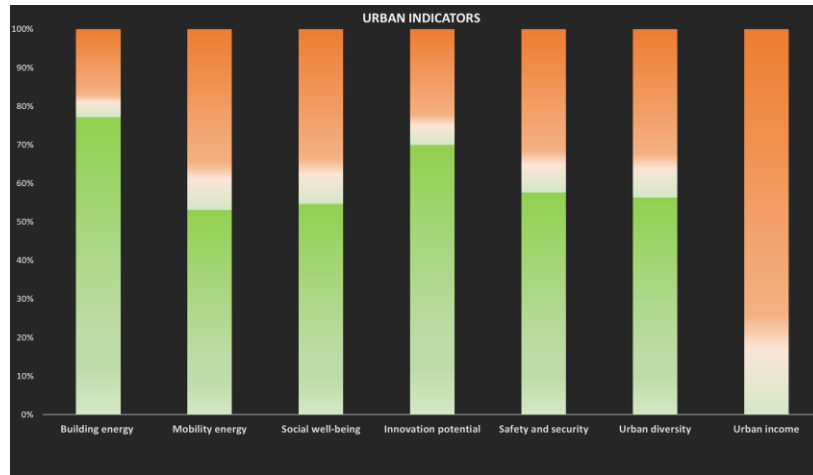


Figure 17: Urban Indicators of Exarchia

The presented analysis indicates that the broader area of Exarchia has a high density of cultural, dining, and leisure facilities that primarily operate in the morning and midday hours. The area balances available living and working spaces and hosts a diverse range of residents in terms of gender and employment types. Additionally, Exarchia exhibits greater proximity to sports facilities compared to the Barcelona model area. However, several areas require improvement, including the density of housing, workplaces (both cooperative and non-cooperative), and educational institutions. Enhancements in accessibility to public transport, healthcare, healthy food, security services, and green spaces are also necessary. The area falls short in promoting human interaction and flexible mobility, with lower proximity to road intersections than Barcelona. Furthermore, the diversity of educational types and sectors, as well as residential, cultural, dining, and leisure facilities, needs to be increased. Regarding urban indicators, building energy consumption is notably high at 77%, with vehicle energy consumption at 53%. These figures underscore the urgent need for energy reduction strategies. Social well-being is around 55%, while safety and diversity are near 58%. The innovation potential stands at 70%, which is promising for regional development. Unfortunately, no data on the district's urban income was available. This data can inform urban planning decisions to enhance the quality of life in the greater Exarchia area.

The proposed process presented in this paper highlights the importance of local data collection and analysis to understand urban areas comprehensively. By comparing Exarchia with a model city like Barcelona, strengths and areas for improvement can be identified, enabling data-driven and objective urban design. Visualizing community data and comparing it with model cities aids in understanding abstract quantitative data more concretely and improving the targeting of sustainability by making informed decisions. It also promotes community involvement, making urban planning a truly participatory process. Data reliability is crucial. In this example, we could approximate the actual situation of the study area to some extent but not entirely due to difficulties such as limited access and incomplete data recording. Updating recorded data is also a significant challenge, as current methods are time-consuming. Unfortunately, in Greece, the digital era focuses more on digitizing bureaucracy than fostering a true technological revolution. Addressing these issues requires the development of more efficient and reliable data collection and updating methods. Innovations such as CityScope, digital twins, and dynamic, incentive-based, algorithmic zoning can exponentially enhance sustainable development and the resilience of cities while also addressing the environmental crisis.

Repeating the experiment with the 2021 census data would offer valuable insights into the area's development over a decade, particularly during critical events such as the economic crisis and the COVID-19 pandemic. Utilizing agent-based simulation models could also facilitate real-time updates on current conditions, suggest data-driven solutions, forecast intervention impacts, and assess these

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interventions using data. Given the controversy surrounding the new metro station intervention, a collective, real-time, data-driven urban planning approach with integrated simulations could present an effective solution. Harnessing new modeling capabilities is crucial to advancing toward more sustainable cities, moving swiftly beyond bureaucracy, speculation, and delays.

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The "Smart Islands" as Step for the Sustainable Tourism Development

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Abstract

Sustainability may be a practical response of human to the overconsumption that he himself has implemented in his effort for more growth according to the dictates of the global market.

Perhaps it is the cure to the depletion of resources and goods, perhaps it is the solution to the resulting threats such as climate, energy, migration crises.

Planet Earth is at its limits and needs a radical change of emphasis and attitude from the "builder" man.

This execution also extends to tourism, one of the most dynamic international services in the global economy with social and environmental implications.

Sustainable tourism development is the basis of the new quality tourism of the islands of Greece that seek a new direction exploiting the answers through the "smart islands".

The beautiful islands of the Dodecanese are case studies collecting all the possibilities for a sustainable path, as a response to contemporary challenges for the future.

We must design now in sustainable terms to have a tomorrow that is no worse ecologically than today.

Keywords: *sustainable development; smart islands; sustainable tourism; Dodecanese; Rhodes*

1. INTRODUCTION

The international system is in a major difficulty having lost the constants that existed since 1990. The "new order" set new terms in the public discourse revolving around the economy, security, technology and development. Globalization based on these forces gave a form of immeasurable growth on the depletion of the earth's natural resources. This resulted in economic as well as social imbalance, a major issue of the modern era.

The energy crisis in relation to the economic, health, climate and immigration make up a framework full of uncertainty, instability and fluidity

The world runs to the rhythms of artificial intelligence, to the discovery of the universe, to robots, but without avoiding inherent violence, assertion, self-interest. The world can be read from beginning to end, but it can also be read fragmentarily due to temporal discontinuity and the dominance of the "I am" [1].

Whether at the level of the country, or at the personal level, individual interest comes to confirm the emergence of a new type of human who pursues profit and the vanity of pleasures [2].

The pressure of the markets and the immeasurable entrepreneurship pushed the economy to precede the social balance creating a multitude of inconsistencies, discontinuities and social upheavals. The new century has dawned with a host of hybrid security, labor and environmental threats.

The targeted use of natural resources and the impressive rise of technological capabilities have provided a framework for interventions in nature, where 75% of the terrestrial environment and 40% of the marine environment have been seriously altered. Demand for natural resources and material goods is expected to explode by 2060, while three times what our planet can "sustain" is already being consumed.

Total Risk!

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The U.N. tried [3] in 2000 to set six (6) central values and principles for the twentieth century under the title “Millennium Declaration” based on freedom, equality, solidarity, tolerance, respect for nature and shared responsibility.

We strongly distinguish the reference to the principle of sustainable development in production and consumption patterns with the call for a global change to achieve the well-being of both us and our descendants.

This will was confirmed in 2015 with the 17 goals for sustainable development, which are also the axis of activities and actions for a sustainable, resilient future of our planet.

In this more general view, the city, which is the modern depiction of the production process, the area of social services and decisions, was included in the planning of sustainable urban development. The need to protect the natural and built environment as well as the maturation of policy change on the basis of a more gentle development led the international community to present sustainable development as the maximum goal for the future of humanity. The art of planning sustainable urban development involves the art of give away cooperation, common benefit, perspectives. After all, “medium-sized” cities are the bases of universal design and also are the most promising urban laboratories of the future [4].

In this development spirit, the activity of tourism is opening the issue of sustainable tourism development. Both the World Tourism Organization and the E.U. (article 195 of the Treaty of Lisbon, where tourism can: 1.promote competitiveness, 2.encourage cooperation between states and 3.develop tourism as an integrated approach in the context of other policies [5]) place also tourism in the framework of sustainability, looking forward to a tourism that promotes a healthy economy in terms of resilience, social cohesion and environmental protection.

In this dialogue the islands are a separate unit, where the Greek Constitution and a number of European directives (e.g.1012/C 181/03) consider the islands as a special unit due to their geographical character with the positive but also negative effects and influences.

In fact, the monoculture of tourism on the many islands of the Aegean in terms of economic growth brings about a series of issues of over-tourism, change in social composition but also damage to the natural environment. For this, a brave policy of sustainable planning and proper prevention is necessary to mitigate the negative consequences by using measures but also technical projects that will improve the carrying capacity of the city-island system to be able to cope the incremental numbers and long-term restructuring [6] .

Tourism is a key factor in social, ecological and economic life on our islands.

And so, within the new spirit of sustainable development, tourism must be shaped as an element of prosperity and progress with the aim of the "smart islands" responding to the quality of the “islanders” as well as the tourists.

We can say that the tourist becomes a citizen and the citizen becomes a tourist and both of them enjoy “well being” in the same place.

2. INTERNATIONAL SCENE - EUROPE

The world today is in a difficult situation. The prevailing liquidity creates flashpoints and regional concerns. It is a fact that after the fall of the “Berlin Wall” (1989) and the composition of the “new order of things” a constant insecurity thrives which is aggravated by constant multi-crisis. The first is presented at the beginning of the new century with the terrorist attack on the twin towers of the International Monetary Fund in the heart of New York by terrorist forces opening the file terrorism and Islam in the public debate. Then the financial crisis of 2008 appears in the world economy with an impact on the entire international system. And the puzzle of crises in the new century continues with the covid-19 pandemic, where global health has been shaken with thousands of deaths across the planet. Even today the post-pandemic period continues with negative results in the health sector with the World Health Organization being concerned. The two wars that have broken near the borders

of Europe this decade, the one of them in Ukraine and the other one in the Middle East, rearrange international relations once again in a geopolitical picture with intractable predictions and with subsequent new forms of crises. One of them is alimentary crisis other is energy, also is the immigration crisis which comes to add up with the previous crises. She comes from the countries of Africa and South Asia at the beginning of the previous decade and also from the war in the Syrian region. The world is at a “global rotation” and the West looking for appeasement and peace solutions but with other world powers taking a wait-and-see attitude, such as China and India.

Essentially, we are talking about a complexity of crises that do not derive purely from geopolitical disputes, but also from a economic-geography dimension. If we accept that the two recent wars are being fought for the restoration of “national interests”, first with the invasion of Russia in Ukraine, and second with the “national presence” in the “Gaza Strip” in Middle East we agree that a character of two wars is “(in)regularity of global stability”, is wars of sovereignty.

So we conclude that the international scene has really been surrounded by a vast instability.

The entire environment is charging even more by the general “climate crisis” that has plagued our planet in recent decades. This particular crisis is directly linked to the economic crisis but also to the energy crisis, taking into consideration that energy is the pillar of modern development. They are interconnected and together with the high technology of 6G. They make a geometrical square for powerful stakeholders.

“Climate change” is one of the major issues of international conferences and meetings. The recent -COP 28- Climate Change Conference in United Arab Emirates once again submit one form of hope for a reduction in greenhouse gas emissions and the gradual phasing out of fossil fuels by 2050 despite the declared lack of funding from the international fund [7]. But it is gratifying that the major energy consuming countries have begun to realize the danger and damage caused by “climate change” and are now planning a change in energy policy by strengthening Renewable Energy Sources (RES), hydrogen (H²), energy derived from nuclear use and other alternatives forms.

The “climate change” makes pressing to elaborate all together plans and decides for a political transformation within narrow and comparative time limits. We must do more to prevent devastating climate change. It is our duty to create free and sustainable cities.

Let us choose to join forces and make a jump into tomorrow, we can doing a shock to the “heart of the world” [8].

Europe, having its sensitivities, has put into the wider planning the transition to a green agreement following the terms of sustainable development resulting from Agenda 2030 with the 17 specific goals and 169 sub-goals from U.N. for prosperity, peace, good management resources, proper democratic governance and strengthening the role of the citizen. It refers to a plan that touches all human activities for a just and sustainable society [9].

Europe takes the lead on the green road. Europe pursues the transition in “smart cities”.

In a recent statement, the French President spoke passionately about collective priorities to reduce CO² emissions, achieve carbon neutrality by 2050, preserve biodiversity and fight poverty and inequality. This can be done in the spirit of “One Planet” resulting from the corresponding Paris Agreement (2016) on climate change [10].

The E.U. is care for the islands and gives very interesting and constitutes a specific policy in the spirit of territorial cohesion.

Europe's Islands Strategy 2020	Europe's Islands Strategy 2030+
Smart growth: growth based on the knowledge economy and innovation	Quality islands: exploiting local resources in special markets through the use of quality products and services (+tourism)
Sustainable Development: economy more efficient in the use of resources - green and competitive	Green islands: rational use of water, land, energy and anything that offend the natural environment
Enlargement without exclusions: employment with social and territorial cohesion	Equal opportunity islands: equal opportunities (businesses-individuals) with those of the European Mainland

Figure1. Schematically the outline of policy for the European’s islands [11]

3. GREECE, A COUNTRY ON THE SUSTAINABLE ROAD WITH USE THE "SMART ISLANDS"

The attempt of the international community to launch policies in favor of the environment, seeing the danger that was developing with the over-use of fossil fuels and especially oil with negative effects on the quality of life in urban centres. The trend of urbanization and the “rapid circulation” of public transport pushed at the end of the 70s, an urban planning for the "Smart City". This model sought a city with less consumption and parallel savings in a partnership between the private and public sectors. This initiative aimed at a sustainable development based in the three pillars which they produce equally and justice: the economy, society and the environment. This would be done through actions to deal with climate change, the radical restructuring of the productive business model, the conservation of natural resources and specially saving water, the restructuring of the administration and the use of "smart" measures - applications and methodologies for less energy than oil.

We can minimize the adverse effects of over-development by properly managing urban regions with humane dimensions on the basis of the sustainable development process.

The efficient use of urban land and energy resources through an optimum distribution of population within a balanced system of settlements would go a long way towards preserving natural capitals [12].

Essentially, we are talking about a shift in the way of job and consumption for the benefit of the ecosystem and, at the same time, the quality of human living conditions.

In 2007, the manifesto for Sustainable European Cities was adopted in Leipzig, Germany, based on specific initiatives and effective actions based on: 1.The quality of public space, 2.The modernization of infrastructure and building stock, 3. Education and training, 4.In the protection of the natural environment, 5.In the strengthening of the local economy and market, 6.In the improvement of public transport, 7.In the care of degraded neighborhoods [13].

This approach opened a door for the international community to plan the manufacture of products in a different way, to use the circular economy, to distinguish the environment as a dimension that offers value to humans. This success "awakened" developed countries to see development with other eyes, with the eyes of a planet in danger.

The continuous immeasurable growth and increase of the population brought about a series of problems that certainly have an impact on the human race. This form of threat has many dimensions and expands without recognizing borders and religions. Essentially, the environmental crisis is a threat that also has a moral dimension within it [14].

Many of the scientists have been written about sustainable cities to gradually move to “smart cities” with the valuable help of technology. Certainly, however, the socio-political background was offered by sustainable cities to the general arrangement of modern urban planning.

An example is the ten (10), “The Melbourne Principles for Sustainable Cities” [15]:

- Vision
- Economy and Society
- Biodiversity
- Ecological Footprints
- Model Cities on Ecosystems
- Sense of place
- Empower people to participation
- Partnerships
- Sustainable Production and Consumption
- Governance and Hope

The “Smart Cities” in the European area combine the urban small industry and the infrastructures of the future looking at three vertical priority areas: 1.Sustainable mobility, 2.Sustainable contraction and 3.Network and process integration in the fields of energy, ICTs (*Information and Communications Technology*) and transport [16].

Each one of these priority areas is divided into several key implementation themes or “Key enables”:

- Policy: citizen focus, regulation, planning
- Information management: Knowledge, indicators, standards, databases
- Economy: new business models, public and private markets, funding

In continuation of the Smart Cities initiative, in March 2017 in Brussels, the Declaration on "Smart Islands" was signed, which is coordinated at a pan-European level by the Sustainable Islands Network-“DAFNI” [17].

The “Smart Islands” Initiative is a bottom-up effort of European island authorities and communities. It builds on years of collaboration between European islands and seeks to communicate the significant potential of islands to function as laboratories for technological way, social, environmental, economic and political innovation. The “Smart Islands Initiative” is inspired by the Smart Cities and Communities – it seeks to improve life on islands through sustainable, integrated solutions that make the most out of islands’ competitive advantages. More so, the “Smart Islands” initiative underscores the role of islands in accelerating Europe’s transition into a low carbon, sustainable and economy.

A Smart island is...

the insular territory that embarks on a climate resilient pathway, combining “climate Change” mitigation and adaptation efforts, in order to create sustainable local economic development and a high quality of life for the local population by implementing smart and integrated solutions to the management of infrastructures, natural resources and the environment as a whole, supported by the use of ICT, all while promoting the use of innovative and socially inclusive governance and financing schemes.

Key Areas of Interventions:

Energy, Transport, Water, Waste, Governance, ICT and Economy [18].

► Ten (10) basics steps according the Declaration to be transforming the islands with a “smart character” are the following elements.

The way of smart islands is directs prosperous and creation societies [19]:

1. Take action to mitigate and adapt to climate change and build resilience at local level
2. Trigger the uptake of smart technologies to ensure the optimal management and use of our resources and infrastructures
3. Move away from fossil fuels by tapping our significant renewables and energy efficiency potential
4. Introduce sustainable island mobility including electric mobility
5. Reduce water scarcity by applying non-conventional and smart water resources management
6. Become zero-waste territories by moving to a circular economy
7. Preserve our distinctive natural and cultural capital

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8. Diversify our economies by exploiting the intrinsic characteristics of our islands to create new and innovative jobs locally
9. Strengthen social inclusion, education and citizens' empowerment
10. Encourage the shift towards alternative, yearlong, sustainable and responsible tourism

Thus, the Greek islands are gradually trying to join the European spirit in the direction of "intelligent behavior and operation". The undertaking is difficult because the previous urban planning is absent and illegally construction has increased due to pressure from mass tourism. This has the effect of building obstacles for the contemporary transition to a green environment in the hope of reducing the energy footprint and protecting nature. This beautiful Greek nature is also the competitive advantage of the islands, which must be preserved by taking measures for the benefit of their islanders and tourists.

The planning of a national spatial tourism in combination with the peculiarities of each region is imperative and morally given for the sustainability of Greece's development path. With the thought that the tourism is the main source of income for the entire geographical area of the Aegean arc and also that it contributes decisively to the national economy, the government must immediately plan measures and carry capacity limits for tourism growth, assessing the cost/ benefit (value of money). The preservation of the natural and architectural beauty of the islands is the only way for a quality and alternative tourism, which together with mass tourism can shape a new business context landscape.

Greece needs to "take a rest" our islands from mass tourism and direct their development to a sustainable tourism path through interventions to change the building and construction model. This proposal can go from the concept of "smart islands" to cooperation between the state, business and islanders. By applying the ten (10) steps that have been mentioned previously in Declaration of "Smart Island" we can see the future of our islands, with another eye.

The necessity becomes imperative because time works against the islands if we do not change the development line. We must act quickly and methodically.

And this line also concerns the islands of the Dodecanese prefecture in the South of Aegean, which are a "key part" of the national economy as well as the tourist image of Greece, must act immediately. The change of course from the mass tourism of the 1970s and onwards, is imperative in the way of alternative forms of tourism offering quality to both tourists and citizens-islanders. The islands of the Dodecanese are offered for this object as a case study with environmental, social, cultural and economic criteria. The balance of all four of these sectors will draw a sustainable future for the region. We can all together achieve the goal of sustainability because without the cooperation and partnership of people the deterioration and pollution of the environment will worsen, the climate threat will be nourished and thus the islands will lose their "emerald" status.

Tourism is a socio-economic phenomenon based on the 6Ps (in transition) [20]:

Education-Culture-Environment-Quality-Politics and Protection.

The combination of these parameters gives away a plan and implementation axis for the successful outcome of sustainable steps for our islands. The aim is to preserve the natural character of our islands against the onslaught of profit and territorial overturning.

Insularity is a maximum political target. The Greek Constitution provides for it, the European Commission provides for it also.

It is up to us to make our islands open laboratories of ecological and sustainable development for the benefit of the current situation and future generations also.

Tourism must follow the limit, nature must be revitalized and human must work with the aesthetics that leads to the "depth of the beautiful" [21].

We owe it to our next generation and we owe it to the place that hosts us.

We did not inherit the environment from our ancestors but we borrowed it from our descendants.

4. ALTERNATIVE FORMS OF TOURISM AS A ANSWER TO QUALITY

TOURISM- THE CASE OF THE DODECANESE

The region of Dodecanese holds the lead in tourism traffic in Greece. This of course brings a great economic benefit to our islands with the parallel strengthening of the relevant infrastructures as well as the relative increase in the population and employees. But the increase in the numbers of current tourism does not mean the sustainable course of the place. The island place is an ecological, rare system. For that hat we must be preserved and taken care of [22].

The tourist mass pressure in certain months of the year (summer), create a multitude of problems in terms of the balance: nature-human-environment. This function is also the question in the modern era in the context of climate change and economic migration. The combination between environment, society and economy at the geographical limit of our islands is still today the goal of the government's plans.

The government and the local government also must cooperate in the final planning of our islands within a national spatial plan without delay and suspensions [23].

This call to do something for sustainable solutions in the general frame of smart and sustainable cities is necessary.

This approach also comes to the "complex of the islands of the Dodecanese" so that they can disengage from the shackles of the "monoculture" of tourism in an alternative, durable, sustainable way for the rational development of a local place [24].

Alternative different forms of tourism provide the autonomy of the tourist, contact with nature, respect for the cultural environment, healthy life and last they succeed to preservation of the architectural structure of the area.

This road can design a new development model based on tourism without removing activities from the other two productivity sectors, that is agriculture and industry

We propose a list of interventions from alternative forms of tourism for all our islands of the Dodecanese combining tourism, the environment and the island society

We read this list below [25]:

This idea can bring our islands back to the new path of revitalization in the spirit of preserving the unique landscape, sustainable development, attractiveness, maintaining and increasing the population, accessibility and also the "intelligent use" of the infrastructure to benefit of the citizen. The "Smart Island" can find a support in alternative forms of tourism following the tenth point of the Declaration for "Smart Islands", (which we have mentioned previously).

Rhodes is already at the stage of following the "smart islands" [26], also attempts to in a holistic sustainable development plan called "The Rhodes Co_Lab".

Also the islands of Halki, Tilos and Astypalaia from the prefecture of Dodecanese have projected a complete transition program to the "Green and Smart Islands" [27].

island	existing situation	Proposed state-complementary to the existing one
Rhodes	Mass tourism, cruise, marine tourism, third age (>60) citizens, student/international airport, tourist port and marina (relations with opposite "beach"-Turkey), seasonal tourism.	Agri-tourism, gastronomy, sports, Yachting (+ new marina), conference, therapeutic, spa, wellness, educational (ASTER and University of the Aegean), urban, ecotourism, rural, cultural, Golf Afandou, "watercourse", ecological.

Kos	Mass tourism, Yachting (existing marina), wine tourism - international airport, first steps in cruising, cycling, seasonal tourism.	Medical tourism – therapeutic, spa (Kos, «home» of Hippocrates), gastronomy, ecotourism, rural, conference, cultural, cycling, wine tourism and walking tourism
Kalimnos	Mass tourism, climbing-international airport- daily trips in Turkey, seasonal tourism.	gastronomy, ecotourism and rural, marine and "fishing" (multiple fish farms), climbing and diving tourism
Karpathos	Mass tourism, Windsurfing, Subaqua -international airport, seasonal tourism.	ecotourism and rural tourism, diving and surfing
Chalki	Mass tourism, partly walking (operates satellite of Rhodes)-today fully «eco-island», seasonal tourism.	walking, "fishing" (lots of fish farms) tourism, diving tourism
Simi	Mass Tourism, religious and marine, international Yachting-(good relations with the opposite “beach”- Turkey) - *operates satellite of Rhodes	Fishing tourism, gastronomy, ecotourism and rural, watercourse of airplane.
Tilos	Low flow-tension of tourism, island with “zero waste”, archaeological museum of small elephants	Ecological, Walking tourism, "Green Island", Cultural tourism
Nisiros	Low flow-tension of tourism, Volcano (Geothermal) Tourism, seasonal tourism.	Religious, Ecological, Tourist marine refuge of "Palos"
Leros	Low flow-tension of tourism, religious tourism seasonal tourism.	Therapeutic, maritime, (it has one of the largest natural harbour in the Aegean) - Yachting
Patmos	Tourism based on religious form (monastery of “Agios Ioannis”), cruise seasonal tourism.	Island with special religious importance, gastronomy, cruise
Astypalaia	Medium flow-tension of tourism, marine tourism, seasonal tourism	Ecotourism and rural tourism
Kasos	"Satellite" island of Karpathos, measured tourist flow, seasonal tourism.	Ecotourism and rural tourism
Lipsi	Low flow-tension of tourism, refuge marine life, seasonal tourism	ecotourism, marine-Yachting tourism
Kastellorizo-Megisti	Medium flow-tension of tourism, daily trips in Turkey, seasonal tourism	Marine tourism, monastic, climbing and diving tourism, watercourse of airplane

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Agathonisi	Low flow-tension of tourism, seasonal tourism	Marine, nature lover tourism, water park, watercourse of airplane
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Figure 2, Alternative forms of tourism in the Dodecanese of Greece

5. CONCLUSION

The world today is going through a constant restlessness under the pressure of threats and fear. Geopolitical, environmental, immigration, climate, energy, food, hybrid construct a framework difficult to solve. Nevertheless, human resists the challenges with his strength, trying to create suitable living conditions. The growing population of the earth together with the over-consumption of products put the natural balance of the planet at risk. The international priority for a sustainable development in all over world has set an outline of changes for a holistic "green deal". This planning starts from the city, extends to the region, the country, the continent and the whole world.

It is a sustainable test of human's abilities to see the future with another consuming side, the side of the limits and the measure for the endurance of the natural sources of supply in the intended sustainable development.

The "smart city" comes in our days to answer the challenges of the modern resident through a design of the circular economy, the rational use of natural resources, the reduction of pollution and the proper management of waste and water. Europe concerned about climate change is following the imperatives of the 2022 "Green Deal" to transition to a green region by adapting energy conditions for the climate [27].

In sequence of all the previous ones, the islands of the Dodecanese, which constitute a separate ecological geographical entity, are directed towards an "intelligent development" responding to the imperatives of the time.

The tourism as a key factor in the islands' economy must adapt to the new political lines for "smart islands". This adaptation can be done through the change of mass tourism model to a sustainable tourism development using alternative forms of tourism as a response to the balance between economy, society and environment of our beautiful islands.

This is the answer for the future of our islands!

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Planning and Design Strategies for public open spaces and "smart" applications in period of pandemic

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Extended abstract

This paper explores the dynamic interaction between urban public spaces, urban planning and the unprecedented challenges posed by the pandemic COVID-19, with a particular focus on the city of Volos, Greece. The study begins by defining the fundamental concepts of public open spaces and their integral role in the urban fabric, providing a contextual basis for the subsequent analysis.

The research delves into the profound impact of the pandemic on public spaces globally, requiring rapid adjustments in their design, use and management. A comprehensive examination of the unique effects of COVID-19 on public spaces in Volos reveals both the vulnerabilities and opportunities presented by the crisis.

Based on these observations, the paper offers a number of applied guidelines for effective management of public spaces by local authorities during a pandemic such as strategies for temporary land-use changes in public open spaces, use-density of public open spaces and crowd control, measures for sanitation of public open spaces, and community involvement in both decision making and applied measures.

It highlights the importance of resilience and adaptability in urban planning.

In addition, the study explores the integration of 'smart' applications and technologies to enhance public space management during a pandemic, using AI-based tools, contactless services and data-driven decision making. Such innovations are investigated as valuable assets to ensure the safety and functionality of public open spaces in the face of unforeseen challenges.

Keywords: *Public open space, Urban Planning & Design Strategies, Pandemic, AI Technology, Smart applications, city of Volos*

Exploring Tourist and Population Mobility: An Integrated Analysis Using Mobile Positioning Data

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Extended abstract

This study uses mobile positioning data provided by a telecommunications operator to examine both population and tourist mobility. The primary aim is to offer a nuanced understanding of these dynamics, correlating them with official statistics and tourism-related variables. It assesses tourist mobility using mobile phone data to understand the temporal and spatial factors influencing tourist flows. The study provides insights into tourist movement patterns and population dynamics in the region, highlighting the importance of hotel infrastructure in supporting local tourism and the need for more comprehensive and accurate analysis.

The methodology encompasses a hybrid approach of data extraction, transformation, and loading (ETL) from various sources, followed by the application of the Knowledge Discovery in Databases (KDD) methodology. It involves ETL processes to structure mobile data, integration with geographic information, and the use of machine learning models (both supervised and unsupervised) to investigate the influence of temporal and spatial variables on the number of visitors. Spatial autocorrelation analysis is also used to identify patterns in visitor density.

The analysis revealed a strong positive correlation between mobile positioning data (MPD) estimates and the 2021 Census data, validating MPD's reliability as a complementary tool for demographic and tourist analyses. Patterns in foreign tourist movements were identified, with peaks at weekends and preferences for daytime and night-time activities. A positive relationship was found between visitor numbers and factors such as public holidays, train routes, weekends and areas with historical points and tourist attractions. The impact of holidays on visitor numbers was particularly significant and varied with the length of the visit.

In conclusion, this integrated study provides valuable insights into tourist movement patterns and population dynamics in Viseu Dão Lafões. It represents a step forward in providing long-term trend analysis and assessing the impact of government policies on tourism, highlighting the importance of exploratory analysis in various social, environmental and economic aspects in Portugal.

Keywords: *Mobile positioning, Decision support System, Spatial analysis, Temporal analysis, Machine Learning*

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ROUNDTABLE DISCUSSION

CHANGING CITIES



Changing Cities VI, Rhodes, 24 - 28 June 2024

RETHINKING THE FUTURE OF CITIES; IMPACTS & CHALLENGES OF TELEWORKING



Changing Cities VI, Rhodes, 24 - 28 June 2024

Pre-organised and coordinated by Prof. Aspa Gospodini

Coordinator Prof. Aspa Gospodini, Department of Planning & Regional Development, University of Thessaly, Greece

Contributors in Round-table discussion

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- **Prof. Georgios A. Panetsos**, Department of Architecture, University of Patras, Greece.
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RETHINKING THE FUTURE OF CITIES; Impacts & challenges of teleworking

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Extended abstract

The recent COVID'19 pandemic and community lockdowns introduced a large-scaled shift towards working from home (WFH), resulting in immediate but temporal impacts on city- centres, urban transportation networks, functional features of residential neighbourhoods and buildings. However, in the post-Covid era, teleworking is both expanding and growing. There are two new categories of teleworkers; (a) 'nomadic teleworkers' and (b) 'over-time teleworkers': The former includes those teleworking from places other than home and office - on trains, at motorway service stations, in airports, in the clients' premises, in holidays resorts, etc., - based on the development of mobile ICT, especially portable computers and mobile phones. The latter includes those teleworking from home outside the normal working hours (early in the morning, late at night, during weekend, etc.).

The percentages of teleworkers are rapidly growing worldwide. More specifically, in the European Union (i.e. the mean percentage of 28 member-states), home-based teleworkers were 5% in 2000, and only 7% in 2007. By 2022, the percentage increased to 10.2% with Ireland having the highest score (25.3%) and Romania the lowest (1.4%) [Data: <https://www.statista.com/statistics/879251/employees-teleworking-in-the-eu>]. Cultural variations appear to play a significant role in the differences among countries; in north-European countries telework is a better-established practice than in south-European counterparts. In 2022, 27.5% of US employees teleworked at least part-time – which was the average of all private establishments (U.S. Bureau of Statistics <https://www.bls.gov/>). Therefore, an increasing number of companies worldwide are adopting WFH policies, indicating that teleworking is likely to be a long-term trend in the labour market.

Urban economists, geographers and sociologists, urban planners and designers, and urban transportation engineers, have always had the tasks to analyse, predict, plan, and design urban space taking into account multiple variables, and focusing on the “lieu” where economic activities occur in cities, and where people reside. The goal of this roundtable discussion is to bring together academics from different disciplines to set up future scenarios for the possible boom of teleworking, and its major impacts (spatial, morphological, economic, and social) on cities. The discussion will focus on the following issues:

- How will the rise of telework impact the economic and social identities of city-centres?
 - Will increase in telework lead to a decrease in needs for large office space by private enterprises in city-centres, and thus, creating a surplus of vacant spaces and buildings in city-centres? How will this affect the office real estate? Additionally, what kind of businesses will move into the abandoned spaces of the city-centres?
 - What will be the impacts of such relocations on travel patterns in the city? Will urban transportation infrastructure (motorways, metro, suburban train lines) be underused and devalued?
 - What are appropriate gentrification processes for repurposing abandoned office buildings in city centres? Could the rise of telework make housing more affordable in the city centre? Could vacant offices in city cores be transformed into residential units? Could this promising strategy contribute to reducing housing prices?

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- Will the vacant office buildings in city centres be transformed into tourist accommodation (e.g. small flats available for short-term rental through electronic platforms), and spaces for culture and leisure-oriented businesses?
- Will the economic identity of city-centres shift towards culture and tourism as symbolic economies?
- What are the anticipated changes for hosted activities and reuse of heritage buildings in the city centres?
- How will the rise of telework reshape inner-city neighbourhoods and suburbs?
 - Will private enterprises relocate to neighborhoods and suburbs, looking for better environmental conditions? What will be the impacts on real estate prices?
 - Will the increase in telework lead to new demands for cultural amenities, shopping, recreation, amusement, etc. in inner city residential areas, as well as in suburbs? How could these needs be addressed in the residential areas of compact Mediterranean cities, and the low-density north European and American cities?
 - Could residential neighbourhoods be transformed into self-sufficient urban units? Are new approaches such as the ‘X-Minute-city’ and chrono-urbanism a sustainable solution? Will an ‘holistic’ kind of neighbourhood be the new task for urban planners, urban designers, and architects? Is this a new opportunity to generate inclusive neighbourhoods in a just-city?
 - Will the existing house-typology undergo alterations? What’s the new role/function, typology and configuration of public spaces in ‘holistic’ neighbourhoods? What are the design and planning guidelines for ‘green and blue infrastructure’ as well as for sustainable mobility networks?

THEMATIC SESSIONS

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RESILIENT CITIES

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Changing Cities VI, Rhodes, 24 - 28 June 2024

Strategic Plan for Resilience with Emphasis on Critical Governance Issues: The case of the Municipality of Saronikos

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Abstract

Cities' resilience is an essential requirement for modern urban development. Urban trends that are related to natural (climate change) as well as economic and social phenomena (pressures on public health, geopolitical tensions, migration) are manifesting themselves at all planning levels, from the global to the local. These challenges, which vary in scale and degree of interaction, necessitate the adoption of strategic urban resilience planning in respect to a place's vulnerability. This study focuses on the spatial resilience of small towns, using the Municipality of Saronikos, a small to medium-sized growing city with insufficient strategic planning in the Regional Unit of Attica, Greece, as a case study. It seeks to add to the debate on the conceptual relationship between resilience, adaptive capacity, crises and governance of urban systems, as well as to emphasize the critical role of strategic planning and 'good' governance on the path to urban resilience. The research was based on the conduct of interviews with municipal officials and representatives of civic groups, following a SWOT analysis. One important finding is that dysfunctional governance produces an unpredictable picture, making it difficult to implement strategic goals effectively.

Keywords: *urban resilience; urban governance; strategic planning; adaptation; Municipality of Saronikos*

1. INTRODUCTION

Spatial systems are places of concentration of economic, social, environmental and political activities. The complexity of these activities, along with increased urbanization, results to the formation of pressures, disruptions and crises, with the result that each city typically grows at its own random yet structured rate [1]. Each city, depending on its characteristics and evolutionary capacity, is called upon to address disruptions through appropriate strategic planning. Cities are seen as complex, adaptive and emerging systems, consisting of multidimensional and interconnected subsystems such as governance networks, urban metabolism, urban infrastructure and socio-economic dynamics [2]. The urban environment is never in balance and is characterized by multi-functionality and increased spatial entropy [1]. The size of a city, its population, the structure of its networks and the activities it develops all contribute to its complexity [3]. In exploring its dynamic behavior, nonlinear systems cause confusion and division, and it is difficult to determine their relevance to urban planning [4]. Therefore, the evolutionary process is at the same time the source of problems but also the framework through which adaptation and sustainability are ensured [5].

Resilience management is an approach that emphasizes proactive action to make a system flexible in the face of future crises, despite its heterogeneity [6]. The goal of urban resilience is to make the city capable of adapting to disturbances and improving daily operations and services to its residents at any time. Simultaneously with the development of socio-economic and political dimensions, characteristics such as preservation, transition and transformation are taken into account [7]. Its defining aspect is "panarchy", which explains the hierarchical framework in which natural and human systems are interconnected via adaptive cycles. The concept of hierarchy is not related to the established vertical power control from top to bottom, but to the semi-autonomous levels generated by the interactions of variables with similar speed and spatial characteristics [8]. Strategies to enhance

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adaptability and resilience are implemented in accordance with national institutional characteristics in urban planning systems [9].

Resilience is studied by analyzing adaptive resource management and adaptive governance [10]. The literature describes governance in various ways, depending on the stakeholders involved, the processes, mechanisms, institutions and administrative structures, the socio-political situation and the objectives pursued. It includes government, the private sector, civil society, methods and processes of planning, management and decision-making, with the perspective of flexible systems [11]. It depicts the ongoing interactions between members of a network, as a result of interdependence, resource sharing and negotiating common goals. Although networks are guided by central authority, they are not accountable to it due to frequent changes (such as state reforms), hence they develop autonomy through self-organization. Governance is of greater importance than government itself [12] and contributes with preventive strategies to local development [13]. According to the European Commission and the White Paper, four key challenges defined the framework for "good governance": greater citizen participation, more effective policies, debate participation, and redefining political-institutional institutions with clear goals [14]. Urban governance emphasizes the need for "management" (an intra-organizational approach) of cities [11]. An integrated model of urban governance includes the structural framework (state restructuring), the institutional environment (distinction of bodies and modes of governance), the political culture and the role of leadership [15].

2. RESEARCH QUESTIONS AND METHODOLOGY

The paper aims to contribute to the debate about the conceptual relationship between resilience, adaptive capacity, crises, and urban system governance, as well as to highlight the crucial role of strategic planning and 'good' governance in achieving urban resilience. The municipality of Saronikos, a small to medium-sized growing city, with insufficient strategic planning in the Regional Unit of Attica, Greece, was used as a case study. Considering the theoretical background and the 5 fundamental questions (Who, What, When, Where, Why) related to urban resilience [2], some research questions that arise are: Who decides what is prioritized to increase the Municipality's resilience? What are the most pressing concerns that the Municipality must address? What role does governance and the participatory process play?

Initially a SWOT Analysis was performed in order to understand the case study's characteristics, with the goal of documenting the strengths-weaknesses and opportunities-threats observed in specific development pillars. It is believed that such a systematization will aid in the recommendation of specific measures - at the operational planning level - at a later stage. Following the SWOT analysis, the core methodology was based on the conduct of interviews with stakeholders, i.e. municipal officials and representatives of opposition groups, through which the Municipality's most critical issues are identified.

The question of timing is also a significant research question; however, it is not addressed in this work. It is important to note that after a crisis, not all parts of the system respond equally quickly. Different levels of resilience exist within the city, as evidenced by some functions recovering more quickly than others. In order to create a benchmark state that would permit the usage of resilience, a time limit (before and after) to indicate the disaster should be defined [16].

3. CASE STUDY AREA: THE MUNICIPALITY OF SARONIKOS

The Municipality of Saronikos is one of the 66 Municipalities of Attica Region. It shares a border with the municipality of Markopoulo in the north, with the locality of Lavreotiki in the east and with Kropia in the west. It was established with the Kalikratis program in 2010 and the merging of the municipalities of Kalivia (the capital of the city) and Anavissos, as well as the communities of Kouvara, Palaia Fokaia and Saronida. Its area is 139.42 km², its population is 29.703 inhabitants (census 2021) and it is classified as a medium-sized city within the European Union's urban network. It features a 27km coastline, temperate environment with mild winters. It is considered the "home of the Kuros" of the archaic period, as well as the ancient "Asteos" roof that led pilgrims to the temple of Neptune in Sunio. It is the home of Byzantine monuments and temples as well refugees that arrived in Greece from Asia Minor 1923.

There is population growth and a trend of settlement in holiday and first residential areas in the surrounding area (20,000 additional inhabitants in the summer and roughly 10,000 in the winter). In addition, the municipality receives roughly 15,000 visitors every weekend during the summer and 6,000 visitors during the winter. Its privileged geographical position is reinforced by its proximity to the international airport "El.Venizelos" as well as the close distance from the port of Lavrio and Rafina. It is located 30min from the capital. The residential organization of the Municipality of Saronikos is unique in that it includes 30 minor communities, the bulk of which are located in the seaside zone, in addition to the urban centers of the cities-villages.

The Municipality of Saronikos is developing on the basis of the Athens Master Plan (RSA, L. 4277/2014). The RSA is a set of objectives, directions, priorities, measures and programmes for Attica's spatial, urban and residential organization, while simultaneously protecting the environment and adhering to the principles of sustainable development. It has as its vision for the period 2014-2021 the social, economic and environmental upgrading of Attica, with increased national and international role and with cultural identity, innovation, new entrepreneurship and local productive and social capital as key development pillars. The city of Athens lends its urban identity to the wider Attica region, boosting its competitiveness. The result is a system of expansions and infrastructures that connects all activities into a single spatial-functional system, the system of the metropolitan area, synthesizing the complexity of governance [17].

The municipality of Saronikos has launched a strategic / operational plan for 2012-2014, and since then, no new plans or modifications have been made. The vision of the Municipality is defined as follows: "A place that offers a distinctive quality of life, beautiful and creative, modern and human, open to the world, to new challenges and opportunities". The strategy outlines strategic objectives, whose accomplishment will set the local community on a course for growth in the interest of its residents. Accordingly, the mission of the Municipality of Saronikos was defined as "The governance of local affairs and the provision of excellent public goods and services to meet the needs of its inhabitants and local actors, with a view to the sustainable social and economic development of the area through the implementation of a policy that will contribute the most to achieving sustainable development and social peace".

4. RESULTS

Step 1: SWOT Analysis

The SWOT analysis as a tool is designed to i) strengthen the internal potential elements of the spatial unit as well as the opportunities offered by the external environment and ii) mitigate the internal weaknesses and threats arising from the outside environment. Through this process, it aims to i) reduce uncertainty, ii) identify the dominant and critical determining factors (internal-external) and iii) establish a documented strategic link of development action with the endogenous potential of the region and with the external environment [18].

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The SWOT analysis conducted for the Municipality of Saronikos is presented in Table 1. The pillars that were chosen to build the analysis were: a. Health and well-being, 2. Economy and society, 3. Infrastructure and Environment, 4. Leadership and strategy. The selection of the pillars was based on the approach of ARUP and Rockefeller which identify 12 indicators that describe the fundamental characteristics of a resilient urban system through the City Resilience Framework.

Table 1. Swot analysis of the Municipality of Saronikos

		Positive factors	Negative factors
Internal factors	Pillars	Strengths	Weaknesses
	1st: Health & Well-being	Favorable geographical location Availability of clean land suitable for crops and irrigation from wells Participation of citizens in volunteering Places to accommodate citizens in case of cold and heat emergency	Non-existent sewage system Absence of state health services, municipal clinics unmanned by staff-equipment Environmental pollution in summer due to insufficient cleaning sector Abolition of the Open Municipal University and KEDIVIM
	2nd: Economy & Society	Stable population course Highlighting local identity and art with cultural events Sufficient hotel facilities	Informal settlements (not included in financing, disadvantage and hinder development) Reduction in production of the agricultural sector due to weak cooperatives Weak commercial urban centers Unexploited archaeological sites Lack of financial autonomy (most revenue comes from the state) Increased objective real estate values
	3rd: Infrastructure & Environment	Voluntary tree plantings - "Reforestation Award" Greek Green Awards 2022 Electric lighting network with upgrade to LED (characteristic of smart cities)	Lack of public transport, sidewalks and cycle paths Problematic intra-municipal road axes Non-existent disabled infrastructure Arbitrary construction in the peri-urban area and illegal placement of canteens on the seafront Fragmented coastal zone
	4th: Leadership & Strategy	Effectiveness of Civil Protection, based on incident recording (2021 award from the Ministry of Climate Crisis-Civil Protection) Saronic Municipality WEB GIS-Geospatial data platform regarding urban development	Non-existent strategic planning to promote the image of the Municipality Complexity of services due to overlapping responsibilities Inability to serve citizens due to organizational problems and knowledge level (non-evaluation of staff)
External factors	Pillars	Opportunities	Threats
	1st: Health & Well-being	Member of the National Intermunicipal Network of Healthy Cities Implementation of the "Housing and Work" program (Ministry of Labor and Social Affairs)	Risk of fire in the summer
	2nd: Economy & Society	Cooperation with the Municipality of Lavreotiki (Development Association) Job opportunities since the creation of the airport Employment program for the unemployed aged 55-67 (OAED)	The global financial crisis of 2008 has not brought back technical professions (especially in construction)

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	Operation of Anavissos School of Tourism Professions	
3rd: Infrastructure & Environment	Sorting of bio-waste in brown bins 15/02-31/12/2023 (E.P. "Transport Infrastructures, Environment and Sustainable Development 2014-2020") Clothing recycling program to reduce landfill waste Approved "Green Corners" (A. Tritsis Program) Approved extension of the suburban railway to the port of Lavrio, crossing part of the Municipality	Missing spatial planning framework that ignores the local community in the proposal to install wind turbines on Mount Paneio
4th: Leadership & Strategy	RSA guidelines Twinning with foreign cities	State directive not to hire permanent employees, resulting in temporary employment contracts

Step 2: Identifying critical issues through interviews

In the interview procedure, qualitative assessment was employed to determine resilience. The questionnaire was developed using the literature background, the swot analysis, and important research issues about crises and governance. The respondents were chosen based on criteria that sought to reflect as many categories of persons as possible who had adequate awareness of the topics at hand. The total number of questions is ten, and the number of responders is five, with the results presented as generalized findings.

1. What is the vision of the Municipality of Saronikos?

During the debates, it was discovered that there is no distinct vision, but that it is dependent on the priorities set by the coalition elected to power, thus it either concentrates on providing public services or on tourism marketing.

2. Is there a resilience plan for the city?

The responses were 'no' or 'I am not aware of'. In 2012, the analysis of the municipality's strategic and operational plan was released, however it was not based on the notion of resilience.

3. Is the Municipality of Saronikos included in any other regional, national or international strategy?

The answers were mostly unfavorable, except for referring to the replacement of electrification in led, which can be regarded an attempt to integrate into the notion of smart cities. One success factor for the municipality, as mentioned by one of the respondents, is its capacity to draw financing from a variety of sources and programs.

4. What, in your opinion, are the most essential challenges (risks) that the municipality is tasked with managing?

The risk of fire, which is a common occurrence in the area, comes first, followed by floods due to the presence of several streams. Then there's the issue of waste local unemployment and a lack of infrastructure.

5. Does the municipality have skilled personnel to carry out disaster risk management?

All of the respondents discussed civil protection, but from diverse perspectives, as follows: i) their training is insufficient, and they perform as a result of their honorarium; ii) they are fully trained because they constantly participate in certified programs (Red Cross, NAPRIMED, INCA), but lack equipment; and iii) the number of existing skilled personnel is insufficient, owing to short contracts. According to the latter viewpoint, the state's directive not to hire for some time during the financial crises of the '00s is a suppressive factor of development. When there are no permanent employees to fill important positions, training contractors can be a temporary solution.

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6.To what extent does the municipality engage in participatory planning processes that solicit citizens' comments and suggestions regarding their needs?

The Municipality's technical program is overseen by the consulting committee. Furthermore, the Cleisthenes law (recent administrative reform) requires municipal councils to grant the right to participate to all citizens. Associations and cooperatives are seen as more active than the preceding ones, which submit their requirements once a year. It is worth noting the respondents' suggestion to establish KEP-type offices (KEPs serve as citizens' points of contact with government services) in extended spatial neighborhoods where citizens' confidentiality regarding their requests will be maintained. As a result, there will be no priority owing to prejudice and arbitrariness at the level of the public servant.

7.Is there a municipal strategy in place to create job possibilities (particularly for vulnerable populations) and market-building activities?

The municipality's plan involves getting involved with programs. The social services provided by the SSI's third pillar connect the unemployed with the OAED. The Social Solidarity Income (SSI) began to be implemented in 2017, with the aim of facilitating citizens experiencing conditions of poverty and social exclusion. The Municipality's legal bodies provide priority to the unemployed for a number of temporary employment opportunities as well as for housing.

8.Are adaptation and mitigation strategies for climate change proposed in planning processes?

Among the initiatives identified are the replacement of public lighting with LEDs, the “branch pruner”, and the Kalivia bioclimatic school. The building of wind turbines on Mount Paneio has divided public opinion, as suitable studies must also be submitted.

9.Do you believe the municipality adequately informs residents about the risks to which they are exposed?

The municipality's website is deemed insufficient, however there is a social media update and warning signs (with fire hazard indicators).

10.Are there measures in place to monitor legislative implementation?

The municipality is overseen by the central administration for the legitimacy of its decisions.

5. DISCUSSION

Factors affecting a city's resilience include risks to human, social and environmental systems as well as the degree of their readiness [19]. They originate either from long-term pressures (demographic changes, urbanization, political instability, climate change, prolonged poverty, persistent conflicts) or from sudden events (sicknesses, market fluctuations, outbreaks of violence, economic volatility, geophysical phenomena) [20,21]. In recent decades, the area under study has been under pressure from residential development (either formal or informal) as well as critical occurrences such as frequent fires. This development has made it difficult to distinguish between the unique qualities of each of these types of space and has resulted in an informal merger of urban and rural space. Since there is no shared objective, the different communities of the Municipality of Saronikos produce heterogeneity of activity, making it impossible to coordinate for collective output. The identified problem in local self-government is that personal relationships surpass objective planning, resulting in critical issues such as a lack of basic infrastructure and transportation system interconnection, unregulated construction in the peri-urban space, and signs of natural environment degradation.

The city of Saronikos faces changing threats, resulting in a disorganized and uncreative city. It might be claimed that it distinguishes partially passive and stable behavior (mechanical perception features), making the place unreliable in undesirable situations. On the other hand, it has the features of an adaptive system in that it continues to evolve, albeit slowly. Because there are often shortages of equipment and trained personnel in emergency situations, decisions must be made using the following: classification criteria, priority level, alternative strategies, objective target, assessment of possible results, assistance from specialists, discussion with stakeholder groups, adequate training of

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people managing emergencies, the ability to calculate actual expenses and immediate reaction [22]. At this point, panarchy theory suggests that dealing with urban complexity must be approached on several scales, because each level conveys a set of information to the next and the relationships within them are modified without compromising the system's integrity [23].

While strategic planning establishes the framework for the development of cities through the dynamic involvement of all stakeholders, the inadequacy of urban planning methods to adapt to such a challenge highlights the necessity for good governance [24]. Regardless of the availability of financing sources, dysfunctional governance produces an unpredictable landscape, making it difficult to effectively implement strategic plans, with the realization of complexity, possible crises, and sometimes insufficient governance to handle a problem [11,13,25]. Cooperation in the realm of governance frequently occurs by chance or in the event of an emergency. Risk governance is also an important mechanism for coordinating risk management at the local, regional, and national levels among public authorities, administrations, the business sector, and civil society [26]. Strategic planning (identifying of needs-opportunities, search for actions) can be combined with prospective processes (foresight) in risk management procedures [27].

A multi-level governance environment can be viewed as a fluid mosaic of multiple and overlapping areas of jurisdiction and competence over specialized domains of sectoral policies that can more effectively respond to changes in demand. Flexibility is another feature of such a model [25]. A significant drawback of urban systems, such as the case study area of this research, is their organization when done from top to bottom using central control mechanisms in uncoordinated ways. In this instance, if policy-making and planning are viewed as system features, with control mechanisms incorporated as fundamental functional factors, it will be easier to achieve the objective of sustainable cities [1].

6. CONCLUSION

The work is based on the notion that governance is both the result and the means of a management procedure that aims to develop a common understanding of problem-solving through participation. Approaches around governance challenge conventional notions of the sovereignty of a hegemonic state [11]. The urban governance crisis is defined as i) problems arising from the diffusion of key functional relationships (transportation, education), necessitating a unified approach and/or coordination, ii) non-unified urban planning, and iii) deficiencies in the political legitimacy of decision-making bodies and citizen acceptance (democratic deficit) [14]. The concept indicates forms of public action where the hierarchically structured system is catalyzed, allowing for the participation and service of many actors' interests, as well as the attainment of common goals [28]. Its implementation presents difficulties due to insufficient institutional framework, weaknesses of administrative and audit bodies, indifference to institutional actors' participation, syndical and micro-political logic and lack of democratic procedures [29].

In a nutshell the critical issues that have arisen from the preceding analysis are a lack of basic infrastructure and transportation system interconnection, unplanned development on the outskirts of the city plan, natural environment degradation primarily due to fire events, business survival issues, and underutilized historical and cultural heritage. Another critical factor is the inadequacy of municipal services' staffing, which is linked to organizational issues and decreased productivity. Without a coherent strategy, efforts to increase the Municipality's resilience have been scattered. As a result, there is a lack of financial strategy and focus on revenue-generating development initiatives. 'Kallikratis' (an administrative reform program at the end of the 2010s) was implemented with flaws, in a limited time for diagnosing weaknesses, adapting and homogenizing the new structure, with a small number of implementation phases, and without giving weight to the unique local characteristics and needs.

Risk and crisis lurk in every system (social, institutional, urban etc.) and governance is a critical aspect in increasing urban resilience since it incorporates the perspective of adaptation. The risks of an urban system are found in both its internal and external environments. The Municipality of Saronikos is a place that faces changing threats, therefore identifying the weak and strong areas that need to be addressed will help to establish a sound strategy. It is distinguished in part by passive and stable conduct (characteristics of the mechanical perception of resilience), which renders it unreliable in adverse events. On the other hand, it exhibits the features of an adaptive system in that, despite moving slowly, it does not stop evolving. However, dysfunctional governance produces an unpredictable picture, making it difficult to implement strategic goals effectively.

The Municipality of Saronikos is a complex system, and protecting it is not an easy task. Because of its qualities, it requires careful handling to increase its durability. After all, resilience is synonymous with the survival instinct, which evolved as a result of the creation of a city in order to protect itself. Cooperation among all stakeholders (residents, actors) is essential for the sharing of ideas while ensuring financing availability. Continuous monitoring of changeable factors using indicators is critical for reinforcing this area, which, when combined with expertise, can aid in its robust design. The Municipality of Saronikos' society can be strengthened by applying the theoretical approach of adaptive cycles by protecting and preserving the experience on which change will be based, and by encouraging participation at all levels of administration and governance [13,30]. This circular process is based on the principles of participation, transparency, and accountability and effectiveness [31]. A critical situation does not always result in disaster, but it is caused by the exposure of the element at risk and its vulnerability. When resilience is an initial goal rather than a post-solving need, disaster response is activated, allowing the system to recover [32]. In this respect, cities that invest in and implement resilience-building strategies are better prepared to deal with shocks and chronic stresses.

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Cultural heritage's management in contemporary cities

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Extended abstract

Religious Archaeology

Transition from religious to cultural

The socio-cultural and economic changes that inevitably occur in contemporary cities contribute to the phenomenon of abandonment in specific urban areas, both residential and industrial, with a consequent perspective of decay. Consider, for example, the areas of former factories, with their spaces and buildings left neglected, which no longer shock us, but are instead catalogued within the realm of industrial archaeology. It has been acknowledged that these repulsive places can, in reality, become attractive and serve as an opportunity for urban development through their regeneration, involving communities in becoming participants in the project of change. This scenario is quite different when it comes to places of worship, the so-called "sacred places," where a sense of belonging, more cultural than religious, can generate social conflicts, especially in the era of free digital communication. Outcry arises if they are abandoned or repurposed, but it must also be emphasized that there is a persistent inclination to build new ones—mostly empty boxes inducing static rituals, examples of pure formalism, relegated to the fringes of urban development plans and scarcely utilized.

We are facing a new phenomenon: Religious Archaeology. Unused churches, convents, and chapels, which no longer spark interest, especially among the youth, are managed by clergy less inclined to contemporaneity. Today, sacred places take different forms, causing confusion in socio-cultural language. Consider, for instance, a stadium perceived as the "temple of football," with the ensuing "hand of God" à la Maradona or the "faith" in a sports team or pop star like Madonna. It is, therefore, imperative to rethink sacred space in new dimensions and urban settings, suitable for interaction with communities, in novel aggregative contexts such as shopping centers, sports facilities, transportation infrastructures, and urban parks.

The question arises: what to do with religious archaeology? Demolish it or repurpose it? And what about the "new" parish centers, underutilized and lacking in quality? Our cities are no longer uniform seats of Catholic communities; they no longer require oversized religious structures. A more realistic approach involves sustainable projects distributed in the most attractive locations of the metropolis, offering spaces suitable for various beliefs, and fostering the hope of peaceful coexistence and socio-cultural enrichment.

For too long, religious architecture has been directed merely towards construction; a pause for reflection is advisable, and a kind of "biological standstill" would undoubtedly help regenerate both the clientele and the designers.

Keywords: *Religious archaeology, Urban Regeneration, abandoned church, abandoned religious structure, reuse of religious place.*

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Categorizing Future's Ruins: Towards Sustainable Urban Resilience

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Abstract

The study explores categorising future's ruins, focusing on global literature. Urban ruins and architectural waste prompt inquiry, shaping new architectural awareness. It aims to categorise and interpret future's ruins [1]. Ruins represent urban voids, non-productive areas integral to modern cities. Cities evolve, generating urban architectural ruins as spatial traces of human activity. These ruins, devoid of distinct character, actively shape urban fabric. The research classifies future's ruins, potentially subdividing them based on industrial sites, transit hubs, and critical infrastructure. It outlines three ruin categories, documenting historical mitigation techniques. Urban areas will transform structurally, converting utilised spaces into residual zones. Urban infrastructure changes, centres becoming polluted, and pristine areas diminishing. Given the construction sector's role in pollution, documenting these areas is vital to address ruins and reshape urban fabric, fostering healthier environments. Infrastructure includes transport and utilities, construction involves industrial and commercial buildings, and environmental efforts encompass renewable energy and conservation. This categorisation informs future ruin analysis, addressing urban development and sustainability challenges.

Keywords: urban decay; brownfield; urban resilience; drosscape; future's ruins; infrastructure; sustainability.

1. INTRODUCTION

Throughout the past century, numerous urban centres have undergone phases of expansion and contraction, precipitating fluctuations in industrial development. The ongoing evolution and evolving demands of industrial production, coupled with the pervasive crises affecting various industrial sectors, have engendered the proliferation of abandoned and deteriorated engineering sites and landscapes.

Within an evolving terrain characterised by constant transformation [2], the presence of future's ruins serves as evidence of continuous human evolution and the changing face of cities worldwide. Ruins, often overlooked or dismissed as mere remnants of the past, play a significant role in shaping contemporary urban environments. As urban areas expand and evolve, the emergence of such ruins highlights the complexities and challenges inherent in urban planning and development [3]. Despite their significance, future's ruins pose several challenges to urban planners and policymakers. The presence of these ruins raises questions about urban sustainability, environmental impact, and social cohesion. Additionally, the lack of comprehensive categorisation and understanding of future ruins hinders efforts to address their implications effectively.

This research aims to address these challenges by exploring the categorisation, interpretation, and implications of future architectural ruins. Based on international literature and case studies, the study seeks to develop a comprehensive framework for categorising and interpreting future's ruins. It aims to identify the factors contributing to the emergence and persistence of these ruins within urban

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environments and evaluate existing strategies and techniques used globally to mitigate their impact on urban development. Furthermore, the research aims to propose innovative approaches and solutions for urban planners and policymakers to effectively manage and repurpose architectural ruins in the context of sustainable urban development.

Resilience and sustainability offer a compelling response to the research inquiry. By deploying preemptive strategies aimed at averting the genesis of future ruins, we effectively constrain our forthcoming options, proactively seizing nascent opportunities before their imperative emergence. [4] Through these objectives, this research seeks to contribute to a deeper understanding of future's ruins role in urban landscapes and provide practical insights for shaping future urban environments.

2. URBAN SUSTAINABILITY AND URBAN RESILIENCE

The categorisation of future's ruins in this study is based on the final transformation and scale of revitalization of the areas involved, as well as the surrounding areas. Examining the effects of urban ruins at focal points of upgrading cities or entire regions, the concept of sustainable urban development emerges. Sustainable urban development incorporates the collaboration of urban sustainability and urban resilience.

As the vulnerability of an area can easily be questioned by urban planners, policy-makers, and entire governments adapting to a new urban world, exploration into the shaping of damaged areas, buildings or infrastructures increasingly reflects an interest in sustainable urban resilience.

While urban resilience is characterised as a passive process of facilitating, maintaining and recovering the ecosystem of a city or region, urban sustainability is an active process of integration and progress in the compositions of a city. [5] These two components of sustainable urban resilience serve as the primary outcome and footprint for avoiding future disasters.[6] Based on the Paris Agreement on climate change, which was awarded by the European Union in October 2016 and constitutes the first legally binding global agreement on climate, as well as committing to the Green Deal, the European Union pledged to become the first climate-neutral economy and society by 2050 [7,8]. Among other things, the Green Deal includes measures such as:

- Investments in environmentally friendly technologies.
- Support for innovation.
- Development of cleaner, healthier, and more beautiful transportation.
- Elimination of carbon emissions from the energy sector.
- Ensuring that buildings become more energy-efficient.
- Improvement of standards worldwide.

There is thus an immediate need to transform existing infrastructure and building complexes into upgraded, economically, socially, and environmentally sustainable projects [10, 11, 12]. In the three categories of future ruins being investigated, namely infrastructure projects, industrial areas, and sustainable-environmental infrastructures, sustainability and resilience are encountered as imprints. Therefore, the categorisation of these is generally based on the concept of sustainable urban resilience.

3. CATEGORISING FUTURE'S RUINS

The paper presents three categories of future ruins and records techniques used in the past to avoid them based on global literature. Characteristic examples are provided per category, along with ways to avoid them. In the coming years, urban centres and settlements will need to completely change their structure, and many of these spaces we use will be transformed into residual areas. Existing infrastructure is changing, urban centres are being modified into polluted spaces, and healthy areas

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are disappearing. As the building sector now accounts for the largest share of responsibility for atmospheric pollution, recording these areas is essential for creating a model for tackling ruins and establishing strategies for shaping the existing urban fabric on an urban architectural scale, leading to the development of the standard of living in a healthy environment.

Specifically, infrastructure includes transportation and service systems such as roads and mass transit, electricity production and distribution, water supply, and telecommunications networks. A second category encompasses construction projects such as industrial and commercial buildings, as well as specialised structures like military camps and hospitals. Finally, a third category comprises environmental and sustainability projects, including renewable energy infrastructure and environmental protection. This categorisation provides a framework for recording and analysing future ruins to address the challenges of urban development and sustainability.

3.1 Three Categories of future's ruins

Provides an analysis of future ruin categories, towards sustainability and urban resilience, for infrastructure types, presented in a clear format with supporting references and bibliography to demonstrate their conceptual basis.

I. INFRASTRUCTURES

- Transportation Infrastructure
 - a. Roads and highways
 - b. Bridges
 - c. Public transit systems
 - d. Airport, railway and seaports
- Utilities Infrastructure
 - a. Power Generation and Distribution (Solar farms, power plants, grid improvements)
 - b. Water Treatment and Distribution Systems
 - c. Waste Management Facilities (Landfills, processing plants, recycling centres)
- Telecommunications Infrastructure
 - a. Cell Towers and Broadband Network Expansion
 - b. Fiber Optic Cable Laying and Infrastructure Improvements

II. INDUSTRIAL DOMAINS

- Manufacturing facilities
 - a. Manufacturing infrastructures (car, trains, shipyards etc)
 - b. Warehouses (logistics, storage infrastructures)
 - c. Power Plants
- Commercial domains
 - a. Office buildings
 - b. Retail spaces
 - c. Public buildings
- Special infrastructures
 - a. Hospitals
 - b. Military camps
 - c. Prisons

III. ENVIRONMENTAL AND SUSTAINABILITY DOMAINS

- Renewable Energy
 - a. Solar Farms
 - b. Wind Farms

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c. Hydroelectric Power (barrier, aqueduct, tank etc)

3.2 The NDSM case

The case of NDSM serves as a characteristic example of an architectural relic in the category of industrial domains, which has been transformed into something entirely new. Residential areas and cultural centers have replaced the abandoned shipyard, providing impetus for new investments in the area and the expansion of the initial design to all sectors of the region.

Amsterdamsche Droogdok Maatschappij (ADM), founded in 1877 on the north bank of the IJ in Nieuwerdammerham, developed into a central shipbuilding hub. With privately owned facilities including a foundry and pipeline and engine manufacturing plants, ADM grew significantly until its closure in 1985. In 1907, Verschure & Co Scheeps werf en Machinefabriek joined ADM, strengthening the area's industrial dynamism. At the same time, the establishment of NDSM and other shipyards turned the north bank of the IJ into an important industrial zone. In 1921, the official annexation of the adjacent villages by the municipality of Amsterdam established the Amsterdam-Noord district. Large passenger ships such as *Op ten Noort* and *Christiaan Huygens* (1927) were built in the new NSM yard, underscoring the development of the industrial infrastructure. The merger with NDM in 1946 and the construction of the *Osofond* in 1949 propelled NDSM to a leading position in the shipbuilding industry. In the 1960s, NDSM found it difficult to compete with Asian shipyards, leading to mergers and government subsidies. Lastly the NDM closed its doors in 1985.

The rebirth of NDSM is like the phoenix rising from the ashes. Europe's leading shipyard was transformed into a cultural center with international recognition. In 2018, it is a destination location for tourists and festival-goers from all over the world, with the marina hosting sailing ships. Its presence has been transformed into a combination of many roles: industrial monument, festival site, marina and artistic enclave. During the 70s and 80s, the Amsterdam-Noord area suffered from pollution and unemployment. Today, NDSM is a unique combination of past and present, a golden triangle between shipbuilding heritage, artistic culture and market power.

NDSM was once a shipyard that built and repaired ships up to 1984. After the abandonment of the 90-acre site, a development initiative emerged and regeneration, avoiding the dilapidated state. The adjustment started on 1990s when many buildings were occupied and later developed as sites work and cultural use. Completion of the project by 2034 includes the converting NDSM-West into a mixed-use residential area and NDSM-Oost into city park with art galleries and monumental buildings. This project has been marked as prime example of avoiding ruins of the future as represented by the dynamic reuse of existing infrastructure to cover modern ones intervals. This development was based on a comprehensive strategy, including of the techniques used for its safe restoration and renovation existing buildings.

The process began with extensive excavations and studies to assess the situation of buildings and infrastructure. The combination of these factors led to the developing a sustainable space, enhancing community and cultural life area. Overall, this procedure highlights the importance of its rational use of existing infrastructure and sustainable development to create resilient and urban observation environments. The readjustment of the NDSM in Amsterdam followed a comprehensive strategy sustainable development and avoiding future disasters. Some of the basic urban sustainability and urban resilience principles and techniques used include:

1. Recycling and Reconstruction: Reuse of existing buildings and infrastructure to reduce the environmental footprint and avoid it disposal of materials.

2. Community Participation: Active inclusion of the local community in the process development, securing support and understanding.
3. Sustainable Development: Ensuring that development is sustainable from ecological, social and economic point of view.
4. Multifunctional use: Exploitation of existing structures for various uses, such as events, offices, residences and art spaces.
5. Interface with the Environment: Integration of the environmental dimension in planning, in order to preserve natural beauty and biodiversity.

The future of NDSM looks promising as the plans for its development are ambitious. Major projects such as empty plots and Pontkade highlight the area as a vibrant cultural and residential space. Over the next decade, more buildings are expected to be constructed and activity to focus on sectors such as the creative industry. By bringing together the attractions of life, work and leisure, NDSM is expected to become an important hub of culture and innovation at an international level.

With the Haven-Stad development plan foreseeing the construction of thousands of new residences, and the prospect of high-rise buildings in NDSM West and its connection to Houthaven, the protection of the historic and cultural heritage becomes imperative. The establishment of an active NDSM fund for the preservation and repurchase of old buildings is crucial for maintaining the traditional value of the NDSM. [13,14].

4. CONCLUSION

The present study examines the categorisation of future ruins, focusing on international and global literature. The presence of ruins in the urban fabric and the parasitic growth of architectural waste raise questions and contribute to the formation of a new architectural consciousness. The aim of the research is to explore the possibility of categorisation and interpretation of future ruins. The concept of ruins constitutes a multi-faceted notion closely associated with the term urban void. The presence of these voids, characterised as non-productive and indefinite areas without clear boundaries, is one of the most significant characteristics of modern cities. These spaces appear both at the periphery and within the interior of a city, coexisting with its continuous development. As humanity evolves, the continuous transformation of cities leads to the development of urban architectural ruins. The ruins represent a kind of spatial trace of human activity. Rather than being mere remnants and reminders, they function as an intermediate landscape without their own distinct character. Nevertheless, they actively engage with and play a significant role in the urban fabric. This research aims to categorise future ruins to contribute to their classification and mapping. Industrial sites, hydraulic works, mass transit facilities, and critical infrastructure are examined, with future ruins possibly subdivided into various subcategories.

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People's opinions about their city; Social research in Thessaloniki

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Extended abstract

In order to achieve resilient and sustainable urban environment, it is important to consider the fact that some times what residents like and wish differ from the views of both the authorities and the architects / urban planners.

The coincidence of the catastrophic phenomena of climate change, the energy crisis, the two wars, the economic crisis, plus the consequences of the Covid-19 pandemic, constitute a very particular and intriguing reference level to explore the views of the residents in relation to the present and future aiming at a resilient and sustainable urban environment.

This survey investigates the views of residents regarding the city of Thessaloniki. The research focuses mainly on the following two levels:

2. What the residents consider as important points / places / regions / locations of their city.
3. What the residents consider as the most important / serious / urgent problems and issues that have to be considered for the proper functioning of the city and its resilient and sustainable future.

The research has been conducted under the scope of environmental social psychology, which examines people's relationships and interactions with the built environment that surrounds them. Data collected through interviews and questionnaires are presented and analyzed, regarding the subjective considerations and semantic charges as expressed by the inhabitants of Thessaloniki.

The results of a social survey conducted in the greater area of Thessaloniki are presented in order to investigate the views of the residents on issues related to the urban environment, climate change, the energy and economic crisis and also the extreme phenomena.

The conclusions are expected to be useful to both the authorities and also the architects / urban planners.

Keywords: Social survey, Environmental social psychology, people's opinions, urban sustainability

1. INTRODUCTION

At the UN General Assembly (Paris 2015), all member states agreed on seventeen Sustainable Development Goals, of which the eleventh refers to the goals for Sustainable and Resilient Cities.

Since cities are considered responsible for 70% of energy consumption and 75% of greenhouse gas emissions, but at the same time there are problems in adequate, safe and affordable housing as well as in services and necessary amenities, it becomes necessary and imperative to make cities sustainable and resilient, both in the face of present circumstances and the challenges of the future.

Although the recent COP27 and COP28 highlighted the problems of disagreement on common goals by all states, the messages that were heard very loudly and clearly, made it known that there is no longer much room – from governments to us, ordinary citizens, to make cities viable.

2. THE SURVEY

This social survey in the greater area of Thessaloniki, took place after the recent elections in all of the municipalities of the region, and aims at the views of the people regarding their city. 1394 questionnaires were collected, which covered the wider area of Metropolitan Thessaloniki.

The results of the social survey are presented below:

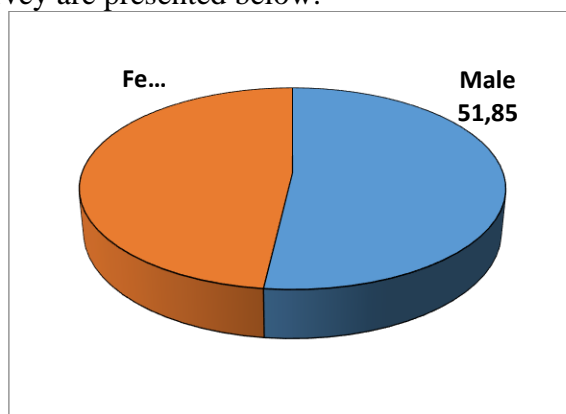


Figure 1. Sex

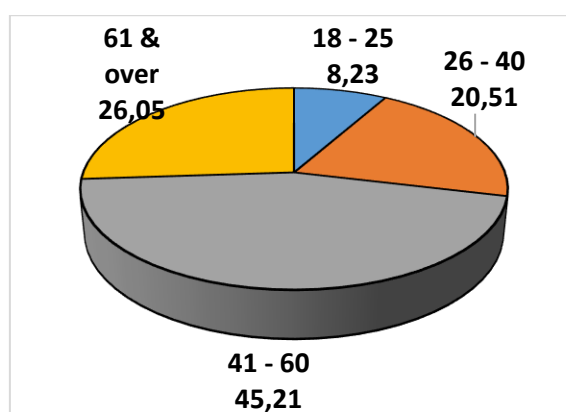


Figure 2. Age

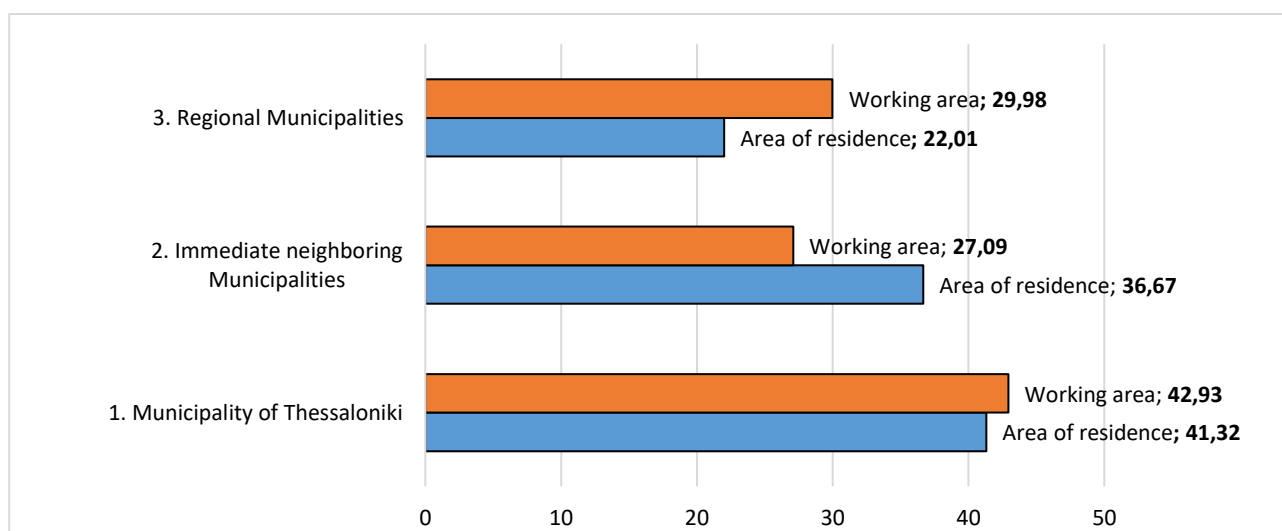


Figure 3. Area of residence-Working area

1.1. Section A

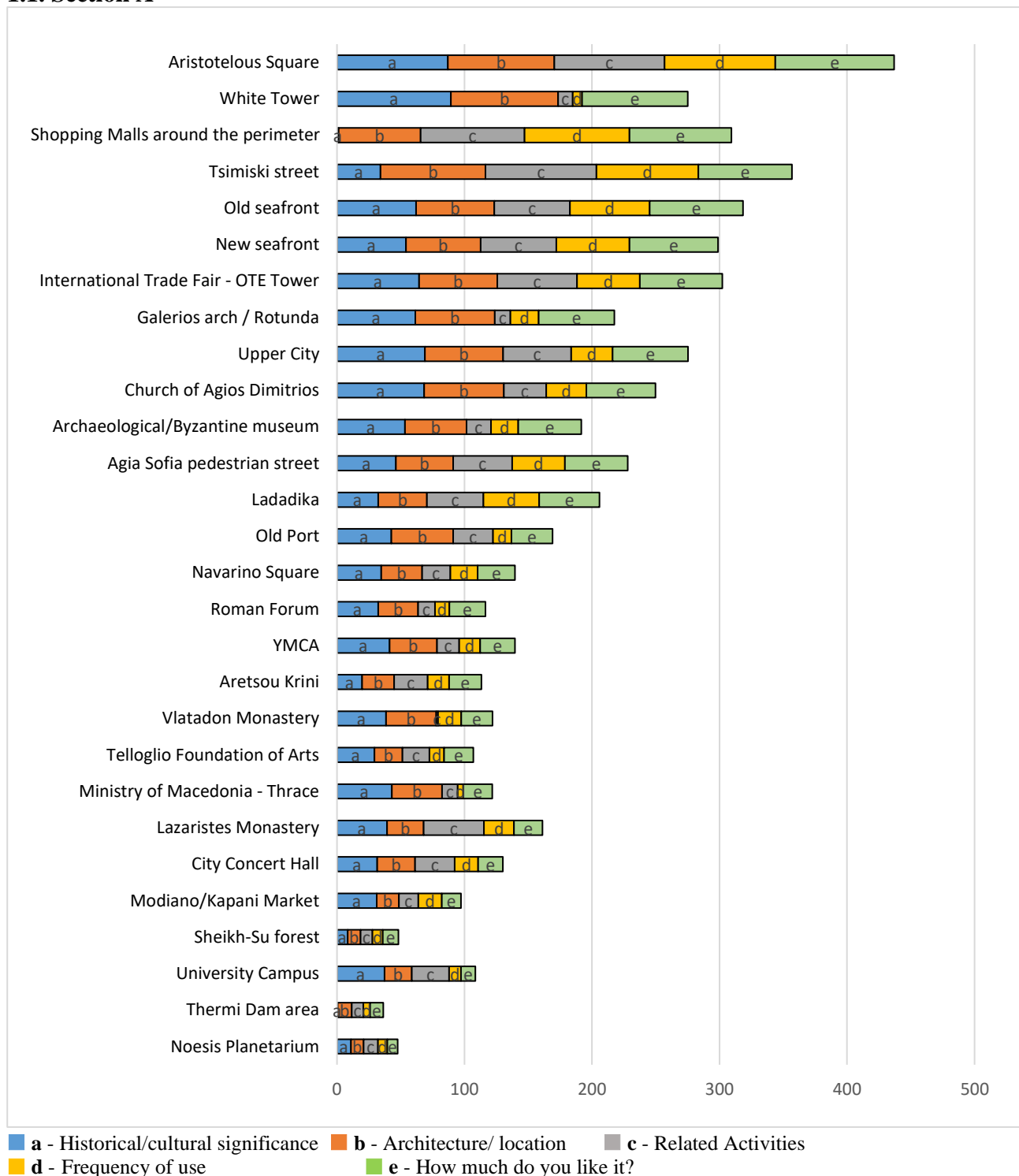


Figure 4. What do you consider to be the most important points / places / locations / buildings of the city?

Aristotelous Square seems to be ahead in all points, (Historical significance 86.97%, Architecture 83.49%, Related activities 86.35%, Frequency of use 87.01%, How much they like it 93.18%).

Next is **Tsimiski Street** (Frequency of use 79.81%, How much do you like it 73.41%), the **new seafront** (Frequency of use 57.42%, How much do you like it 69.32%) and the **old seafront**

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(Frequency of use 62.41%, How much do you like it 73.28%) all with a large percentage at the frequency of use but also at the other factors.

Then people mentioned the "landmarks" of the city, **White Tower** (Historical/Cultural significance 83.01%, Architecture/location 84.01%, How much do you like it 83.01%). **Church of Agios Dimitrios**, (Historical/cultural significance 68.38%, Architecture/location 62.45%, How much do you like it 54.21%). **Arch of Galerius, Rotunda** (Historical/cultural significance 61.45%, Architecture/location 62.33%, How much do you like it 59.42%), etc. but all with a small frequency of use (below 30%).

International Trade Fair (and the **Telecom Tower**) are also mentioned as landmarks, but also with a high frequency of use, 49.32% (for the Fair).

Moreover, an impressive percentage emerged regarding the frequency of use of **shopping centers on the perimeter of the city** (82.36%), in combination with related activities (81.42%), but also the availability of parking spaces (71,59%)

A.S.S.A Method Chart (Kosmopoulos, 1991)

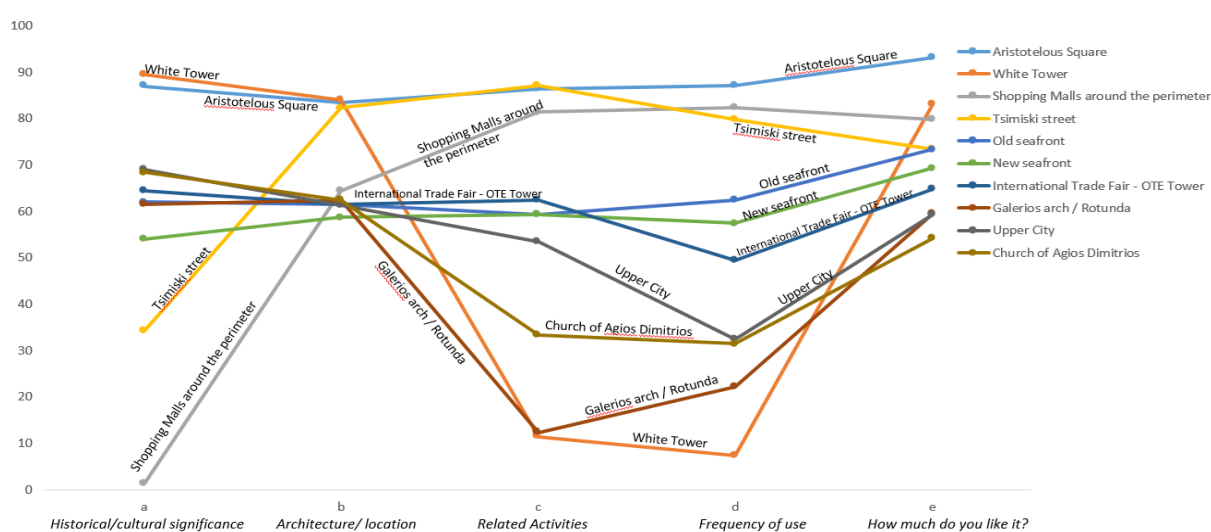


Figure 5

References follow for all the "landmarks" of the city, such as **Agia Sofia street** and pedestrian street, **upper city with the castles, Ladadika, Kapani and Modiano markets, the YMCA, the City Concert Hall, the Ministry of Macedonia - Thrace**, with relatively various characterizations but also a relatively lower frequency of visit (less than 30%).

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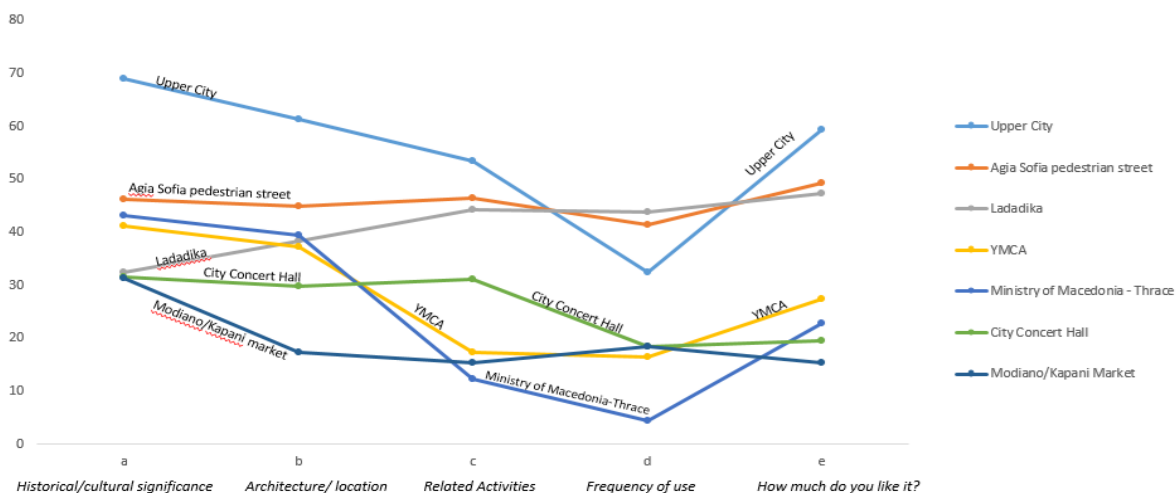
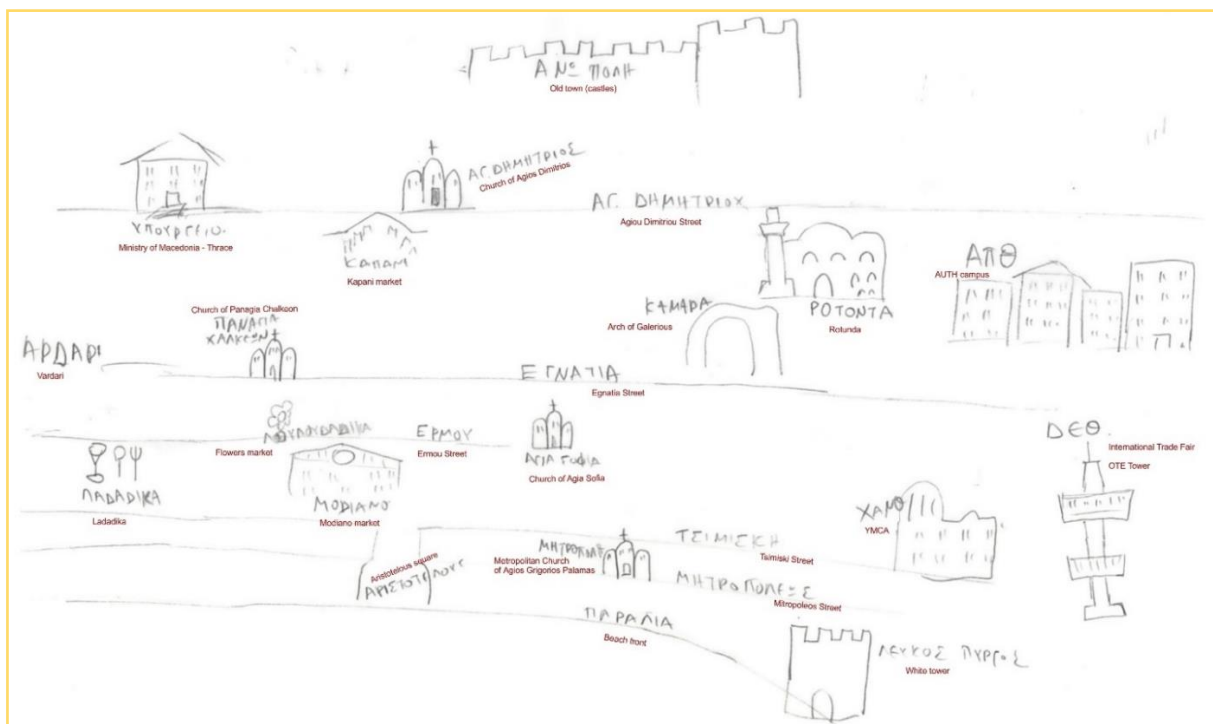


Figure 6

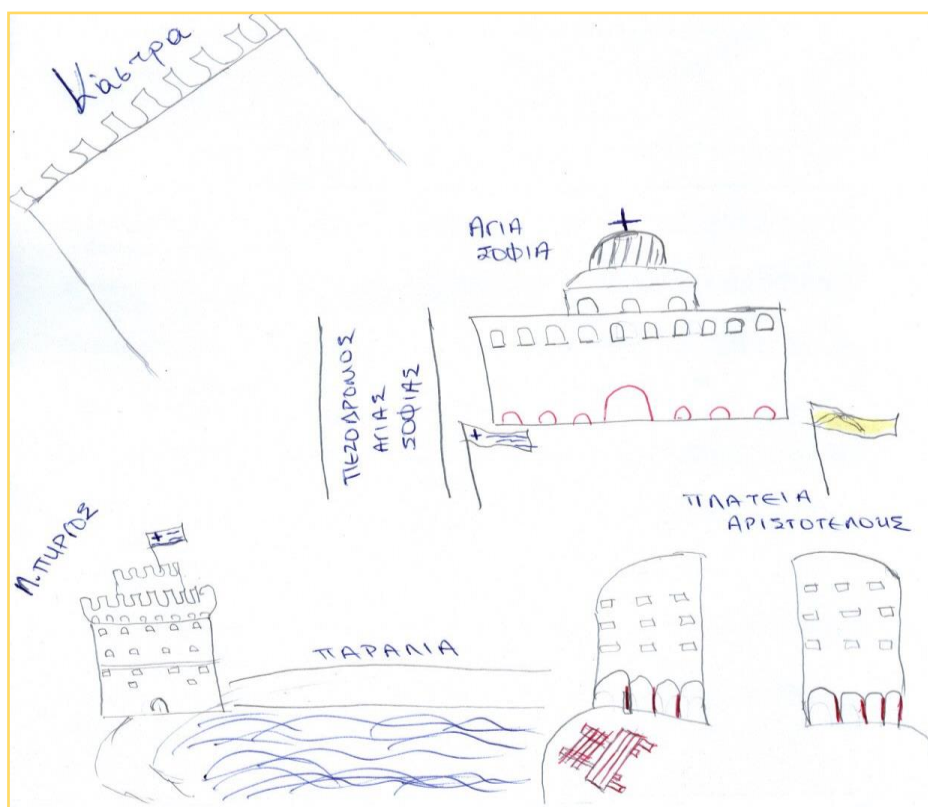
1.2. Section B

Please make a sketch of the city as you think about it, marking up your familiar routes, as well as the points of interest to you:

Here are some of the Sketch map of the residents:



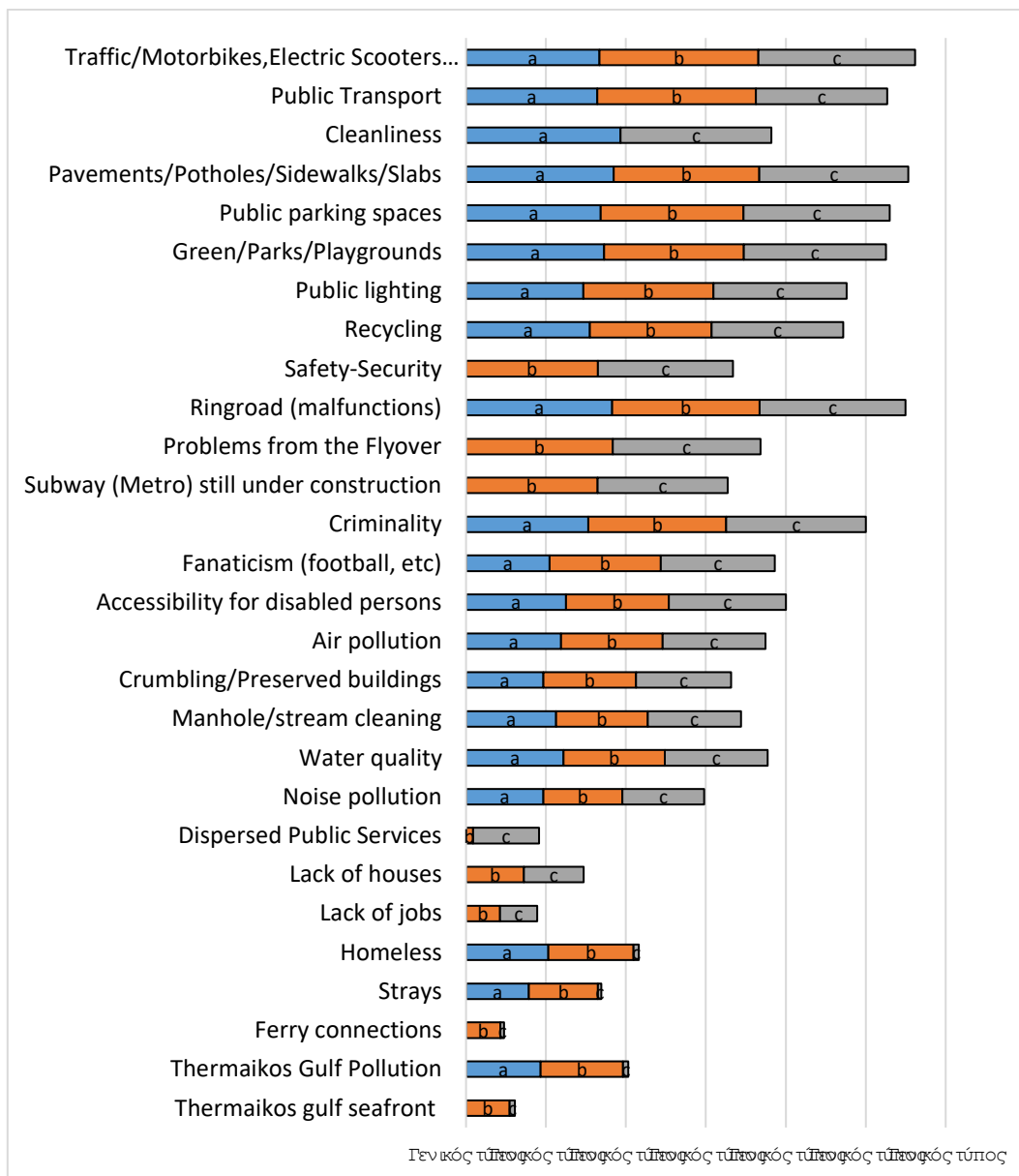
Sketch 1



Sketch 2

As we saw in the first part of the survey, (the answers), but also in the second part, (the sketches), the views of the residents about the important places of the city and which of them they like best, are well described.

1.3. Section C



■ a - Constant and general care is required ■ b - Needs resolution in the near future ■ c - Serious and Urgent

Figure 7. What do you consider to be the most serious / important issues problems / deficiencies for the city of Thessaloniki? Please list up to 10 and evaluate them according to the severity/importance you believe they have:

As for the responses to the third part of the survey, citizens indicate which ones they consider to be the most serious / important issues / problems / deficiencies of the city, and express their opinion on them. Here are the most important ones:

Traffic (98.03%): More bus routes are needed. More Municipal car parks and parking places. Clear and safe separation of lanes and areas for bicycles and skates. Continuous care of the roads’ surfaces (potholes). Unabstracted access to first aid and fire brigade vehicles). Of course, there is also the constant hope that the Metro will relieve traffic. Finally, there are many traffic problems, both on the ring road and in the city, regarding the construction of the Flyover new road (92.31%).

Sidewalks (92.37%): To limit their occupation by tables and motorcycles, take care of their paving, lighting, and access for people with disabilities (65.97%), and care to be taken of the tree lines.

Open spaces (91.27%): The majority want more green spaces with sitting areas and playgrounds that are regularly cared for.

Cleanliness (94.31%): More frequent cleaning of streets, sidewalks, and open spaces, care and cleaning of drainage wells so that roads do not flood, and more waste bins and recycling bins, with frequent collection, are requested.

Crumbling/Preserved buildings (59.38%): For the listed buildings scattered in the city, their maintenance is requested, or if necessary, the demolition of those deemed dangerous for collapse.

Streams (58.46%): It has been reported that many streams in the wider area need cleaning to avoid flooding.

Social care (50.18%): Residents are calling for more crèches, social welfare and care for the elderly, especially those living alone, and for housing and care for the homeless people sleeping on the sidewalks (51.39%). Stray animals should also be taken care of (43.21%).

Safety: The need to prevent illegal acts is highlighted with the desire for security cameras and increased police patrols (84.52%), and night street lighting (83.41%).

2. CONCLUSIONS

Both the tourist guides of the city and the leaflets that can be bought or are offered for free, as well as the Greek National Tourism Organization and the local Municipalities, mention lists of monuments and places to visit. But what this survey highlighted is which places/locations the residents themselves consider as important, and they have assessed their importance.

Moreover, the residents have mentioned what they consider to be the main problems in the city of Thessaloniki, and have assessed the necessity of solving them.

Consequently, we believe that the social research can help to achieve a convergence of views, but also another focus of view for any planned interventions in the city, and we hope that the local and regional authorities can exploit its results.

Regarding the traffic issue, more bus routes are requested, the need for more car parking spaces and municipal parking places (the availability of parking spaces is the reason why shopping centers on the perimeter of the city have become the preference of residents), and definitely to have a clear and safe separation of lanes and areas for bicycles and skates, so that there is no risk of accidents and the road surface (potholes) is taken care of. There should also be free access to essential vehicles). Of course, it is also hoped that the Metro will relieve traffic. And, of course, there are strong concerns about the disruption that the Flyover new road construction causes.

As far as sidewalks are concerned, it is requested to limit their occupation by tables and motorcycles, to take care of their paving, lighting, and access for disabled people, and to take care of tree lines.

When it comes to open spaces, the majority want more green spaces with sitting areas and playgrounds that are regularly looked after.

Regarding cleanliness, more frequent cleaning of streets, sidewalks, and open spaces is requested, care and cleaning of drainage wells so that roads do not flood, flammable objects and pruning products are removed to avoid fires, and more waste bins and recycling bins, with frequent collection. In terms of social care, residents are calling for more crèches, social welfare and care for the elderly, especially those living alone, and for housing and care for homeless people sleeping on the sidewalks. Also take care of stray animals.

Regarding the listed buildings scattered throughout the city, their maintenance is requested, or if necessary, the demolition of those deemed dangerous for collapse.

It is reported that many streams in the wider area need cleaning to avoid flooding.

A large percentage want more public and municipal libraries and cultural centers, while they say they do not need more nightclubs, "eateries" and cafes.

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There are requests for two-way communication (smart city) with Municipalities, so that citizens might inform about possible problems (garbage, lighting, traffic lights, potholes, etc.) and that themselves are immediately be informed about possible problems (floods, earthquakes, fires, etc.).

The need to prevent illegal acts is highlighted with the desire for security cameras, night lighting and increased police patrols.

In conclusion, we notice that even without the residents having studied UN Goal 11, the residents themselves wish and hope for the realization of a Sustainable and Resilient City for the Thessaloniki of Tomorrow!

3. ACKNOWLEDGEMENTS

The processing and analysis of the results was done by the members of k-ecoprojects, and I am thankful. Most of all I am thankful to the residents of Thessaloniki who participated in the survey by completing the questionnaire.

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Rediscovering Sustainable Urban River Flood Culture in the Era of Modern Climate Risks

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Abstract

Urban river floods pose significant challenges to modern societies, impacting health, property, infrastructure, cultural heritage, and the environment. Over centuries, the perception of flood risk has evolved from an external threat to a societally constructed risk, influenced by vulnerability and exposure. Geographic Information Systems (GIS) have emerged as an effective, interdisciplinary tool for flood risk assessment, integrating natural and socio-economic data to create comprehensive flood risk maps. This paper reviews 60 academic studies to identify the strengths and limitations of GIS in flood risk mapping and underscores the importance of incorporating social dimensions and vulnerability indices. The inclusion of local community participation and social dynamics is crucial for developing effective, context-specific flood risk management strategies.

Keywords: urban river floods, social evolution, flood, risk management, river culture, GIS

« Αρχή πάντων ὕδωρ », Θαλής / “Water is the beginning of all things”, Thales

River Floods: A Continuous Threat to Urban Societies

Urban environments are complex yet fragile ecosystems that are exposed to climate risks and their consequences for societies. Natural hazards, such as floods, pose a continuous threat to the development and sustainability of contemporary societies, as they can cause significant damage to health, property, infrastructure, cultural heritage and environment.

According to the Directive 2007/60/EC of the European Parliament and the Council, a flood is defined as “the temporary covering by water of a land not normally covered by water”. Last decades have been characterized by a significant increase in the frequency of floods, leading to substantial socioeconomic and environmental consequences. Between 2000 and 2021, floods represented 40% of all natural disasters and affected, directly or indirectly, more than 140 million people per year worldwide. [1], [2] Arrighi’s analysis in 2021 revealed, that more than one thousand cultural heritage sites all over the world, that underlined that 35% of natural and 21% of cultural and mixed UNESCO national world heritage sites, are currently in risk because of river floods, in terms of hazard and exposure.[3]

The inundation risk posed by urban rivers is influenced by several determinants, such as the natural characteristics of the river itself, including its morphology, dimensions, vegetation, water depth, and downstream hydrological conditions. Simultaneously, contemporary factors underscore the amplification of flood occurrences, due to rapid urbanization, demographic expansion, artificialization of natural areas upon riparian ecosystems, and the climatic alterations due to global warming. [4], [5]

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Historical Floods: Myths and Early Risk Management

Throughout history, urban rivers have played a pivotal role in shaping human settlements, offering plenty of advantages. They have served as a natural defence system for ancient cities, navigation routes for commerce and trade, and harnessed hydraulic potential for diverse industrial purposes, including tanning, milling, and more recently, electricity generation.

First communities were trying to explain the mysteries of natural disasters, by giving these phenomena a spiritual character, with mythological and folklore stories all over the world highlighting how the rivers were inspiring respect, awe and fear in human societies.

These narratives, from Scandinavian mythology, when Odin and his brothers killed the giant Ymir, whose blood inundated the earth, to the Biblical tale of the Great Flood in Genesis, when Noah's ark served as the vessel of salvation, illustrate how ancient civilizations searched ways to interpret and contextualize devastating inundations.[6], [7]

According to ancient Greek mythology, rivers were "born" by the Titans Oceanus and Tethys and considered to be gods. Kifissos River (Athens and Boeotia), Ilissos (Athens), Maiandros (Asia Minor), Alfeios and its tributary Kladeos (Peloponnese, Olympia), are some of these Greek mythological river Gods. People were praying to the water element for protection, blessing and assistance, while they would offer prayers and sacrifices to them, seeking protection on their journeys over their waters, blessing for good flow and behavior of the rivers, and other favorable actions. [8]

From Allies to Obstacles: Rivers in the Age of Industrialization

As societies were evolving, industrialization and rapid growth of the population, alongside with the technological evolution changed radically the behavior of the societies against the rivers. That resulted in extensive land consumption and artificialization, affecting riverbanks, floodways, and water basins. The previous respect for the water element, was switched, when the now called "modern city" started perceiving rivers as obstacle rather than asset. Measures such as canalization, dam construction, and the implementation of artificial barriers, or even entirely covering of them, have been taken in previous decades to address climate hazards like floods or droughts, or in order to prevent water pollution in the cities. [9]

The process of artificialization has been identified as a significant disruptor of the natural hydrological cycle. This disruption leads in decreased vegetal interception, evapotranspiration, and infiltration, coupled with an increase in both the volume and velocity of surface runoff. These changes are primarily attributed to vegetation removal, soil imperviousness, modifications to natural drainage patterns, and the implementation of artificial drainage systems. [1]

An illustrative example of the consequences artificialization can be observed in Trikala (Thessaly, northern Greece) where Letheus river had been artificialized multiple times including the covering of sections of the river and the construction of dams. These interventions, despite several warnings issued in the late 19th century, led to the largest and most destructive flood of the Letheus River. This flood event occurred in June 1907, resulting in numerous fatalities and extensive property damage. Diakakis (2012), in his comparative evaluation of 545 flood events in Greece of the period 1880–2010, identified the Trikala flood as the most destructive in terms of human casualties, that caused at least 300 fatalities. [10], [11]

Another severe event was that of November 2017 in Mandra, (Attica, central Greece) owed to the covered torrents of St. Catherine and Soures. It was the result of a 150–160 mm rainfall event of 7 h duration that provoked a flash flood, with a death toll of 23 people and 6000 people being affected. Crucial was the role of the settlement's location, on the two streams, with no planning standards. [11], [12], [13] These types of events underscored that the urban integration of the river primarily requires the removal of potential obstacles to smooth flow and the urgent construction of necessary flood control infrastructures.

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More recent example is that of Dubai flood on April 2024, were a huge and non-expected rainfall caused a great socio-economic-infrastructure impact on the city. The cruelty of the event itself, probably related to the climate changing conditions, alongside with the urban planning of the city that didn't take into consideration flood risk, led to a great catastrophe for the area. [14]

Modern Perspectives: Social Dimensions of Flood Risk

After the 1980s the perception of floods as an external risk for the society has been reconsidered. [15] Decision makers agreed on the fact that natural disasters, such as floods, are mostly socially constructed events related -as an internal risk- to the vulnerability of a system, and its characteristics. Anderson underlines since 1995 that “*Whereas previous assessments focussed on the "acts of nature" that come from outside human agency, later assessments have acknowledged that it is largely human actions, decisions and choices that result in people's vulnerability to natural events.*” [16]

Natural disasters are not necessarily 'disastrous' as they are inherently occurring phenomena on the planet. The actual risk arises from the adverse impacts of these phenomena on human-made environments. [17] Weichselgartner underlines that “*a natural disaster, in a pure sense does not exist; rather there is the interaction of changes in physical systems with existent social conditions. The disaster itself occurs within society and not within nature.*” [18]

Social vulnerability is a term that explain this susceptibility of a population or a social system towards these climate extremes, because in a theoretical non vulnerable system, there is no need of adaptation to natural risks. ¹ [19], [20] Various researchers and sociologists have pointed out that disasters have more to do with the social, political, and economic aspects of a group, since they reveal most of the times inequalities, injustices and weaknesses they affect mostly the socially vulnerable population.[21], [22], [23], [24] Poor population can be more vulnerable, since they can present a lack of access to coping resources and represent weak links in mitigation capacities. Elder people, women, people with disabilities or immigrants can be more vulnerable in a crisis situation, because of unequal access to information and education, physical and societal difficulties or due to communicational barriers.

Resilience describes the capacity of a system facing a risk to organize, predict, prepare, respond, resist disturbances, absorb impacts, recover, and reorganize, in order to maintain the same function and structure and continue to fulfill its purpose [28], [29], [30] Godschalk provides a well-framed definition of resilient cities, stating that resilience entails a city's capacity to recover from severe events without experiencing immediate chaos or lasting harm. He underscores the value of networked social communities and robust lifeline systems in building stronger cities through learning from past events. A resilient city, according to him, is a city that equally takes into consideration the natural systems (topography, soil, waterways...) and anthropogenic parameters (buildings, roads, energy facilities...) [24]

In order to deal with the floods, the European Commission enacted a Directive (ED) 2007/60/EC for the assessment and management of flood risks, requiring from each member the production of Flood Hazard (FHM) and Flood Risk Maps (FRM). These maps should focus on prevention, protection, and preparedness. In order to give rivers more space, these plans should, where possible, consider the conservation and/or restoration of floodplains, as well as measures to prevent and reduce damage caused by floods to human health and life, the environment, cultural heritage, economic activity, and

¹ *Although, history has witnessed as well and pure natural disasters and other events that occurred on the planet on a scale much larger than what the scale that humanity could affect (e.g., planetary temperature changes such as those that occurred towards the end of the 'Precambrian' geological era, which saw the coldest period in the planet's history leading to the extinction of many animal organisms, prolonged periods of drought, volcanic eruptions, etc.), which are beyond the scope of the present research.*

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infrastructure. [31] In order to achieve this goal from this ED, and plan sufficient FHM/FRM, an urgent need for a comprehensive and sustainable approach has been revealed, involving the participation of all stakeholders. Contemporary urbanization strategies have started to reconsider their perception towards urban floods and adaptation strategies, aiming to define new solutions that embrace resilient and flexible projects that are promoting the idea of socially coexisting with urban fluvial floods rather than combating them. [9], [32], [33]

Mileti, in his book “Disasters by Design: A Reassessment of Natural Hazards in the United States”, emphasized as early as 1975, the importance of adopting an interdisciplinary approach against natural disasters with a long-term perspective that includes engagement with local communities. According to him, “*Local resiliency with regard to disasters means that a locale is able to withstand an extreme natural event without suffering devastating losses, damage, diminished productivity, or quality of life and without a large amount of assistance from outside the community*” [34]

The main challenge towards this reconsideration of the urban approaches though, lies in the difficulty of collecting, assessing and evaluating technical and social data from diverse perspectives and fields, and effectively communicate them to local authorities and stakeholders in a way that is easily understandable and coherent.

In this regard this paper proposes the use of Geographic Information System (GIS) software as an interesting tool that could serve as a connecting element for this reconsideration process towards an effective flood risk management culture for the contemporary societies.

GIS as an efficient Tool for Flood Risk Assessment

Geographic Information Systems (GIS) is a computer system designed to create digital representations of the Earth's surface by visualizing specific characteristics. Since its inception 60 years ago, GIS has rapidly evolved to a vital tool in various fields of application, research, and global business. Initially developed in Canada in 1963 by Roger Tomlinson for national land-use management, GIS has since grown into an integrated computer system for data visualization, storage, and manipulation. [5], [35], [36] ESRI's ArcGIS, the commercial form of the program was initially launched in 1981, while Quantum GIS (QGIS), founded in 2002 as a free and open-source alternative. [37], [38] Today, GIS serves as an essential information database, analytical tool, and decision support system, facilitating complex spatial analysis and visualization.

Urban river floods are multi-dimensional events that combine both spatial and non-spatial data. [5], [39] Identifying risk zones within cities and understanding their interactions with the urban fabric are crucial steps in developing effective urban flood management plans. GIS can perform hydrologic and social analyses and thus it has been a valuable resource for researchers, urbanists and public authorities all over the world in order to produce natural risk maps for the cities. [2], [40], [41]

GIS is commonly used alone or alongside with other systems and programs. For example, RS or Remote Sensing, is a well knowing technique using satellite or aerial imagery to gather data about land cover, topography, and other relevant factors. Hydrological Modelling (such as HEC-RAS, wetspa, hydrotel, swat or ArcHydro - an extension of ArcGIS) involves using computational models to simulate the flow of water during flood events, using as data terrain, land use, soil type, precipitation, and drainage networks to predict flood extents and depths. MCDM, or Multi-Criteria Descision-Making techniques (AHP, FUZZY AHP, ANP, DEMATEL, PROMETHEE, WLC, MAUT, TOPSIS, VIKOR, ELECTRE etc) are used to evaluate and prioritize multiple criteria or objectives. Last years, Machine Learning, or ML, algorithms (DT, RF, SVM, ANN, LR) have been used in order to analyse large datasets to identify complex patterns and relationships between various factors and flood risk. The use of these methods separately or the collaboration is standing as an efficient way of data analysis Flood maps production.

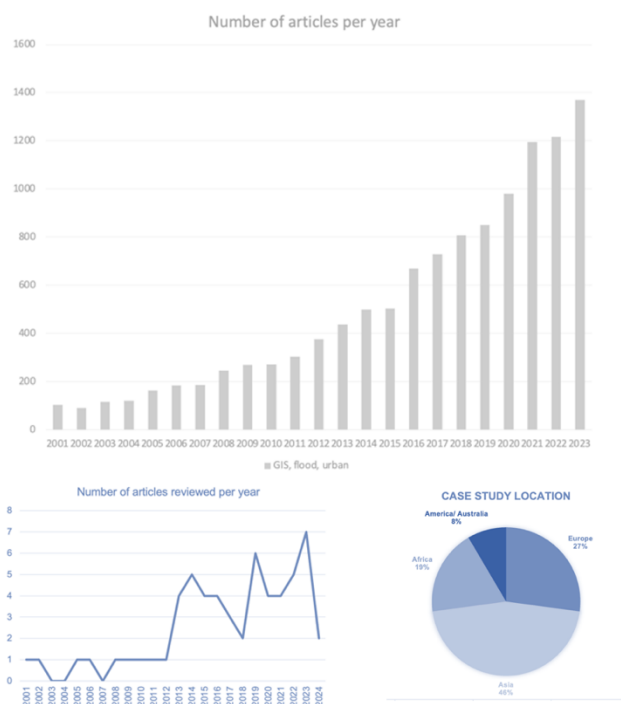
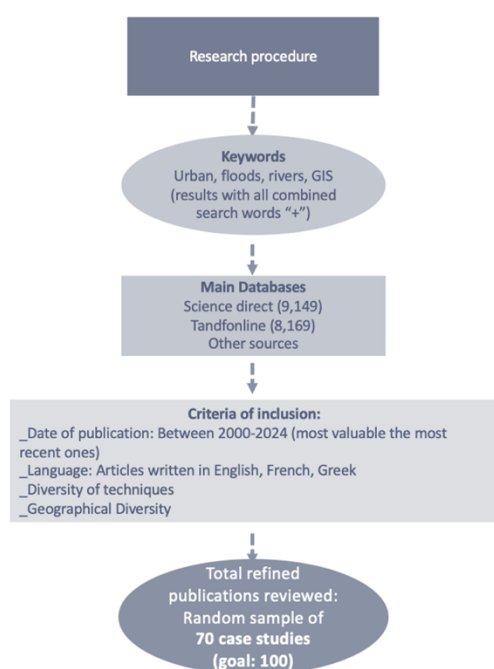
Criteria of evaluation

Throughout academic literature, there is a continuously increasing number of applications of GIS technology as a methodological tool in order to examine flood hazard and risk in different case studies, evolving alongside with the technological development and our knowledge on the matter.

This paper is effecting a state of the art in an amount of 60 papers, using a mixture of different criteria of evaluation in order to study and analyse the benefits and limitations of this tool in the FRM production.

The methodology for search, inclusion, and evaluation adheres to the parameters outlined in Table 1. Specifically, the chosen papers center on the examination of riverine or urban flash floods with the aim of producing flood analysis or flood risk maps. Selection criteria prioritize relevance to the research topic, publication year to trace methodological evolution, and geographic diversity of case studies to encompass varied socio-economic and geographical contexts across continents and countries.

Table 4 Statistical data about the reviewed papers



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Table 5 Results from criteria and techniques used in the reviewed papers

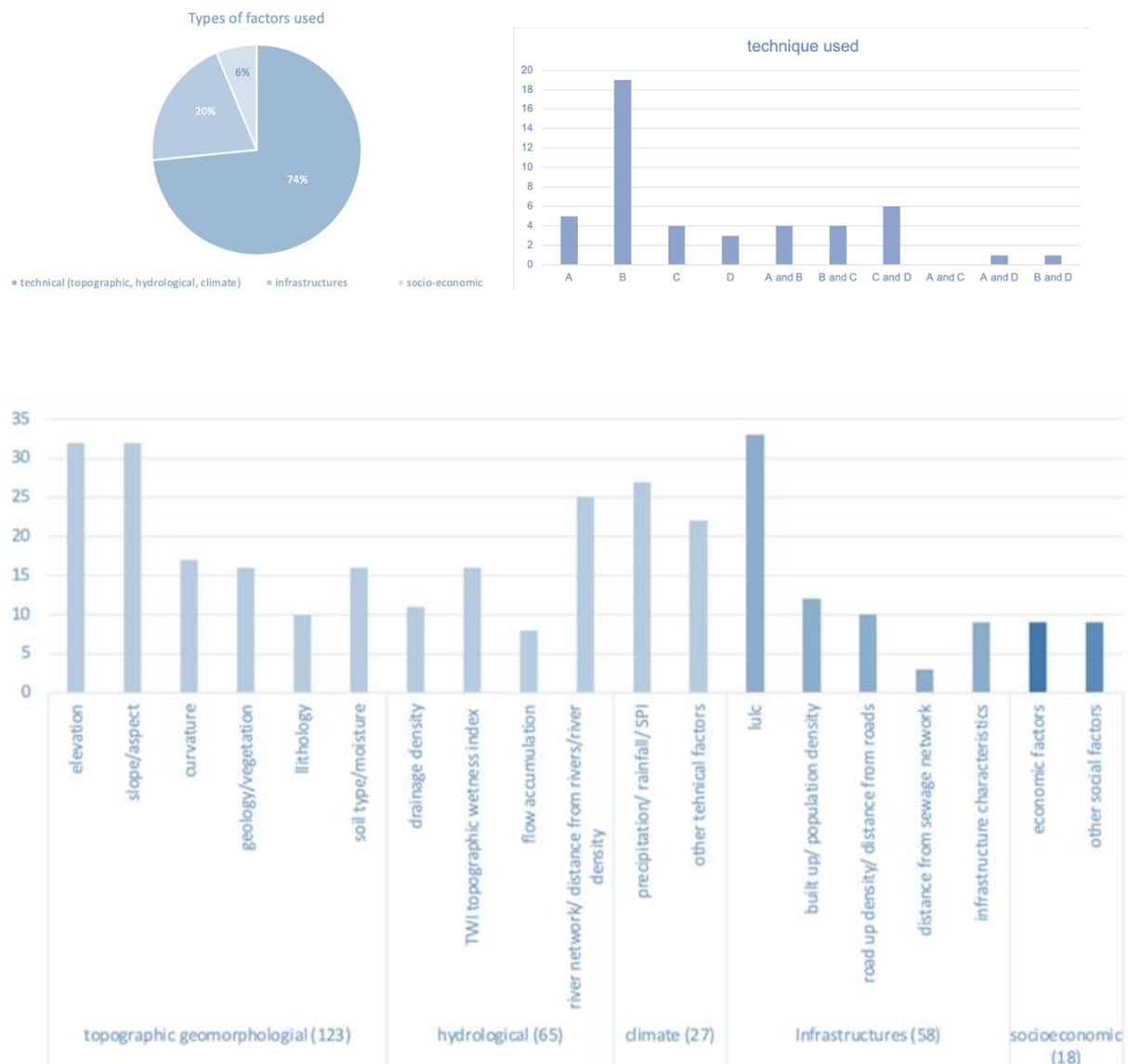


Table 6 Papers reviewed analysis

Title	Case study location	Continent	Year of publication	Application area	Technique	Hydrological network, wetland, wetland, HEC-RAS	S. MCA, AHP, ANP	C. / A. / ML, DT, RF, SVM, ANN	D. Statistical Analysis, Cr. Ent, FR, LR, SL, WOE, WI	Verification	Historical data or other verification	Factors used	Authors	Source
Urban flood risk mapping using the GARP and QUEST models: A comparative study of machine learning techniques	Iran	Asia	2019	FRM	B and C		x	x		x		rainfall, land use/land cover (LULC), elevation, slope percent, curve number (CN), distance to river, distance to channel, and depth to groundwater; urban density, quality and age of buildings, socioeconomic conditions, population density	ScienceDirect	
Evaluating urban flood risk using hybrid method of TOPSIS and machine learning	Iran	Asia	2021	FRM	B and C		x	x		x		HAZARD: slope aspect, elevation, slope angle, rainfall, distance to streets, distance to rivers, land use/land cover, distance to urban drainages, urban drainage density, and curve number. RISK: building density, population density, building history, and socio-economic condition	Bafiqi, Sabokbari, et al.	
Urban Flood Vulnerability and Risk Mapping Using Integrated Multi-Parametric, AHP and GIS: Methodological Overview and Case Study Assessment	Kenya	Africa	2014	FRM	A and B	X	x					elevation, slope, s-soli, rainfall, drainage network, LULC	MDPI	
Integrated machine learning methods with resampling algorithms for flood susceptibility prediction	Caspian sea	Asia	2020	FSM	C			x		x		Elevation, slope, aspect, curvature, distance to stream, rainfall, NDVI (vegetation), LULC, lithology	ScienceDirect	
Hybrid artificial intelligence approach based on neural fuzzy inference model and metaheuristic optimization for flood susceptibility modeling in a high-frequency inundation prone area using GIS	Vietnam	Asia	2016	FSM	C and D			x		x		Slope, elevation, curvature, topographic wetness index (TWI), stream power index (SPI), distance to river, stream density, Normalized Difference Vegetation Index (NDVI), lithology, rainfall	ScienceDirect	
Exploiting local performance on flood risk: A participatory GIS approach for bridging the gap between modeled and perceived flood risk	UK	Europe	2024	FRM	B					x		2D scaled participatory mapping of flood risk and questionnaire surveys: contrast of qualitative and quantitative responses	ScienceDirect	
Flood hazard zonation using GIS-based multi-parametric Analytical Hierarchy Process	Dhaka river	Asia	2024	FHM	B		x			x		Flow accumulation (F), Soil (S), Rainfall (R), Elevation (E), Distance from the river (D), Slope (Sl), Land use (L), Topographic wetness index (T) and Profile curvature (P)	ScienceDirect	
Identifying flood vulnerable and risk areas using the integration of analytical hierarchy process (AHP), GIS, and remote sensing: A case study of southern Orissa region	Ethiopia	Africa	2023	FHM	B		x					slope, drainage density, rainfall, elevation, TWI, soil, river distance, and LULC	ScienceDirect	
GIS-based machine learning algorithm for flood susceptibility analysis in the Pagla river basin, Eastern India	India	Asia	2023	FSM	C and D			x	x	x		Elevation, Slope, Plan Curvature, Flow Accumulation, Length of Slope (L.S), Topographic Wetness Index (TWI), Rainfall, Geomorphology, Topographic Roughness Index (TRI), Topographic Position Index (TPI), Stream Power Index (SPI), Drainage Density (DD), Distance from Road, Distance from River, Normalized Difference Vegetation Index (NDVI) and Land Use and Land Cover (LULC)	ScienceDirect	
Flood hazard zone mapping incorporating geographic information system (GIS) and multi-criteria analysis (MCA) techniques	China	Asia	2022	FHM	B				x	x		Rainfall, intensity, Elevation, Slope, aspect, Curvature, Topographic wetness index (TWI), Stream power index (SPI), Land use land cover (LULC), Distance to the river (DTR), Soil texture (ST)	ScienceDirect	
Urban flood susceptibility modelling using AHP and GIS approach: case of the Mfoundi watershed at Yaounde in the South-Cameroon plateau	Cameroon	Africa	2022	FSM	B	X	x			x		Natural elevation, drainage density, rainfall, slope, distance from the river, topographical humidity, hydraulic conductivity (soil permeability), groundwater level, the presence of swampy areas and geology, anthropogenic: Land Cover (LC) controlled by galloping population growth and the failure of sanitation system	ScienceDirect	
Planning green infrastructure to mitigate urban surface water flooding risk - A methodology to identify priority areas applied in the city of Ghent	Belgium	Europe	2020	FRM	B							Storm-water runoff mitigation, social flood vulnerable group protection, flood sensitive area road infrastructures protection, flood sensitive area buildings protection, environmental justice	ScienceDirect	
Flood hazard and flood risk assessment at the local spatial scale: a case study	Slovakia	Europe	2015	FRM	X				x			Water Depth, flow Velocity, Functional Land Use, vulnerability Assessment, regional Flood Discharge Formulae, hydraulic Modeling, vulnerability acceptable risk count by cadastral maps, orthophotos from the year 2011, and field research	Tandfonline	
Flood Susceptibility Mapping through the GIS-AHP Technique Using the Cloud	India	Asia	2020	FSM	B		x			x		Precipitation, river network density, and SPI, elevation, slope, profile curvature, landforms, ruggedness index, distance from rivers, soil type, soil moisture, TWI, soil erodibility factor (K), rainfall erosivity, LULC, soil-adjusted vegetation index (SAVI), and NDVI, population density, global man-made impervious surface (GIMS), global human built-up and settlement extent (HBASE), and distance from roads	MDPI	
Integration of remote sensing data and GIS for accurate mapping of flood-prone areas	Italy	Europe	2011	FSM								SAR image	Tandfonline	
Application of the GIS based multi-criteria decision analysis and analytical hierarchy process (AHP) in the flood susceptibility mapping of urban areas	Tunisia	Africa	2019	FSM	B		x					River network, Watershed limit, Elevation, Slope, Soil, Drainage density, Rainfall, Groundwater level, LULC and Lithology	ResearchGate	
Application of GIS-Interval Rough AHP Methodology for Flood Hazard Mapping in Urban Areas	Serbia	Europe	2017	FHM	B		x					Height, slope, distance to the sewage network, the distance from the water surface, the water table and land use	MDPI	
Flood risk assessment using hybrid artificial intelligence models integrated with multi-criteria decision analysis in Quang Nam Province, A GIS-Cellular Automata-Based Model for Coupling Urban Sprawl and Flood Susceptibility Assessment	Vietnam	Africa	2021	FRM	B and C		x	x		x		Elevation, rainfall, flow accumulation, SPI, STI, TWI, slope, river density, distance from rivers, plan curvature, profile curvature, curvature, land cover, and lithology	ScienceDirect	
A GIS-supported fuzzy-set approach for flood risk assessment	Canada	American/Australia	2014	FRM	A and D	X			x			Flow accumulation, altitude, precipitation, LULC, distance from hydraulic network, slope, hydrotopology	MDPI	
Flood Early Warning with Integration of Hydrologic and Hydraulic Models, RS and GIS	Iran	Asia	2009	FHM	A	X						Antecedent Precipitation Index (API), melt Index (MI), total Winter Precipitation (P), timing Factor (T)	Tandfonline	
Flood Hazard and Flood Risk Vulnerability Mapping Using Geo-Spatial and MCA around Adigrat, Tigray Region, Northern Ethiopia	Ethiopia	Africa	2019	FRM	A and B	X	x			x		Slope, elevation, LULC, river characteristics, infiltration of soil, Rainfall	ResearchGate	
Development of a new integrated flood resilience model using machine learning with GIS-based multi-criteria decision analysis	Pakistan	Asia	2023	FRM	B and C		x	x		x		HAZARD: slope, elevation, flow accumulation, LULC, flow direction, annual precipitation, water table/ RISK: population density, LULC, built-up density, road to density, flood hazard map	ScienceDirect	
Spatial prediction of flood susceptible areas using rule based decision tree (DT) and a novel ensemble bivariate and multivariate statistical models in GIS	Malaysia	Asia	2013	FSM	C and D			x	x	x		Elevation, slope, aspect, plan curvature, Rainfall, topographic wetness index (TWI), sediment power index (SPI), sediment transport index (STI), distance to the stream, Land use and cover (LULC), distance to the roads, Literacy ratio, dependency ratio, population density, household head education, Source of income, number of income sources, income level, housing density, Dwelling types, no. of health and education facilities, working-age group, equity, and inclusion, flood shelter, trained personnel, Emergency response services, disaster risk reduction, social networks, training/drifts, community preparedness plan, early warning system, Past experience, determination to change, understanding of risk/hazard	ScienceDirect	
A GIS-Based Index of Physical Susceptibility to Flooding as a Tool for Flood Risk Management	Brazil	American/Australia	2023	FSM	B		x					Digital elevation model (DEM), curvature, geology, river, stream power index (SPI), rainfall, land use/cover (LULC), soil type, topographic wetness index (TWI) and slope	ScienceDirect	
Flood Risk Index as an Urban Management Tool	Brazil	American/Australia	2008	FRM								Elevation, slope, distance from the major drainage network and land use	MDPI	
Assessment of flood hazard areas at a regional scale using an index-based approach and Analytical Hierarchy Process	Greece	Europe	2015	FHM	B		x					Depth, duration, velocity, dwellings density, income per capita, traffic	ResearchGate	
Artificial neural network for flood susceptibility mapping	Bangladesh	Asia	2023	FSM	C			x				Flow accumulation, distance from the drainage network, elevation, land use, rainfall intensity and geology	ScienceDirect	
Assessment of flood hazard based on naturalized anthropogenic factors using analytic hierarchy process (AHP)	Greece	Europe	2013	FHM	B		x					Elevation, slope, aspect, curvature, TWI, SPI, roughness, and LULC	ScienceDirect	
GIS-based spatial prediction of flood prone areas using stand-alone frequency ratio, logistic regression, weight of evidence and their ensemble techniques	China	Asia	2013	FSM	D			x	x			Natural land uses, geological substrate, slope, shape of the watersheds, density of hydrographic network + sub-factors / anthropogenic: encroachments, inadequate technical works, spaced cross-section at the plain area of the stream	Scip	
Flood hazard assessment in a mountainous river basin in Thessaly, Greece, based on 1D/2D numerical simulation	Greece	Europe	2022	FHM	A	X				x		Altitude, slope, aspect, geology, distance from river, distance from road, fault, soil type, land use/cover, rainfall, Normalized Difference Vegetation Index, Stream Power Index, Topographic Wetness Index, Sediment Transport Index and curvature	MDPI	
Evaluating the application of the statistical index method in flood susceptibility mapping and its comparison with frequency ratio and logistic regression methods	Brisbane	American/Australia	2018	FSM	D			x	x			Altitude, slope, aspect, curvature, geology, soil LULC, TWI, SPI, TRI, STI, distance from rivers, distance from roads	MDPI	
Flood susceptibility mapping using frequency ratio and weights-of-evidence models in the Golanstan Province, Iran	Iran	Asia	2014	FSM	D			x	x			Lithology, land-use, distance from river, soil texture, slope angle (in degree), slope aspect, plan curvature, topographic wetness index (TWI), drainage density, altitude	Tandfonline	
Flood susceptibility assessment using GIS-based support vector machine model with different kernel types	Malaysia	Asia	2015	FSM	C and D		x	x	x	x		Altitude, slope, curvature, stream power index (SPI), topographic wetness index (TWI), distance from the river, geology, rainfall, land use/cover (LULC), soil, surface rainfall	ScienceDirect	
Flood susceptibility mapping using a novel ensemble weights-of-evidence and support vector machine models in GIS	Malaysia	Asia	2014	FSM	C and D			x	x			Flood inventory, slope, stream power index (SPI), topographic wetness index (TWI), altitude, curvature, distance from the river, geology, rainfall, land use/cover (LULC), soil type	ScienceDirect	
Artificial neural network approach to flood forecasting in the River Arno	Italy	Europe	2002	FHM	C			x				Rainfall data, waterlevel data, distance of rain gauges, power production sites	Tandfonline	
Spatial prediction of flood susceptible areas using rule based decision tree (DT) and a novel ensemble bivariate and multivariate statistical models in GIS	Malaysia	Asia	2013	FSM	C and D			x	x	x		Digital elevation model (DEM), curvature, geology, river, stream power index (SPI), rainfall, land use/cover (LULC), soil type, topographic wetness index (TWI) and slope	ScienceDirect	
Detection of Flood Hazard in Urban Areas Using GIS: Izmir Case	Turkey	Asia	2016	FHM	B							Elevation, rainfall intensity, flow accumulation, slope, land use	ScienceDirect	
Flood risk mapping and urban infrastructural susceptibility assessment using a GIS and analytic hierarchical raster fusion approach in the Ona River Basin, Nigeria	Nigeria	Africa	2022	FRM	A and B	X	x			x		Elevation, drainage density, and slope indicators, land use, soil, and geologic structure, lithological structure, inundation, and runoff indexes, transport infrastructures, building footprint	ScienceDirect	
Mapping social vulnerability to floods: A comprehensive framework using a vulnerability index approach and PCA analysis	Romania	Europe	2023	FRM	B		x					Population density, Population growing rate, Share of the population under 5 years old, Share of population over 65 years old, Share of women, Share of employed population, Share of unemployed population, Percent of built-up areas, Built-up area growing rate, access to drinking water, Drinking water network, Flooded area extent, Flooded areas under 0.5m, Flooded area between 0.5 and 2	ScienceDirect	
Flood risk assessment based on hydrodynamic model and fuzzy comprehensive evaluation with GIS technique	China	Asia	2019	FRM	B					x		Inundation depth(m), Inundation duration(h), Inundation area(ha), Ground elevation(m), Ground slope(%), Imperviousness(%), Building density(%), FCI density(ha)	ScienceDirect	
Flood disaster risk mapping in the Lower Mono River Basin in Togo, West Africa	Togo	Africa	2017	FRM	X		x					Natural : River Flow, Elevation, Slope, Soil, Land use, Cover, Flow Accumulation / Social: family sizes, level of income, adult literacy, past experience of flooding, level of capacity measures, early warning systems etc	ScienceDirect	
Analysis, prioritization and strategic planning of flood mitigation projects based on sustainability dimensions and a spatial-value AHP-Geo	Greece	Europe	2023	FSM	B							Environmental, social and economic data	ScienceDirect	
Application of satellite image processing and GIS-Spatial modeling for mapping urban areas prone to flash floods in Gena governorate, Egypt	Egypt	2019	FRM	B			x					Soil, geology, rainfall, elevation, slope, flow direction, stream order, land cover, total population, and population density	ScienceDirect	
Flash Flood Hazard Mapping Using Satellite Images and GIS Tools: A case study of Najran City, Kingdom of Saudi Arabia (KSA)	Saudi Arabia	2015	FHM	B			x					Rainfall, soil type, surface slope, surface roughness, drainage density, distance to main channel and land use	ScienceDirect	
A flood risk decision making approach for Mediterranean tree crops using GIS, climate change effects and flood-tolerant species	Greece	Europe	2016	FRM	b					x		Flow accumulation (F), Rainfall intensity (R), Elevation (E), Geology (G), Land use (L), Slope (S)	ScienceDirect	
Assessing urban flood disaster risk using Bayesian network model and GIS applications	China	Asia	2019	FRM	C							Rainfall, river density, slope, proximity, elevation, impervious area, per unit energy consumed, population density, road density	Tandfonline	
Urban flooding risk assessment based on GIS- game theory combination weight: A case study of Zhengzhou City	China	Asia	2022	FRM	B		x		x			Hazard: flood depth, vulnerability: population density, ltc, road network density, night time light brightness, medical rescue points	ScienceDirect	
Inundation extent as a key parameter for assessing the magnitude and return period of flooding events in southern Iceland	Iceland	Europe	2010	FDM									Tandfonline	
Flood management and a GIS modeling method to assess flood-hazard areas—a case study	Greece	Europe	2011	FHM	B		x					Flow accumulation, slope, land use, rainfall intensity, geology and elevation	Tandfonline	
Flood risk assessment and mapping in peri-urban Mediterranean environments using hydrogeomorphology. Application to ephemeral streams in the Valencia region (eastern Spain)	Spain	Europe	2012	FRM	A	X						Hydrogeomorphological factors (topographic features, paleochannels and alluvial fans), and streambed characteristics) human exposure factors (LULC), economic value of properties, population density, critical infrastructures	ScienceDirect	
Regional scale flood modeling using NEXRAD rainfall, GIS, and HEC-HMS/RAS: a case study for the San Antonio River Basin Summer 2002 storm event	USA	American/Australia	2005	FHM	A	X						Elevation, soil, LULC, streamflow, rainfall-precipitation, river geometry	ScienceDirect	
Modeling of the flooding in the Okavango Delta, Botswana, using a hybrid reservoir-GIS model	Botswana	Africa	2006	FHM	A							Hydrological data	ScienceDirect	
GIS-based multi-criteria analysis for flood prone areas mapping in the trans-boundary Shatt Al-Arab basin, Iraq-Iran	Iran	Asia	2021	FRM or FSM	B and D					x		Rainfall data, elevation slope, soiltype, rockformations, soiltype, LULC	Tandfonline	
Flood susceptibility mapping using an improved analytic network process with statistical models	Iran	Asia	2020	FRM or FSM	B and D							Slope, Altitude, Aspect, Distance from River, Rainfall, Topographic Wetness Index (TWI), Slope Length (LS), Plan Curvature, Land Use/Land Cover (LULC), Geology/Lithology	Tandfonline	
GIS-based MCDM - AHP modeling for flood susceptibility mapping of alluvial areas, southeastern Tunisia	Tunisia	Africa	2016	FSM	B		x			x		Elevation, land use/land cover, lithology, rainfall intensity, drainage density, distance from the drainage network, slope, and groundwater depth	Tandfonline	

Findings: Bridging Technical and Social Aspects in Flood Risk Mapping

By examining Table 3, it is evident that the largest percentage, 32%, of the papers used qualitative-based empirical modeling techniques (such as MCDM/AHP) to produce Flood Hazard Mapping (FHM) and Flood Risk Mapping (FRM). Smaller percentages of papers used GIS in collaboration with statistical methods, hydraulic models, machine learning techniques, or a mix of techniques to achieve even more accurate results. Out of the 60 papers reviewed, 36 papers, have verified the results of their maps either using technical programs like ROC (Receiver Operating Characteristic) or by utilizing historical data from previous floods.

Almost 30% of the papers focus on FHM production, while the rest are focused on flood susceptibility and flood risk mapping. By examining the input criteria for the FSM/FRM production is interesting to notice that elements such as elevation, slope and river network are consistently examined across these studies, while variables like curvature and lithology are addressed in only a subset of them. (Table 2)

However, in terms of urban and social criteria, while land use and land cover (LULC) emerge as the predominant factor observed in the majority of papers, it can provide only a preliminary understanding of social parameters. While technical criteria represented the 74% of used factors in the totality of the papers, only 20% of factors are related with human infrastructures and, even less, 6% of factors have socio-economic character.

It's interesting to mention that analyses that include socio-economic criteria are found in high majority in articles of the last five years (only 3 articles included these types of criteria before, on 2008, 2012 and 2017), proving this increasing reconsideration on the matter of including social parameters. Although, they were still representing a minority of the FSM / FRM (34% of the articles included these types of criteria from 2019 to 2024).

Even though the majority of articles was focused on mostly technical analysis to produce the flood risk maps, there are some articles that searched deeper the socio-economic side of the vulnerability. Ajtai et al. (2023) made a social vulnerability analysis for their FRM, searching the index and the value of each social characteristic. They agreed that social vulnerability is influenced not only by the inherent characteristics of a certain community, but also by location, spatial distribution, hazard type, and hazard characteristics. The interaction between all these factors leads to complex relationships that must be considered and carefully analyzed. [42]

Bulen and Miles (2024) defended that Participatory GIS (PGIS) can help bridge the gap between modelled and perceived flood risk by involving the local community in research and questioning them on their past flood experiences. They conducted a survey in Reading, a large town in Central Southern England, incorporating local communities into the Flood Risk Management (FRM) production using PGIS. The study found a high level of agreement between participatory mapping and flood model outputs, demonstrating that local communities, with prior flood exposure or flood risk education, possess valuable knowledge that can inform effective flood risk strategies. [43]

Discussion/Conclusion

Urban river floods pose significant challenges to communities worldwide. The perception of flood risk has evolved from viewing natural disasters as external threats to recognizing them as internal societal risks requiring an efficient socio-technical interdisciplinary approach. Sustainable and resilient urban futures demand tools that facilitate research for urban designers, policymakers, and stakeholders. The contemporary cities need to think beyond the technical solutions to prevent catastrophic events, and to truly understand the social dynamics of each place and the way that society interacts in the case of crisis in order to propose urban and political solutions that reflect the special needs of each place.

Aknowledging the diverse social factors influencing vulnerability—such as population experience with disasters, socioeconomic inequalities, gender norms, and political-cultural contexts—enables

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better identification of critical zones for urban reconsideration and development of targeted urban strategies. The society stands in the core of an urban environment, that defines its dynamics and evolution so it is critical to be an essential factor to be taken into consideration into the risk management strategies. The participation of the population in the decision making and the understanding of the social dynamics of each place is crucial in order to propose sustainable solutions. Geographic Information System has emerged recent years as an important tool, offering powerful capabilities in data visualization, analysis, decision-making support and fast and comprehensible maps production. GIS is software that can easily import, analyze and visualize various data, assess flood hazards, understand spatial dynamics, and communicate simply the results in a form of understandable basic maps. Stakeholders, such as urban designers and policymakers can exploit the multilayered nature of GIS technology in order to identify the urban priority areas for flood management strategies according to the socioeconomic priorities of the places.

The results of this literature review underline that despite the fact that the contribution of socio-economic factors in flood risk analysis can result in more precise flood maps, technical criteria remain predominant in flood risk assessments using GIS technology. Recent years indicate a progressive increase towards the integration of socio-economic data, proving an evolving recognition of the importance of social dimensions in flood risk management. However, this integration is still in its preliminary stages and requires further research.

The pursuit of urban resilience vis-à-vis climate hazards necessitates a comprehensive framework that combines natural and social dimensions. The incorporation of socio-economic data in map production is crucial for identifying vulnerable populations and urban areas, reassuring that flood risk management strategies are not only technically accurate but also socially equitable. Prioritizing the requirements and experiences of population and employing qualitative approaches, interdisciplinary collaboration, and participatory methods in the flood risk assessment is essential in order to create resilient and sustainable urban environments and mitigate the impact of natural disasters.

By analyzing the socio-economic fabric of urban areas, stakeholders can identify marginalized communities that are mostly affected by flooding events. Moreover, recognizing the socio-economic drivers of vulnerability enables the formulation of targeted interventions that address root causes rather than mere symptoms.

Interdisciplinary collaboration lies at the heart of effective flood risk management strategies. Reinforcing a collaboration and an efficient dialogue between experts from diverse fields (such as hydrology, urban planning, sociology, and economics) can result to the development of innovative solutions that integrate technical expertise and socio-economic insights for a better risk management. Furthermore, necessary are participatory methodologies that involve local communities in the decision-making processes related to flood risk management. By incorporating local knowledge, values, and experiences into planning, into a bottom-up approach, interventions are more likely to resonate with the needs and aspirations of affected communities and reinforce the resilience of the population.

In conclusion, the pursuit of urban resilience in the face of climate risks demands a holistic approach that integrates both natural and social dimensions. By centering on the needs and experiences of diverse urban populations, cities can become more adaptive, inclusive, and sustainable, thereby mitigating the impact of natural disasters and enhancing the well-being and resilience of their inhabitants.

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Changing cities, changing climate, changing nature

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Extended abstract

Cities do not lack of Nature. This presentation attempts to identify Nature not in cases of a tropical jungle forest, or a distant idyllic mountain, but also in cities, i.e., in densely populated, concrete, highly polluted and fastest-growing environment, where wildlife co-exists with humans and the built environment. That is, acknowledging City and Nature as one indivisible ecosystem. Contemporary metropolises and most cities face heavy impacts of urbanization that affect their very basic services: street infrastructure, sanitation, housing, human livelihoods and health. At the same time, anthropogenic pressures such as constant noise, chemical pollution, poor air quality, traffic, buildings' density, space disruption, dominance of cement and water impermeability, seem to also threaten the overall stability and resilience of urban biodiversity.

Additionally, it is estimated that climate change effects on cities such as heat waves, water scarcity, increased frequency of floods, can be an aggravating factor that intensifies urban growth impacts and further augments the existing pressures on urban biodiversity. Eventually these pressures may alter city's biological limits, disrupt ecological processes and dissolve arrangements and compositions. Responding to the above challenges, it is expected that ecosystems in urban areas should be able to change their behaviour and evolution patterns (adapt) and avoid threats so as to thrive living in the city.

Being a co-tenant of a shared living habitat and nature's ultimate ecosystem engineer, man is expected to convey the urban ecosystems' particular functions and interdependences with climate change. Current urban planning and design approaches integrate both mitigation measures that promote self-sufficient walkable neighborhoods, green infrastructures, sustainable urban mobility and transportation, energy savings and reduction in burning fossil fuels, and the implementation of adaptation strategies for buildings, materials, transportation systems, water and energy infrastructure resilience. However, there is more to understand on how urban species are changing over time in order to shape cities as a heaven for all living organisms.

This attempts to point out the complex interconnection of climate change with other challenging environmental urban conditions, to highlight existing tools for integrated assessments of urban biodiversity conservation, and to present best practices of city planning worldwide that may be adjusted for Greek cities. Ultimately, urban nature should emerge as an equally important "stakeholder" in the climate change responds and discussion; and it should be considered in future design of cities towards a more biodiverse and sustainable –urban well-being for all.

Keywords: *urban nature; biodiversity; urban planning; integrated sustainable solutions; adaptation*

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An investigation of the evolution of heating and cooling degree-days in different climatic zones of Greece

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Extended abstract

In this paper, the heating and cooling degree days of four different cities of Greece are evaluated using long-term climatic data. The ASHRAE method has been chosen in order to calculate the degree-days, with the required daily dry bulb temperature data obtained by the meteorological stations of the National Observatory. The study period involves the decade 2011-2020 and the selected cities are Kastoria, Trikala, Maroussi and Heraklion, representative of the 4 climatic zones in Greece. For the calculations of the cities' Heating degree-days (HDD), a base temperature of 16°C has been chosen while for Cooling degree-days (CDD) the base temperature was set to 24°C. Degree-days for all the cities are estimated on a monthly and an annual basis.

In terms of the mean annual air temperature, marginal deviations have been reported for each city throughout the years. Yet, the average annual air temperature values have been found significantly lower for the colder climatic zones (i.e. Kastoria and Trikala) compared to the warmer ones (i.e. Maroussi and Hraklion). Interestingly, the position of the weather stations and its respective microclimatic conditions, will affect the estimated values of the HDDs and CDDs. Regarding the annual values of the HDDs, the highest values are noticed in Kastoria following Trikala, Maroussi and Heraklion. The highest differences, reaching 73,8% - 83,8% have been noticed between Kastoria and Heraklion. On the other hand, Maroussi presents the highest annual values of the CDDs, followed by the corresponding CDDs of Trikala, of Heraklion and finally of Kastoria. As far as the CDDs are concerned the most important percentage deviation over the decade studied is that of 79,1% - 99,2% between Maroussi and Kastoria.

Keywords: heating degree-days (HDD), cooling degree-days (CDD), ASHRAE, climatic zones

Climate Change, Coastal Vulnerability, and Mangrove Protection in Africa

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Abstract

Climate change poses an urgent global challenge, particularly impacting Africa, a continent with reduced greenhouse gas emissions. This study highlights the critical need for enhanced climate action in line with the Paris Agreement, focusing on Africa where rising global temperatures exacerbate coastal vulnerabilities. Climate change is a multifaceted crisis, leading to shifts in global climate patterns, including temperature increases, rising sea levels, and more frequent extreme weather events. Addressing this requires a multi-level approach, encompassing greenhouse gas emissions reduction, renewable energy transition, and climate adaptation, and mitigation at local, national, and international levels. Mangroves serve as a natural defence for Africa's coastal cities against climate impacts. Found in coastal intertidal zones, they provide ecological benefits, including shoreline protection and marine life habitat. However, their preservation demands complementary measures, such as effective land use planning and development regulations. Africa's coastlines, also often hit by extreme climatic events like cyclones, tsunamis and others face increased risks due to the diminishing natural defences provided by mangroves. These ecosystems are essential for mitigating climate change effects on coastlines, acting as buffers against wave energy and protecting offshore ecosystems from sediment runoff. Additionally, mangroves are vital for the social sustenance and economy of coastal communities, offering resources such as food, medicine, and timber.

This research conducts a comprehensive analysis of mangrove depletion in Africa, evaluating policies, initiatives, and community efforts directed towards their conservation and regeneration. It proposes strategies to enhance coastal resilience against climate threats like erosion and cyclonic events, aligning with Sustainable Development Goals 11 (Sustainable Cities and Communities) and 13 (Climate Action). These strategies emphasize the importance of combating climate change and its adverse effects.

Unfortunately, mangroves are in decline. To reverse this trend, strategies including policy reform, support for NGO and community-led mangrove conservation projects, and promotion of sustainable practices are vital. Notable efforts, such as those in Mozambique, demonstrate the potential of these approaches in reducing erosion and safeguarding ecosystems during climatic events. The study not only examines mangrove loss in Africa but also underscores the significance of NGO and community involvement in their restoration. Unfortunately substantial portion of mangrove depletion is attributed to human activities, with natural factors like cyclones also playing a role.

In conclusion, the study stresses that mangrove conservation is crucial for mitigating climate change and enhancing coastal resilience in Africa. Effective global collaboration, policy development, and training of the community increasing knowledge in mangrove conservation are essential, transcending environmental importance to become key elements of sustainable development and climate adaptation in Africa.

Keywords: *climate change, African urban centers, coastal fortification, Natural-Based Solutions, mangroves.*

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1. INTRODUCTION

One of the key concerns is that ongoing global climate change is expected to alter global biodiversity patterns significantly [1,2]. Climate conditions are a well-known driver of community and species distribution patterns from the global to the regional scale [3,4]. The predicted climate changes, such as higher temperatures, shifts in precipitation, and intensified storm activities, are likely to trigger substantial changes in these biogeography patterns [5]. Coastal areas have been identified as regions where vulnerability intersects with biodiversity hotspots. These coasts are particularly exposed to multiple changing pressures, including extreme weather events, sea level rise, intense anthropogenic activities, and regional habitat loss[6].

The vulnerability of coastal ecosystems has raised significant concerns within the conservation community. Coastal ecosystems often harbour a variety of rare and specialized species and provide crucial ecosystem services, such as serving as nurseries for marine life in the case of mangroves (Figure 1). Africa, in particular, hosts exceptional biodiversity, including endemic species and extensive coastlines. The inter-tidal habitats provided by African mangroves support significant fish and benthic faunal species diversity and perform numerous locally and globally important functions. However, these vital ecosystems are threatened by local anthropogenic pressures such as overfishing and mangrove deforestation, as well as global phenomena like climate change and sea level rise. African coasts already experience major environmental shifts, including a decline in rainfall in western regions and warming in the western Indian Ocean that exceeds global averages [7,8].



Figure 1. Photograph of a mangrove forest in Mozambique.

Human-induced global warming is a key driver of shifts in the distributions and ecological functioning of the world's ecosystems and the species they support. In Africa, land-use change has already resulted in severe biodiversity loss, and its conservation must remain a global priority. Climate change is altering rainfall regimes and temperatures across the continent, which in turn is expected to affect biodiversity and ecosystem services. Africa's coasts are particularly vulnerable to these climatic shifts, as they support rich biodiversity and are expected to experience continued population growth and climate impacts. Mangroves, one of the most important ecosystem types on African coasts, rely on stable environmental gradients, which are unlikely to naturally keep pace with the rapid sea level rise driven by global warming [11].

The resilience and adaptability of urban landscapes are critical as cities drive global economic growth and development [12]. African urban centers have grown exponentially in population over the last 60 years, with more than half of the world's population growth in the first half of this century expected to occur in sub-Saharan Africa [13]. Rapid expansion and increased urbanization may lead many cities to overlook critical social-ecological resources that provide vital ecosystem services central to the well-being of citizens. African coastal cities, in particular, are extremely vulnerable to the impacts of climate change due to an increased likelihood of flooding and severe storms. These impacts have potentially devastating effects on informal settlements, central business districts, transportation systems, and coastal infrastructure, including ports, energy, and water infrastructure.

Protecting coastal areas from erosion and other climate change impacts requires immediate attention and effective strategies. Mangroves and other nature-based solutions (NBS) play a crucial role in this protection, offering natural defences against extreme weather events and supporting biodiversity [14–16]. Their conservation and restoration are essential not only for maintaining biodiversity but also for ensuring the safety and resilience of coastal communities [13,17,18]. As such, a comprehensive approach integrating habitat protection, sustainable resource use, and innovative policy measures is paramount to safeguarding these invaluable ecosystems.

2. METHOD AND RESULTS

A comprehensive review of the literature was conducted on May 2, 2024, utilizing the Scopus database. The search was focused on the keywords 'mangrove', 'Africa' and 'NBS'. The inclusion criteria were defined to encompass articles published from the year 2020 to the present. This period was chosen to ensure the relevance and contemporaneity of the data.

From this search, a total of 30 articles were selected. These articles were meticulously examined, and the respective databases cited within them were also considered. The selected articles and their referenced databases are thoroughly documented and are integral to the scope of our study.

In addition to the academic literature, websites of several non-governmental organizations (NGOs) actively involved in mangrove protection were reviewed. These organizations were chosen based on their recognized contributions and ongoing projects related to mangrove conservation. The information gathered from these sources provided a broader context and practical insights, complementing the academic data and enriching the overall analysis.

The preservation of mangroves is of paramount importance due to their role as natural buffers against coastal erosion, storm surges, and flooding. Mangrove ecosystems provide critical services such as stabilizing shorelines, reducing the impact of natural disasters, and protecting coastal communities. Additionally, they are vital carbon sinks [19], sequestering significant amounts of carbon dioxide and thus contributing to the mitigation of climate change. By preserving mangroves, we not only safeguard biodiversity but also enhance the resilience of coastal areas to environmental changes and disasters. As natural solutions, mangroves are cost-effective and social and economic sustainable, offering long-term protection and multiple ecological benefits.

Furthermore, data presented in Figures 3 and 3 were obtained from the Global Mangrove Watch (GMW) database [10]. These figures include "*Estimates of mangrove areas in West African countries in 1996 and 2020*" and "*Estimates of mangrove cover in East African countries in 1996 and 2020*". The GMW aims to provide geospatial information on the extent of mangroves and changes over time. This data is vital for the national wetland professionals, decision-makers, and NGOs. The primary objective of the GMW is to offer countries without a national mangrove monitoring system an initial baseline of mangrove extent and change maps. This support helps prevent further loss and degradation of mangrove forests.

Country	Mangrove area (km ²) 1996	Mangrove area (km ²) 2020	Change (%)
Angola	293,25	283,57	-3,30
Benin	29,12	28,77	-1,20
Cameroon	1963,56	1970,01	0,33
Cote d'Ivoire	57,85	54,48	-5,83
DRC	238,00	236,84	-0,49
Equatorial Guinea	256,34	255,95	-0,15
Gabon	1759,46	1747,01	-0,71
Gambia	607,72	609,72	0,33
Ghana	180,67	179,52	-0,64
Guinea	2278,75	2211,45	-2,95
Guinea-Bissau	2742,92	2688,32	-1,99
Liberia	186,82	183,37	-1,85
Mauritania	3,25	3,44	5,85
Nigeria	8604,33	8442,43	-1,88
Republic of Congo	20,18	20,11	-0,35
Sao Tome & Principe	0,48	0,48	0,00%
Senegal	1266,03	1269,74	0,29
Sierra Leone	1600,47	1529,03	-4,46
Togo	0,53	0,50	-5,66

Figure 2. Estimates of mangrove areas in West African countries in 1996 and 2020 (adapted [9,10]).

Country	Mangrove area (km ²) 1996	Mangrove area (km ²) 2020	Change (%)
Comoros	0,97	0,97	0,00%
Djibouti	8,89	7,50	-15,64%
Egypt	2,94	2,24	-23,81%
Eritrea	93,37	77,91	-16,56%
French Southern Territories	6,72	6,72	0,00%
Kenya	549,90	544,30	-1,02%
Madagascar	2826,44	2775,67	-1,80%
Mauritius	5,53	4,32	-21,88%
Mayotte	6,77	6,76	-0,15%
Mozambique	3186,45	3027,35	-4,99%
Seychelles	3,83	3,83	0,00%
Somalia	36,79	35,15	-4,46%
South Africa	25,66	26,43	3,00%
Sudan	17,70	9,39	-46,95%
Tanzania	1136,96	1107,87	-2,56%

Figure 3. Estimates of mangrove cover in East African countries in 1996 and 2020 (adapted [9,10]).

The data on mangrove areas in West and East African countries between 1996 and 2020 reveal concerning trends of reduction, with some isolated improvements. In West Africa, the most significant reductions occurred in Côte d'Ivoire (-5.83%), Togo (-5.66%), and Sierra Leone (-4.46%). In contrast, Mauritania (+5.85%), Cameroon (+0.33%), Gambia (+0.33%), and Senegal (+0.29%) registered small increases in mangrove area, indicating possible effective conservation and reforestation efforts. São Tomé and Príncipe maintained its mangrove area constant, suggesting stable management of these ecosystems.

In East Africa, the most pronounced losses were observed in Sudan (-46.95%), Egypt (-23.81%), and Mauritius (-21.88%), highlighting even more severe degradation. Conversely, Comoros, the French Southern Territories, and Seychelles maintained their mangrove areas unchanged, while South Africa

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saw a slight increase of 3.00%. These data suggest significant variation in the effectiveness of conservation policies and the pressure on mangrove ecosystems in different countries.

Comparing the major variations between West and East Africa, it is notable that East Africa exhibits more extreme percentage losses, as seen in Sudan and Egypt. In both cases, factors such as deforestation, coastal development, and climate change are common determinants. The conservation of mangroves is essential for biodiversity protection, climate change mitigation, and supporting local communities. Therefore, it is crucial to implement more robust conservation policies, increase awareness of the importance of these ecosystems, and foster international cooperation to share best practices and resources.

This dual approach, integrating both scholarly articles and NGO resources, along with geospatial data from the GMW, ensures a comprehensive understanding of the current state of mangrove ecosystems in Africa and the efforts being made towards their conservation. The selected articles, additional data sources, and geospatial estimates are detailed in the references section of this paper, providing a robust foundation for our research.

3. DISCUSSION

Mangrove forests, as pantropical coastal wetland ecosystems, provide numerous ecological services, such as functioning as fish nurseries, protecting shorelines, storing carbon, and controlling erosion. However, these ecosystems face multiple stressors. Over the past three decades, more than half of the world's mangrove areas have been lost, primarily due to deforestation driven by urban, agricultural, and aquaculture expansion. Climate change, particularly sea-level rise and increased frequency and intensity of extreme weather events like tropical storms, further threatens mangroves [20].

Traditionally, coastal protection relied on civil engineering solutions, including groins, seawalls, breakwaters, and storm barriers. However, these hard structures often cause ecological damage and reduce biodiversity by disrupting natural dynamics [21]. This realization has led to a shift towards nature-based solutions (NBS), which are inspired and supported by natural processes to address societal challenges cost-effectively while providing benefits for human well-being and biodiversity [22].

NBS offer multiple co-benefits, such as natural capital, green jobs, clean air, water regulation, recreational opportunities, and urban regeneration. Despite their potential, the adoption of NBS is slow due to the lack of standardized methods for assessing their multifunctional performance, which hampers the establishment of a solid evidence base demonstrating their advantages over traditional grey infrastructure [22].

Healthy coastal ecosystems, such as mangrove forests, play a crucial role in reducing flood risks. Their root systems and dense vegetation attenuate wave energy, trap sediments, and reduce erosion, providing critical protection and stability to coastal areas [21]. Understanding and promoting these natural processes is essential for effective coastal management (Figure 4). Figure 4 illustrates the dynamic interactions between hydrodynamic processes (e.g., sea level rise), morphological processes (e.g., subsidence), and ecological processes (e.g., tree growth). These interactions affect wave attenuation capacity and surface elevation changes, which in turn influence the functionality and persistence of mangrove ecosystems [23].

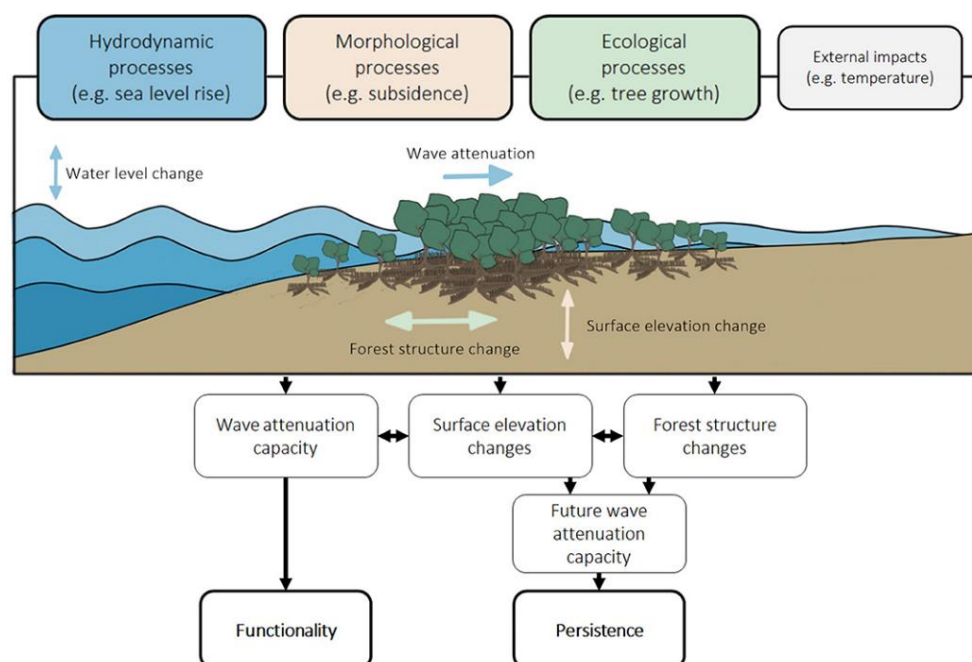


Figure 4. Hydrodynamic, morphological, and ecological processes interact in mangroves, determining their functionality and persistence [23].

However, much remains unknown about the effectiveness of NBS in extreme weather conditions. Future research and collaboration between engineers and ecologists are necessary to improve our understanding and application of NBS. Projects like LIFE Coast-Adapt in southern Sweden [24] and Seagrass Protect in the Western Indian Ocean are pioneering efforts to explore the interaction between submerged vegetation and coastal dynamics, advancing our knowledge and application of NBS for coastal protection [23].

Recently, NBS have been gaining popularity and are becoming integral to coastal management strategies in many countries. Despite their effectiveness, NBS is still a relatively new practice, raising concerns regarding their environmental and anthropogenic impacts. Additionally, there are several disadvantages and pitfalls that need to be addressed to enhance the implementation of NBS. Overcoming these challenges and concerns will be crucial for the broader adoption and success of NBS in providing sustainable and resilient coastal protection [25]. As the impacts of climate change intensify, there is a growing need for better guidelines on coastal adaptation management and NBS, as well as more evidence of their effectiveness. It is hoped that this will encourage governments and landowners to shift their perspective and, whenever possible, move away from relying solely on hard constructions toward adopting softer solutions [26].

The biogeomorphic dynamics in mangroves are characterized by continuous interactions between hydrodynamic, morphological, and ecological processes. The current state of a mangrove forest determines its capacity to attenuate hydrodynamic energy (i.e., reducing wave height and water levels) and its resultant functionality. Improving our understanding of these dynamics and providing robust evidence of NBS effectiveness will be critical in promoting their wider adoption as viable alternatives for coastal protection in the face of climate change [23].

An important but challenging approach is establishing "*Mangrove Benefit Plans or Funds*" from ecotourism revenue and taxes to support conservation efforts. Financing for mangrove conservation is crucial for African coastal communities and achieving climate goals. Discussions emphasize the need for investment in green infrastructure, with budgeting and policy alignment being essential steps [27].

Challenges for national strategies include a lack of interest in mangroves, constrained budgets, and limited political visibility. The concept of NBS requires more discussion to clarify its scope and principles and designing NBS inclusively can address local challenges and social justice concerns. Incorporating NBS into urban planning in Africa can address issues like green space depletion and water pollution while building resilience against climate risks. A citizen co-created approach can increase knowledge and integrate local insights. Promoting urban and peri-urban agriculture through NBS can support food production. Knowledge exchange between African Countries and other regions can enhance NBS implementation and management [27].

Studies, such as the one by O'Donnell et al., [28] have shown that mangroves perform well during storms and provide significant co-benefits, including carbon storage and habitats for juvenile fish. However, urban areas often replace vegetated shorelines with hardened structures. Future research should focus on overcoming barriers to conserving and implementing NBS along residential coastlines to enhance their adoption and effectiveness.

In conclusion, promoting NBS as viable alternatives for coastal protection requires improved understanding, robust evidence of their effectiveness, and better guidelines for coastal adaptation management [25]. Integrating NBS into broader coastal management strategies can provide sustainable and resilient solutions to climate change impacts. This discussion is further elaborated in the case study of Mozambique, highlighting the specific challenges and successes in mangrove conservation.

3.1. The Case Of Mozambique

Efforts to preserve mangroves in African countries often lack cohesion, resulting in inadequate protection due to insufficient policies, laws, and institutional frameworks. This issue is particularly prominent in Mozambique, where mangroves extend along the coastline, covering approximately 3,027.35 km², making them the largest mangrove forests in East Africa [29]. These vital ecosystems host eight mangrove species, primarily along major rivers such as the Zambezi, with the Zambezi River Delta alone housing half of the country's mangroves [30]. Despite their ecological and economic importance, mangroves face significant threats from deforestation driven by agricultural expansion, aquaculture, and industrial activities, leading to sedimentation and the degradation of surrounding ecosystems [29].

In addition to environmental challenges, inadequate urban sewage treatment poses health risks, while certain areas like Mossuril have witnessed mangrove conversion for salt production. Large-scale infrastructure projects like the Cahora-Bassa dam exacerbate mangrove degradation by altering water flow. Moreover, industrial pollution from activities such as oil and gas extraction, alongside crude oil transportation, further jeopardizes these ecosystems. Over time, Mozambique has experienced a decline in mangrove coverage, necessitating updated legislation and strategies to mitigate these threats [29].

In the study by Macamo, C.C.F. et al. [18], a case study highlights successful mangrove co-management in Nhangau, Mozambique, showcasing a promising model for sustainable restoration and conservation. Collaborative efforts involving the community, local government, and NGOs have led to initiatives such as mangrove planting, law enforcement, and the promotion of alternative income-generating activities. These efforts have resulted in tangible benefits, including mangrove rehabilitation, heightened community awareness, and improved ecosystem services. Nonetheless, challenges persist, necessitating strengthened legislation, improved management mechanisms, and enhanced financial sustainability.

This study offers valuable insights into the dynamics of community-based mangrove management and emphasizes the importance of stakeholder involvement in achieving positive outcomes. Future research should focus on the ecological aspects of mangrove restoration and compare replanted sites

with natural stands to inform decision-making and support the long-term sustainability of mangrove ecosystems in Mozambique.

4. CONCLUSION

Mangroves thrive in salty, oxygen-poor environments, expanding land where they flourish, acting as sediment traps, and buffering sea level changes biochemically. These behaviours are crucial to coastal communities, making mangroves exceptional in such habitats. The combination of biological and physical processes in mangroves produces a range of ecosystem goods and services. However, mangroves face significant threats, including conversion to aquaculture ponds, road construction, timber and fuel collection, and erosion. The urgency of conserving mangroves has intensified due to human-induced climate change and natural disasters like tsunamis and hurricanes.

Nature-based solutions (NBS) are emerging as vital strategies for protecting coastlines against extreme weather events. Mangroves, as part of NBS, play a pivotal role in coastal resilience by attenuating wave energy, trapping sediments, and reducing erosion. These natural defences are increasingly recognized for their effectiveness in mitigating the impacts of climate change and extreme weather events on coastal communities.

The first step in mangrove conservation is identifying the remaining resources, which is part of the purpose of Section 5's analysis. However, more knowledge of mangrove locations is insufficient without proper management within a broader context. Biodiversity, particularly well-documented in mangroves, is fundamental. Identifying diverse remnants can aid in establishing and conserving mainland reserves.

A variety of conservation tools, applicable worldwide, should be employed to conserve mangrove forests. These include habitat protection, technical research assistance, stewardship promotion, education, emissions reduction, sustainable resource use, and the development of high-value goods and services.

Future policy recommendations and research could benefit from a comprehensive assessment of tropical forests and ecosystems through remote sensing. This can inform investment allocation, emission reduction strategies, and global carbon impact assessments. Enhanced monitoring of forest carbon storage can further clarify local and global carbon impacts, aiding conservation efforts. Harvest design modifications, guided by inclusive practices and global conventions, can mitigate logging impacts and encourage forest restoration. Governmental incentives and restrictions should be realigned to promote sustainable practices and forest protection. Additionally, public awareness and education on forest conservation are crucial to support these efforts.

In conclusion, mangrove conservation is essential for protecting coastal areas against the increasing threats of climate change and extreme weather events. By integrating NBS into coastal management strategies, we can enhance the resilience and sustainability of these vital ecosystems. Collaborative efforts involving habitat protection, community engagement, and innovative policy measures are crucial for the long-term preservation of mangroves and the myriad benefits they provide to coastal communities.

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Green Public Space and Mobility Strategies to Address Climate Change. Insights from Paris Experience

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Extended abstract

Over the last two decades most European cities have focused on developing coherent and innovative urban policies for climate change mitigation and adaptation, while creating a livable, sustainable, and resilient urban environment for their residents. To achieve these goals, key concepts and common strategies have been emerged, concerning both urban and transport planning and design, such as: green-blue infrastructure, nature-based solutions, public space and building greenification, ecological corridors, sustainable or green mobility patterns, transit-oriented development, “ville de proximité”, 15-minute city etc.

The paper focuses on the case of Paris, as a representative example of a European metropolis, which has a significant legacy both in green public spaces and mass transport systems (metro, bus). The city disposes an important green-blue infrastructure, progressively and top-down planned especially since the mid-19th century. Since the beginning of the 21st century, this infrastructure has been enriched through bottom-up design and reappropriation processes, while incorporating the ecological approach and the enhancement of biodiversity. At the same time, policies to enhance sustainable mobility, such as the introduction of modern tram lines, the strengthening of utilitarian cycling with the bike-sharing system (Velib’) and the extended network of cycle paths, the extensive low-traffic zones and streets pedestrianisation (rues aux écoles, rues végétales), which were accelerated since the pandemic and in view of the 2024 Olympic Games, provided multiple opportunities for public space redesign at street level.

The paper delves into the urban strategies employed by the municipality to prioritise green public spaces and efficient sustainable mobility systems, drawing insights from plans, initiatives and actions, such as Plan Climat, Plan biodiversité de Paris, Etude des Espaces publics à végétaliser à Paris, Plan Vélo, Plan Piéton, Réinventer Paris, Réinventons nos places, Embellir Votre Quartier, and Permis de végétaliser, which have shaped Paris’s approach to sustainable and resilient urban development during the last two decades. Based on literature review and field research, the paper attempts to explore these multifaceted plans, strategies, and actions, as well as their implementation processes to assess their potentials and limitations.

The Paris experience demonstrates the positive impact of integrating green public spaces with sustainable mobility. These initiatives have not only improved the quality and livability of the urban environment but also enhanced the well-being of its residents. Lessons learned from Paris innovative strategies, planning and design tools and participatory processes could provide valuable insights for cities seeking to address climate change impacts and achieve urban sustainability and resilience.

Keywords: *climate change; urban resilience; public space greenification; green mobility; ecological corridors; planning and design tools and processes; Paris*

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The Socio-Economic and Green Aspects of Adaptive Reuse - Adaptive Reuse as a Vehicle towards Viable Redevelopment in Cyprus

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Extended abstract

This paper grips on the practice of adaptive reuse and its great potential to contribute to smart redevelopment schemes focusing on the built fabric's resilience and its viable regeneration/redevelopment.

By adaptively reusing an asset, the underlying abandonment is minimized along with its adverse effects on both the social and built fabric. Adaptive Reuse is beneficial as it connects the new version of the building to its original character and the embedded narrative. Therefore, the sense of place can be retained, and certain values are conserved (such as social, cultural, historical). Relevant links to the past and significant memories are kept, and historical or cultural landmarks are safekept. Going off from this realization, core social values such as pride and memory can be enhanced by careful consideration of adaptive reuse strategies which highlights that adaptive reuse contributes to maintaining the character and the vitality of the built fabric, while at the same time contributing to the continuation of the livability of certain areas going through social or economic changes, thus making them resilient and durable.

Furthermore, adaptive reuse as a practice can be characterized as "smart" as it preserves regional flavor while minimizing impacts on the environment; recycling participates in this process as a more viable path is followed concerning materiality and sources, and the grey energy associated with these. However, through long periods of recession, any kind of development or redevelopment within the built fabric can be postponed or discouraged. Taking for example the negative economic effects of the COVID-19 Pandemic and the war outburst surrounding Cyprus, the building industry has been greatly struck. Henceforth, this paper overviews data and showcases examples from the current situation in Cyprus relating to new developments/ constructions as opposed to regenerated/ reused assets and their socio-economic reflections. The data derives from both governmental sources and private architects' archives. The findings indicate that, when comparing similar cases, adaptively reused units or complexes are not necessarily more affordable. Nevertheless, it is noted that sometimes more informal strategies are implemented, and simpler actions are taken, with minimal transformations, that truly affect positively both the units and their context (small and extended scale). Finally, the paper discusses how the narrative around adaptive reuse, described at the beginning, can provide food for future redevelopment schemes for them to fall under the scope of resilience and sustainability.

Keywords: *redevelopment; resilience; adaptive reuse; Cyprus*

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Classification of Urban Design Solutions for Flood Resilience Criteria - A Case Study of Rotterdam, Netherlands

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Extended abstract

Cities have always been vulnerable to various environmental risks. These threats have been growing in recent years: accelerated urbanization and rapid development are encountering ever-increasing negative ramifications of climate change. Floods represent one of the most dangerous natural disasters, which, if woven into the urban fabric, represent a global problem threatening the densely populated environment. European cities are increasingly suffering from severe floods, and the case studies of cities with built-in examples of urban flood resilience could provide a database for lessons learned.

The Dutch city of Rotterdam represents the European front-runner in dealing with climate risks smartly and proactively from the strategic to the implementational level. The comprehensive case study of the City of Rotterdam aims to understand interdependencies between spatial problems related to floods, strategic and urban planning measures to deal with them and the effectiveness of concrete built-in solutions to achieve urban flood resilience. The analysis, evaluation, and discussion start from a broader aspect and continue with a more specific perspective. A case study analysis is structured in two steps.

In the first step, the literature was reviewed in a broader context. The analysis was structured in two thematic groups related to (i) a review of the identified scientific articles using keywords “flood resilience” and “Rotterdam” in WOS Core Collection and Scopus and (ii) the identification of strategies and plans shaping the city with proposed measures and examples of possible solutions to achieve flood resilience. The actual built solutions were examined in the second step to determine applied criteria and measurable indicators.

The first analysis identified an existing legislative strategic and planning framework and means implemented in it to achieve urban flood resilience. The second analysis resulted in a comprehensive collection of design solutions to enable flood resilience and their classification according to the type of flood problems they respond to. Systematic analysis of selected constructs in literature resulted in defining context – it provided insight into approaches (frameworks, models, methods, tools, etc.) in achieving resilience and an overview of all relevant strategic and planning documents, which implement solutions for identified flood problems on this specific example and further provide lessons learned about planning and urban design criteria in post-disaster flood situations. The paper presents the initial phase of the pilot case study for Rotterdam City, part of the proposed and ongoing doctoral research focused on urban flood resilience criteria on a neighbourhood scale. Further research of the selected case studies aims to identify urban design criteria and measurable indicators which enable urban flood resilience for specific urban flooding problems.

Keywords: *design solutions; criteria; Rotterdam; urban plans and strategies; urban flood resilience*

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Wet, Dry and In-Between: An Interdisciplinary Approach to Multi-Hazard Resilience in Dili Municipality, Timor-Leste

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Extended abstract

This session will present the results of preliminary efforts to enhance multi-hazard resilience in Dili Municipality, Timor-Leste, in the aftermath of Tropical Cyclone Seroja (2021). Heavy precipitation in combination with the topography and local development patterns, triggered flash floods and landslides that led to the devastation of roads, bridges, public facilities and other infrastructure. This climate event is part of a larger pattern influenced by the effects of global climate change. Severe droughts plague the region for extended periods, punctuated by violent tropical storms that will reportedly only increase in intensity and frequency.

Supported by the Global Fund for Disaster Risk Reduction (GFDRR), the Consortium is tasked with developing design-driven, risk-informed spatial strategies to improve the municipality's capacity to adapt to wet, dry and in-between conditions, while improving baseline resilience to events like, floods, earthquakes and tsunamis that are also prevalent in the area. The team is using a combination of grey and green infrastructure, including nature-based solutions, to facilitate landscape restoration and smart urban growth while also mitigating multi-hazard risk. Proposed recommendations are validated and prioritized to reflect the local context, values, and perspectives through a rigorous multi-stakeholder engagement process.

The Consortium will open the session with a presentation on Dili Municipality's risk profile, identify opportunities for designed intervention at the urban and regional scale, and address the very process of the challenge itself. Next, our team will discuss how international resilience efforts might be structured to optimize the resilience value to the city, leveraging innovative approaches to engagement and capacity building to inform urban governance and financing strategies. The team will close the session by opening the discussion to our audience.

Keywords: multi-hazard resilience; risk mitigation; disaster preparedness; resilient investment; Timor-Leste

ENVIRONMENTAL URBAN PLANNING

CHANGING CITIES



Changing Cities VI, Rhodes, 24 - 28 June 2024

Protecting urban agriculture towards a resilient city. Polish perspective

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Extended abstract

Urban agriculture (UA) is the collective name for a wide variety of farming activities that occur within the boundaries of a city or the direct sphere of influence of a city. A shared feature of UA types is a limitation in space: horizontally, vertically, or both. Farming is generally not the primary function in the urban ecosystem; however, its spatial role should not be underestimated. Urban green spaces connected with urban agriculture are widely accepted as a nature-based solution for effectively addressing societal challenges related to urbanization. In Polish cities, urban agricultural areas comprise large percentage of the cultivated area (about 43.5% of urban areas in general are located within the city limits. According to public data, 7.8% of individual farms in Poland are urban farms. Resilience is understood as a certain perspective or way of thinking, as a set of solutions that increase opportunities in various dimensions (social, physical or financial), as anticipatory planning for building potential and increasing the capacity of resilience (absorption of shocks and regeneration). Having said that, urban agriculture has a potential for climate resilience.

In general, the future of agricultural land use in Europe is uncertain. Competition for land between agriculture and urban land use is very intensive. The problem requires a wide policy agenda and needs to be addressed by various policy instruments combined with legal instruments. The second group comprise mostly of the regulatory ‘command and control’ planning approaches. However, there is a growing interest in the other type of instruments, for example the market-based instruments (MBI).

The presentation and the following paper aims to present a potential for innovative instruments for urban agriculture protection and identify barriers to implement such solutions. The paper analyzes both theoretical frameworks and practices for protecting agricultural land use through various instruments in Polish cities. The analysis is three-fold. Firstly, we identify strengths and weaknesses of the Polish system of UA, both in a historical and contemporary context. Secondly, future challenges resulting from the current global and local conditions will be indicated as well. Thirdly, we departure from the traditional focus on economic tools (mainly subsidies) for supporting agriculture in search for more efficient, inclusive, equitable and integrated UA. Protecting urban agriculture requires flexible, stimulating and context-sensitive tools. In this regard, we formulate *de lege ferenda* conclusions and recommendations. Our framework is national-context-sensitive, so it may be used for various national case studies, too. Moreover, such results may contribute to further comparative studies.

Keywords: urban agriculture, resilient city, climate adaptation, ecosystem services, Poland

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Evaluation of the polycentric operational model for a Greek city

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Abstract

The COVID-19 pandemic has become a pivotal point for reevaluating how users engage with urban environments. The swift transformations observed not only in the economic and social sectors but also in daily life have prompted a global reconsideration of the functioning of developed cities under these new circumstances. Furthermore, the imperative to address climate change has spurred research into the optimal operational model for modern cities, encompassing mundane functions and needs, car usage, networking, and communication.

The polycentric city formation model emerges as a response to these challenges. This contemporary theory integrates technological advancements and is user-oriented, aiming to cultivate a greener, environmentally friendly urban space that contributes to the fight against climate change. Given the shift toward a more sustainable environment and a user-friendly city structure which aligns with the principles of sustainable mobility, and also the potential of the available technology, the implementation of a structure with multiple centers, a mix of functions, and extended networking can generate a new urban topography rooted in 21st-century environmental principles.

This paper extends previous research, where the polycentric city model was evaluated using economic theory, specifically through applying a cost-efficiency analysis. The objective was to establish foreseeable outcomes of such a formation, and quantify potential benefits on environmental, economic, and social levels. The analysis employed ex-ante evaluation, simulation techniques, and indicators to define the cost-effectiveness ratio. The findings revealed that the cost of implementing a polycentric operational model in Greece, while dynamic and varied case by case, is relatively low compared to the resultant benefits. Most of these benefits align with the European Sustainable Development Goals, a strategy to which all European countries and cities are already committed and working towards fulfilling. The seemingly lower cost for Greek cities to transition to a polycentric model is attributed to their small-scale urban fabric and the mix of uses, both essential factors when implementing this operational model. Neighborhood formation is already favored and present at a foundational level, providing Greek cities with an advantageous starting point in terms of the potential costs of restructuring from scratch.

This paper is part of an ongoing research and builds on the previously established evaluation model and employs a case study to validate the evaluation method, producing a series of observations and estimations regarding the costs and benefits of polycentric city operations.

Keywords: *post-pandemic city, urban environment sustainability, polycentric city.*

1. INTRODUCTION

The polycentric city constitutes a development model that has been examined in various variations in urban planning theory since the last century. In contemporary discussions within urban planning, the concept evolved to the 15-minute city that emerged as a compelling vision aimed at fostering more livable, sustainable, and resilient urban environments. Essentially, the 15-minute city model advocates for reconfiguring cities to ensure that residents can conveniently access essential services, amenities, and job opportunities within a 15-minute walk or bike ride from their residences. This vision signifies a reappraisal of conventional urban development patterns, which typically prioritize

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automobile-centric infrastructure, towards a structure with multiple small scale centralities within the urban fabric.

Among the European cities, the city of Paris has been leading in the implementation of the 15-minute city concept, leveraging its distinctive urban layout and cultural heritage to redefine how urban life is organized spatially. Through strategic interventions and policy measures, Paris seeks to cultivate compact, polycentric neighborhoods where everyday needs can be met within close proximity. This approach aims to decrease reliance on cars, encourage active transportation, and improve overall quality of life.

Nevertheless, the 15-minute city model poses several threats along with its benefits. As pointed out in previous work [1] implementing the 15-minute city model in Paris, or any urban setting, presents both achievements and obstacles. While Paris has demonstrated notable adaptability in capitalizing on opportunities arising from the COVID-19 pandemic to advance its urban agenda, uncertainties persist regarding the applicability and efficacy of certain strategies, particularly in diverse urban contexts characterized by varying scales and socio-economic dynamics.

After drawing insights from Paris' experience, this paper aims to delve into the complexities of implementing the 15-minute city model and assess its implications for urban planning practice in the Greek city. By critically examining both the successes and limitations of Parisian initiatives, valuable lessons can be gleaned for other cities embarking on similar urban transformation endeavors. The chosen case study is the city of Ilioupolis, a municipality in southeast metropolitan Athens, with a characterizing urban plan similar to the 19th century garden city. The city is organized around several roundabouts that have become very closely related to the identity of Ilioupolis. In this paper, these roundabouts become the core of the proposed scenario of the 15minute city model.

The uniqueness of the urban design of the area predisposes and promotes centralities at the points where we encounter the roundabouts. When exploring the case study, the already existing trend of centralization development at these points is taken into account, a trend that seems to have accelerated after the COVID-19 pandemic. In this way, the proposed centralities of the 15-minute city examined in this research are the product of bottom-up processes and not predetermined top-down locations, as in the case of Paris, for example. Moreover, this paper emphasizes the importance and necessity of flexible, context-sensitive approaches to urban planning that prioritize both equity and sustainability, both of which are significantly boosted via community engagement.

Ultimately, through a comprehensive analysis of the case study of Ilioupolis, this paper aims to contribute to the ongoing discourse surrounding innovative urban planning strategies and their potential to shape more inclusive, resilient, and vibrant Greek cities for the future.

2. MUNICIPALITY OF ILIOUPOLIS

2.1 Urban fabric characteristics

Ilioupoli is a municipality that was developed to meet the increased housing demands created by the large refugee influxes to Greece following the Asia Minor Disaster of 1922. It is a suburb of Metropolitan Athens, located in the southeastern part of the basin. It is situated at the foothills of Mount Hymettus and is only a few kilometers away from the center of Athens. It was declared a municipality in 1963 (Government Gazette 45/A/19-4-63). It has always been crossed by several streams, the most significant being 2-3 branches of the Pikrodafnis stream, most of which are now covered. In the area where the municipality of Ilioupoli is now developed, there was a small estate during Ottoman rule, called the "Kara estate." The buyer in the following years was A. Nastos, who later sold the land initially required for the construction of the Municipality of Ilioupoli.

In 1925, the "Greek Company for Urban and Rural Settlements Drandakis - Pagkalos, and CO" was established with the aim of constructing the settlement according to the plan of Aristomenis Valvis, as modified in 1928 after its first approval in 1925. Ilioupoli initially targeted a wide range of residents. It had a rural section, a semi-rural section, and a general population section, which were

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distinguished from each other based on the size of the available plots of the settlement. In the general population section, the size of the plots reached that of the center of Athens. The smallest acceptable plot size was set at 112.5 sq.m. and remained so until 1940. Along the way, the rural section was abolished as buyers could not afford it financially. According to the "General Guide to Ilioupoli" (1960), anyone "...found a place for a home, the rich and the poor, the scientist and the professionals, the employees and the workers..."



Figure 1. Plan of Ilioupolis (1925) [2]

The original plan by Valvis for the settlement of Ilioupoli was characterized by a clear effort to mimic the principles of a garden city. Strong curves, numerous concentric circles and roundabouts lead to the creation of small building blocks. This initial plan underwent modification with evident signs of improvement in 1928 (Government Gazette 227/1928).

In 1930, the "Anonymous Construction and Industrial Company of Ilioupolis Athens" was founded, a company that, along with the "Greek Company for Urban and Rural Settlements Drandakis, Pagkalos, and CO" and with the "Anonymous Transportation Company of Ilioupolis," undertook the execution of the plan.

However, the image of the city of Ilioupoli in its early years was not very encouraging regarding the completion of the plan and its settlements. Nevertheless, it was widely advertised in newspapers, urging buyers to invest in land purchases, which (according to said advertisements) would not lose their value, and thus the investors would profit from a potential devaluation of the currency (a practice not uncommon in 20th century Greece). The main service networks of the city were ultimately completed after World War II, a period during which the Municipality began to grow systematically.

3. EXISTING, EMERGING AND PROPOSED CENTRALITIES

3.1 Existing centralities

In Ilioupoli, the General Urban Plan (GUP) was approved in 1988 (Government Gazette 407/D/1988, reissued Government Gazette 1225/D/1994) and is still in effect, defining the allowed land uses of the city (Fig.2). The GUP includes the entire current area of the Municipality, along with the successive expansions after the initial approval of the city plan. The same GUP separates 14

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neighborhoods - Urban Units as they appear on the map below (Fig. 3). The division of neighborhoods seems to have been made based on geometric characteristics of the town plan and with the intention of an equal distribution of the covered area per unit. There does not appear to be an intention to create independent centers per neighborhood, and the circular nodes are, in most cases, not placed at the center of each unit, but seem to serve as meeting points for two or more neighborhoods. Given that the already defined neighborhoods have a maximum distance range of 1.5 kilometers from each boundary, this distance can work perfectly with the scenario of the 15-minute city and promote accessibility using bicycles, walking, or other non-motorized vehicles.

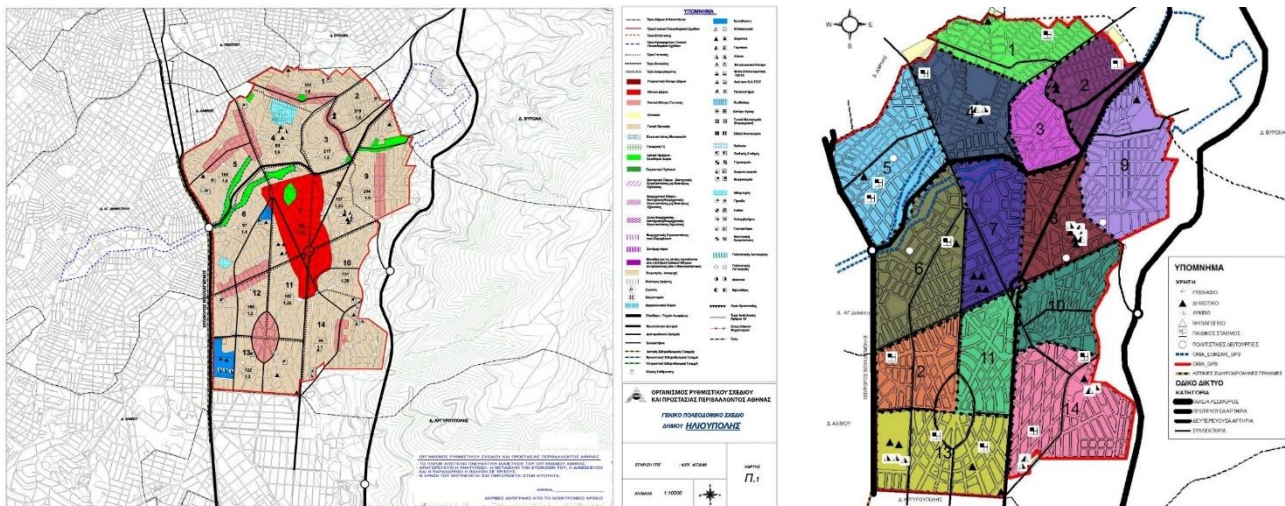


Figure 2. General Urban Plan of Ilioupoli [3]

Figure 3. Neighbourhood division [4]

For many years, and up until the end of the 2010s, when the economic crisis changed the density of commercial uses, Ilioupoli developed commercial and recreational activities mainly around Ethnikis Antistaseos Square, which is the central square of the Municipality and located at the intersection of neighborhoods 7-8-10-11. This development aligns with the General Urban Plan of the city, which designates the square and part of the axes leading to it as the "city center," differentiating it from other adjacent squares in other neighborhoods designated as "neighborhood centers."

Another secondary center of smaller scale was developing at Independence Square in neighborhood 1, just before the intersection of neighborhoods 1-3-4, while with lower intensity and uses related only to commerce, two more centralities were found, located, one at Karaiskaki Square (Kanaria) at the intersection of neighborhoods 4-5-6-7 and one at 28th October Square in the heart of neighborhood 8.

We can observe that, unlike the central square of Ilioupoli, the secondary centers created initially did not follow the current General Urban Plan regarding the determination of the neighborhood centers. The General Urban Plan placed these units mainly along axes and not on circular nodes, not exploiting the centrality they provide due to their layout.

3.2 Emerging centralities

After the economic crisis, new centralities began to emerge, mainly around the development of commercial and leisure activity zones in areas that showed less interest until 2010. This trend strengthened towards the end of the economic crisis around 2019, and despite the slowdown experienced during the period 2019-2021 due to the pandemic, it accelerated at a faster pace in the last two years (Table 1).

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The newly created centralities also tend to indeed move along axes, as initially predicted by the General Urban Plan (GUP), but still concentrate on those connecting the most developed squares of the Municipality. Thus, we observe a new center at 25th March Square at the intersection of neighborhoods 6-7-11-12, another one at Agia Paraskevi Square at the intersection of neighborhoods 11-12-13, and one more at Agia Mavra Square at the intersection of neighborhoods 8-9-10. The commercial and leisure uses also tend to expand on the axes between squares as shown in the consolidated map below (Fig.4).

CENTRALITIES \\NUMBER PER USES	RETAIL			LEISURE			MARKET		
	2014	2019	2024	2014	2019	2024	2014	2019	2024
25th March Square	12	14	15	3	4	7	2	2	2
Agia Paraskevi Square	2	2	2	2	6	6	4	4	4
Agia Mavra Square	4	2	2	3	4	6	0	1	2

Table 1. Uses per centrality.

The above-mentioned businesses are found either on the square or within a radius of less than 100 meters from it. The nearly doubling of leisure establishments along with the increase in retail and food market shops are trends encountered in all three cases. This trend was not -yet- present in other squares of the Municipality.

3.3 Proposed centralities

Examining the distribution of existing and emerging centralities in the Municipality, along with a 500meter radius of service for each centrality, we observe that there is a significant overlap across its entire extent of the city, with only two neighborhoods having room for improvement.

The first one is Neighborhood 14. The prominent topography of the neighborhood, located precisely at the foot of Mount Hymettus, as well as the strong boundary formed by Kyprou Avenue, which serves as the main and high-speed axis for vehicular traffic coming from Alimou-Karea Av. towards south Athens, dividing the neighborhood from the rest of the Municipality, result in the relative isolation of the neighborhood. Therefore, it is suggested to explore the creation of a local center in around the Ilioupolis municipal swimming pool, as the pre-existing use already establishes a degree of centrality to the area. The proposal aims to further strengthen this centrality and accommodate the part of the city that is relatively separated from the rest of the municipality.

The second point of low coverage from the existing and emerging centralities is the boundary between Neighborhoods 2 and 3, along which the General Urban Plan (GUP) initially established the use of the neighborhood center. While there is a market operating in the area with some shops, the intense adjacency with Alimou-Karea Av., the increased traffic, and the wide width of the road at this part of the city, have not favored cohesion in operations and the creation of a cohesive centrality up until today.

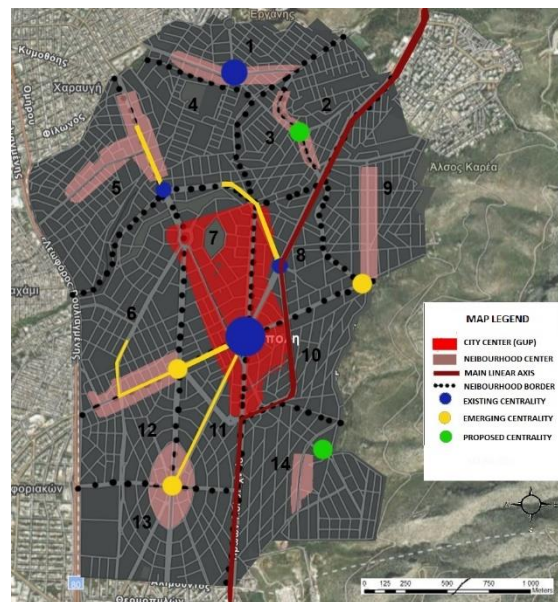


Figure 4. Centralities per type

4. QUANTITATIVE ESTIMATION OF MODEL IMPELEMENTATION COSTS

The centralities identified in the study area create a dense network capable of covering the entire Municipality with a service radius ranging from 500 to 700 meters. A total of 7 centralities were identified, and two more were proposed. In proportion to the city's population, which, according to the 2021 census, stands at 76,730 residents, this means that approximately 8500 residents are served per centrality. During the implementation of the 15-minute city model, it is important to protect specific established features defined by urban planning legislation. This means that the new proposed centralities are not intended to compete with the current commercial center of the Municipality. The Ethnikis Antistaseos Square, representing the municipal center, retains its primary central character in any case, as reflected in the intense overlap of service radius of the neighboring centralities under examination. The goal is to strengthen smaller local units that can maintain a degree of differentiation among them in terms of character, functions, and size.

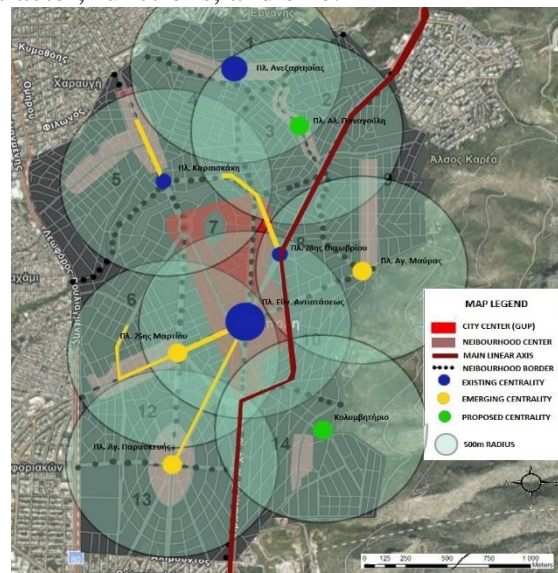


Figure 5. 500m radius per centrality

In this section, we proceed to the parameterization of the centralities according to the desired outcome. This means determining the expected character of each centrality, the desired functions per

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point, while assessing the degree of satisfaction of the desired condition from the current situation. This comparison will highlight the necessary interventions needed to achieve the predetermined goal for each centrality. These requirements can then be evaluated in terms of cost and effectiveness.

Building upon the functions introduced by the model of K. Moreno for Paris, where the key operating axes were proximity, mixed-use, density, repetition, we observe a high degree of satisfaction of these conditions in the case of the Municipality of Ilioupoli. The city is indeed characterized by a dense fabric with mix of uses and its small scale favors proximity to each center.

In terms of proposed uses, K. Moreno positioned schools at the center of neighborhoods and set the six basic uses that need to be satisfied: residence, work, market, education, health, and recreation.

In the present context, we choose to set open spaces/squares as the center of the unit, which already demonstrate a dynamic concentration of mixed functions. Additionally, while in the case of Paris, where the stronger separation of uses and the size of the city are evident, residence needs to be defined as a default requirement, in the context of the Municipality of Ilioupoli (and the broader Greek cityscape), the function of residence is considered to be satisfied throughout the examined area. Specifically, in the Municipality of Ilioupoli, according to the Operational Program of the Municipality of Ilioupoli [5], which drew data from the 2011 Census, out of a total of 11,885 buildings, only 677 are not used for residential purposes (exclusive or mixed use).

On the contrary, given the inadequate public transportation network in the greater Athens area, which results in increased use of private vehicles mainly for commuting to and from work, it appears that additional public service points and remote working opportunities are much more necessary in the present context.

During the pandemic, three points were highlighted regarding remote work and public service in Greece: a) remote operation without the requirement for physical presence is largely feasible and effective, b) remote work burdens employees with the need to secure a workspace at home, which is not always feasible in terms of living conditions, space, and equipment, and c) there is an inevitable shift of operational costs from businesses to employees.

In this case study, the proposal for municipal remote work operational centers (hubs) ensures a safe environment close to home, allowing employees to have a fully equipped workspace in a common working space open to the public and businesses. The available space can be a public or private building, and private capital can be leveraged with incentives provided to private enterprises. The successful development of such a structure within the Municipality will achieve a reduction in private vehicle usage, decrease commuting time to and from work, create job opportunities for single-parent households and/or young parents, and improve the user's quality of life. All of these are Sustainable Development Goals as adopted by the EU.

However, in the case of examining central Athens or any other city with significant tourist interest, the aspect of residency should revert to the parameters, while the demand for remote work structures would decrease. It should be noted that the exclusion of residency from this specific parameterization does not imply that protective measures for residency should not be considered to the extent that it is estimated that the proposed interventions will affect it (e.g., to avoid the phenomenon of gentrification). These measures should be examined during the stage of establishing the institutional framework for the implementation and execution of the 15minute city model in Greece.

Table2 presents the coverage of functions (YES/NO) per identified centrality in the Municipality of Ilioupoli. The indication "+" is used in case of desired enhancement of the specific use:

CENTRALITIES/USES	RETAIL	LEISURE	MERKET	GREEN SPACES	EDUCATION	HEALTHCAR E	REMOTE WOKRING
EXISTING							
Eth. Antistaseos Sq.	N	N	N	N	N	O	O

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Aneksartisias Sq	N	N	N	N	N	O	O++
Karaiskaki Sq.	N	N	N	N	N	N	O
28th October Sq	O	N+	N	N	N	O++	O
EMERGING/TO BE ENHANCED							
25th March Square	N+	N	N	N	N	O	O++
Agia Paraskevi Sq	N+	N	N+	N	N	O++	O
Agia Mavra Square	N+	N+	N	N	N	O	O++
NEW PROPOSALS							
Al. Panagouli Sq.	N+	N+	O	N	O	O	O
Swimming complex	O	O	O	N	N	O	O

Table 2. Coverage of functions (YES/NO) per identified centrality

To save resources, specifically concerning public service/healthcare facilities and remote working spaces, a larger radius per central point can be utilized. It is thus proposed a service clustering every three centralities. In this case study, remote working spaces may be established at 25th March square, at Anexartisias square, and at Agias Mavras square, while healthcare/public service facilities may be located at 28th October square and Ag. Paraskevis square, in addition to Karaïskaki square, which is in close proximity to the existing municipality's healthcare infrastructure. Even with this proposed clustering for these specific functions, the user's commute will not exceed the one-kilometer limit. Data on employment in the municipality of Ilioupolis, sourced from the Operational Program of the Municipality of Ilioupolis, report that out of a total of 30,527 employees in the municipality, 84.79% are employed in the tertiary sector of services [5]. This implies that even if there is a possibility of remote work for 1 out of 3 employees in the service sector, over 8,500 commutes to and from work are prevented per user.

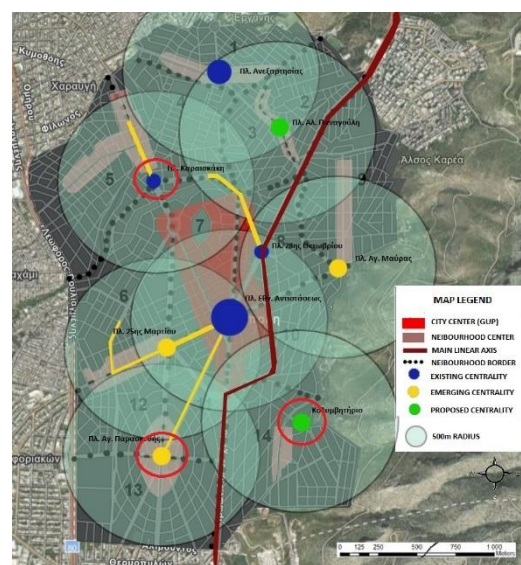
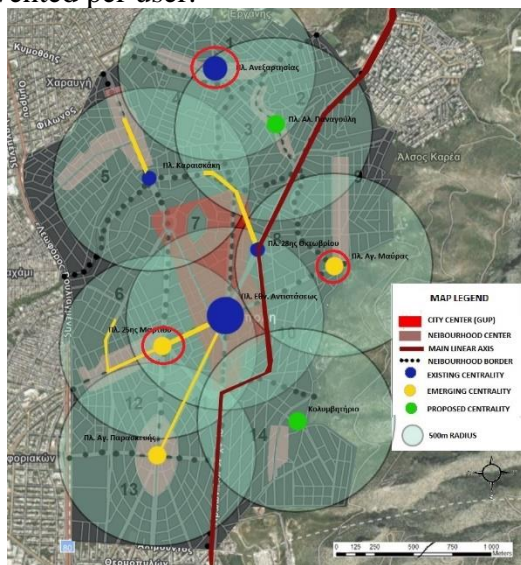


Figure 6. Proposed locations for remote working hubs

Figure 7. Proposed locations for healthcare facilities

In the previous section, the goals and needs for the operation of centralities in the Municipality of Ilioupolis were outlined. From the table that presented the coverage of functions (YES/NO) per identified centrality in the Municipality of Ilioupolis, we observe that the actual requirements of the local centers mainly involve enhancing existing functions and uses rather than adding new ones. This ensures that the proposal follows a dynamic already present in the area and guarantees a reduction in

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potential disruption of balance, as well as an increased likelihood of acceptance by the public. Specifically, as concluded from the above, the following are required:

Enhancement of existing use:

Retail in 4 centralities

Leisure in 3 centralities

Market in 1 centrality

Installation of new use:

Remote working facilities in 3 centralities

Healthcare/public service in 2 centralities

It should be noted, however, that an exact estimation of the level of enhancement needed is not yet possible, given that both remote work and public service/healthcare facilities are expected to attract daily users to the proposed locations, thus boosting retail and leisure uses to some extent either way. Furthermore, requirements for enhancing uses overlap with the installation of the new uses in all cases except for Panagouli Square, meaning that the city interventions can and will have multiple impact on several sectors.

According to the above analysis, the actions that the Municipality of Ilioupolis should take to support the above scenario are as follows:

Δ1. Enhancement of commercial, leisure and market uses in the designated areas.

Δ2. Establishment of 2 healthcare/public service facilities and 3 remote work facilities.

Δ3. Development of a network between centralities with safe routes that comply with the sustainable mobility principles.

Δ4. Modernization of regulatory framework to facilitate proposed interventions.

Actions Costs/Requirements	Δ1	Δ2	Δ3	Δ4
Leasing of building infrastructure				
Adapting building infrastructure				
Technical equipment				
Operating costs/Consumables				
Operating costs/Energy				
Incentives for private individuals				
Urban equipment				
Creation/upgrading of pedestrian traffic network				
Upgrade/Enhancement of green network				
Enhancement of public transportation				
Consultation organization				
Person-hours for consultation				
Diffusion of results				

Table 3. Requirements/costs per Action

In the above table, we have defined the minimum requirements for promoting the scenario of multiple centralities in the case study of Ilioupolis Municipality. We observe that, apart from the need for equipping, leasing, and/or adapting municipal buildings to accommodate the new uses of healthcare/public service and remote working facilities, there is a strong overlap of requirements per set Action. This implies increased efficiency of the resources allocated to meet each predetermined requirement.

Furthermore, we observe that overall, the requirements consist of mild-scale interventions that are either explicitly included in existing strategic priorities of the Municipality (e.g., the Operational

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Program of the Municipality of Ilioupolis 2015-2019) or are part of the requirements arising from compliance with European Sustainable Development goals. This fact, on the one hand, makes such interventions a constant target of the municipal authority and, on the other hand, entails the possibility of securing funding from European sources that will not burden the municipal budget.

It is therefore estimated that the substantial burden that the exploration of the 15-minute city model will impose on the Municipality of Ilioupolis will be small and mainly focused on issues of strategic development and management, consultation organization, resource leverage, and incentive development. In terms of efficiency however, this cost, besides being a constant need of Greek local government at all levels, is estimated to be much smaller in comparison to the benefits that the city and the user will derive in terms of daily living, resilience, risk management, as well as in relation to today's requirements for environmental protection.

5. CONCLUSION

In conclusion, the study on the implementation of the polycentric operation in the Municipality of Ilioupoli that promotes the 15minutes city model sheds light on the potential benefits and challenges associated with this urban development approach. Through an analysis of the identified functions and needs of the centralities, it becomes evident that the proposed strategy aligns with existing community dynamics and strategic priorities, thereby minimizing potential disruptions while maximizing public acceptance. The outlined actions required for supporting this scenario highlight the municipality's commitment to sustainable urban development, leveraging both existing strategic frameworks and European funding opportunities. Despite the anticipated modest increase in administrative and organizational efforts, the potential benefits for residents in terms of everyday living, resilience, and environmental protection far outweigh the associated costs. Ultimately, the pursuit of the polycentric 15minute city model represents a forward-thinking approach to urban planning that prioritizes the well-being and sustainability of the community in Ilioupoli, and potentially for more Greek cities.

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Architecture of the urban pavements in Rome. A case of study of Multi-scale and digital approach for an ecological transition

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Abstract

The issue of urban quality of public space has become a significant concern in city management strategies, as evidenced by international and European policies. A research project conducted by Citera-Sapienza University, funded by the Municipality of Rome, aimed to develop guidelines and tools to enhance the quality of urban pavements. The study posited that the quality of cities is inextricably linked to the quality of their streets, pavements, and squares. The complex urban structure and historical layers of Rome provide a unique opportunity for experimentation with various approaches to urban planning and management, with the ultimate goal of achieving urban quality. The study identified innovative solutions for different types of paving, including for vehicles, pedestrians, cyclists, and trams, as well as parking areas. In light of the city's diverse spatial contexts, the study sought to contribute to the urban quality and character of Rome's streets by elucidating its distinctive typological and morphological attributes.

Keywords: *urban quality; technological innovation; digitalization; sustainability; management of the built environment.*

1. INTRODUCTION

The maintenance and reconfiguration of public space is influenced by a number of socio-economic and cultural factors. Changes in the lives of European citizens, such as pandemics, wars, economic instability, green policies and the rising cost of raw materials, are determining new configurations in urban space. For example, the rising cost of petrol and the advent of e-mobility are influencing urban mobility, with more and more people using electric bicycles and scooters. However, this transformation has not been planned in a unified and conscious manner, leading to interference in urban mobility. The COVID-19 pandemic has also had an impact on the urban street, with the closure of parks and an increase in outdoor businesses. Restrictions on vehicular traffic to reduce carbon dioxide emissions, together with the need to develop rail transport, are leading to further changes in public space. These changes, which are part of the metamorphosis of contemporary life, are bound to persist. These changes, which are largely unplanned, are only one aspect of the broader challenges associated with the metamorphosis that contemporary life is undergoing. They are likely to persist. In light of this, it is crucial to explore ways to streamline and mitigate the impact of these changes. This entails understanding how to structure and streamline the process of change, as well as proposing alternative scenarios for the city of Rome. These scenarios should aim to enhance the city's resilience and sustainability, while reducing the negative effects of mobility, sociality, and trade.

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The definition of the '*Linee guida e strumenti operativi per il miglioramento della qualità urbana delle pavimentazioni stradali carrabili, ciclabili e pedonali degli spazi pubblici Roma Capitale*' was informed by the study of the principal element of the research, namely the roads. The term "street" is derived from the late Latin locution "via strata," which refers to a ballasted road. This term is derived from the Latin past participle "stratus," which is derived from the verb "sternere," meaning to lay down or pave. This definition is well expressed in its encyclopaedic definition: "long strip of ground made flat and firm, which the ancients used to pave to go from place to place." The term "way" is used as a synonym for the word "road," which in turn is derived from the Latin term "via." This term, in turn, is derived from the verb "vehere," which means to carry or to lead. In contrast to the word "road," the word "way" is used to describe a series of actions that occur in different contexts. This etymological reading suggests that the concept of concentrating research on the aggregative function of the street in the strict sense should be extended to encompass its role as a public space that is not solely intended for transport and movement from place to place. The street, which was originally a paved surface characterised by its materiality, has developed into a social and commercial hub, while still fulfilling its primary function of allowing pedestrian and vehicular movement.

The study of the road fabric at the urban scale, which determines the urban network, provides the foundation for understanding the settlement fabrics, which can be considered the negative of the road. These settlement fabrics comprise the morphological composition of urban planning studies in the broadest sense. The research was conducted at a smaller scale, focusing on proximity, to investigate in detail the spatial and perceptual configurations. The most appropriate tools for this study were identified as the cross-section, the plan and axonometry. In order to achieve this objective, a selection of urban planning treatises developed in the European context at the turn of the 19th and early 20th century has been chosen, with a particular focus on aspects related to the study of the street. This is because the authors selected were in part concerned with the observation of urban transformations, generated by the advent of modernity and the invention of the automobile, which have been significant factors in the organisation of the road system and the public space of social aggregation. Alternatively, they were directly concerned with the transformation of urban agglomerations.

2. MATERIALS AND METHODS

The research hereinafter presented commences with an analysis of the current state of good practices employed in the qualification of public spaces within compact, stratified, modern and contemporary cities. The study developed a typology of the compositional, functional, technological and material elements that constitute the city's street layout. In fact, the street plays a role in structuring and characterising the urban morphology in its historical complexity and in relation to the urban fabrics, which in turn influence the settlement typologies. These typologies can be categorised into three main areas:

- the street;
- the square;
- the green system.

The study of these complex systems has been articulated by breaking down the final elements through which they are concretely configured. As an example, the road, in addition to being classifiable in terms of urban planning and traffic, is made up of a set of concrete elements that can be gradually broken down: urban wings, trees, carriageway, lane, pavement, pavement, verge, drainage, manhole cover, etc. The considerable overlap between the various urban elements with different functions suggests that the architectural design of the street should be based on criteria that are always up-to-date and sensitive to the definition of quality elements of public spaces. These elements play a crucial role in the lives of citizens [1] and concern a multiplicity of aspects, including the theme of urban pavements. This is part of a broader theme of the quality of public space [2], since the street is the

soul of the city [3]. There is no doubt that through a partial reading of the city by stratigraphic levels, the layer constituted by urban paving – streets, pavements, squares – has an essential function in contributing to the quality of urban life. This element is the foundation of urban decorum and furnishings and interweaves the physical component with the functional and usage component of the city in a continuous state of transformation. The research aims to return to tradition, to the ‘genius loci’, to the sense of community and to the real inclusion of the citizen in civic life, inspired by the principle that the human being as an entity has not changed in its intrinsic nature throughout history. While customs, technologies, and production processes may evolve over time, the essence of humanity remains constant. The innermost tensions and needs of humanity, in all their complexity and universality, have remained unchanged throughout history.

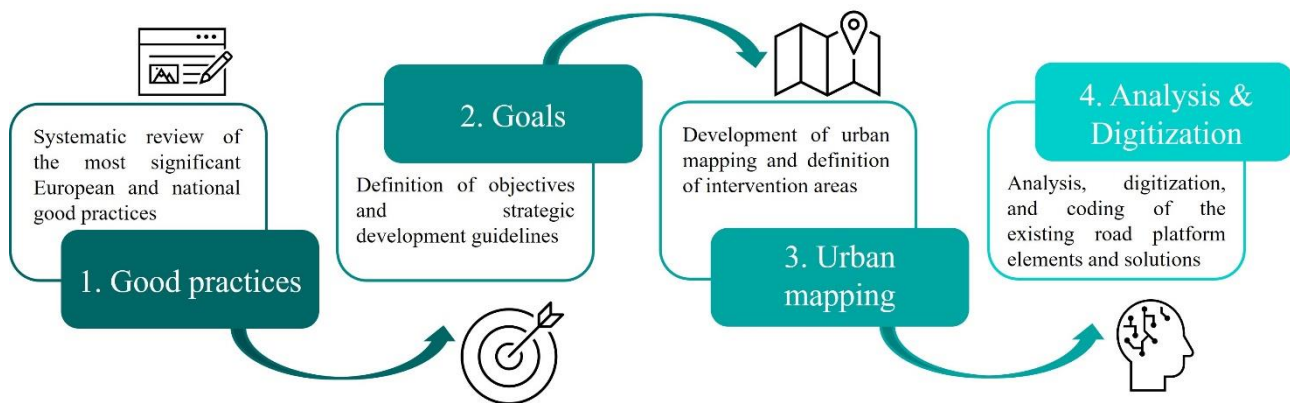


Figure 1. Methodology flowchart for the development of guidelines and tools aimed at enhancing the quality of urban pavements.

The methodology to develop guidelines and tools to enhance the quality of urban pavements is based on 4 main steps (Figure 1):

- 1st step: systematic review of the most significant European and national good practices;
- 2nd step: definition of objectives and strategic development guidelines based on the state of the art at the international and national levels;
- 3rd step: urban mapping;
- 4th step: analysis, digitization, and coding of the existing road platform elements and solutions.

2.1 State of the art and good practices

The authors selected for this study were chosen based on their contributions to the field of urban planning. Joseph Stubben's treatise, "Urban Development" [4] is a comprehensive study of urban planning in Europe, including numerous planimetries and road sections of cities across the continent. Many of these cities are located in our study area, specifically in the Iberian Peninsula. Of particular interest in this author's work are the graphic aspects, namely the use of the section as the most effective tool in the representation of the road platform in relation to the settlement tissues, and the quality of the representation in general, which lends itself excellently to the description of the road. Furthermore, the author implements a comparative vision in the vast sampling of roads analysed. The second treatise we studied was Camillo Sitte's "The Art of Constructing the City" [5], in which the author deals mainly with the square, the public space par excellence. He focuses a great deal on the perception of spaces and the relationship between the urban backdrop and the open space, between the road network and these nodes, as well as the material composition of the compositional elements. This approach is significant and interchangeable for the study, albeit of linear rather than punctual elements. These elements present some common characteristics in the uses of the street, some similar

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elements in the urban scene. These include urban wings, paving, monuments, fountains, kiosks, commercial activities, verges, interstitial greenery and albedo. The third author we have discussed is Eugene Henard [6], whose work is entitled 'Study on the Transformations of Paris'. In this text, Henard presents a series of futuristic scenarios regarding the urban and road layout for Paris. These scenarios are presented in a dystopian key, but they are not so distant from transformations that have actually taken shape in the composition of roads within consolidated cities in the European sphere. The fourth author analysed in the context of the development of the research is Ildelfonso Cerdà, who developed the plan for the urban transformations of Barcelona [7]. Cerdà paid particular attention to the conformation of the street from multiple points of view, in an exhaustive and even ironic way, in relation to the current and future transformations of the street in a broad sense. He dedicated a large chapter to the street within his treatise.

A systematic review of the most significant European and national good practices was also conducted to align knowledge with the state of the art on the specific topic. The good practices selected as most relevant at European level were the cases of Amsterdam and Barcelona, while at national level the cases of Milan and Bologna were deemed to be of particular interest. The selection was based on two criteria. The first concerns the period between 2011 and 2021, during which the most advanced measures in the field of urban sustainability were adopted by European cities. The second criterion considered the extent to which the policies adopted paid attention to the degree of stratification of the urban fabrics analysed and in particular to the relationship between the historic centre and the expanding city. In considering the cases in which the policies adopted paid attention to the degree of stratification of the urban fabrics analysed, and in particular to the relationship between the historic centre and the expanding city, it is evident that these variable conditions contribute to determining the objectives of standardising solutions. In the case of Barcelona's Superilles programme [8], which has become the model for the transformation of the streets of the entire city, the city council has identified the new 'panot for the 21st century' as a potential solution [9]. The first century of the programme preserves its value as an intangible heritage, while incorporating innovative solutions and technologies that make it more sustainable for the future. This sustainability is based on the composition of materials and manufacturing processes, reuse and recyclability.

In the context of Europe, it is notable that cities that have long favoured the development of soft mobility systems include Amsterdam. This city has adopted a method known as the 'Puccini method', which has been in use since 2021. This method is a manual that standardises solutions for the design of public spaces, including streets, squares and gardens. The method has adopted a set of sustainability standards, which must be met by every project and subsequent contract. In addition, this set of urban policies contains a mapping of pavements, a mapping of the lighting system and a mapping of the main structure of urban vegetation systems. Amsterdam's design guidelines can be found in two manuals that contain the technical details of the urban policies, including drawings and a list of the materials used. The *Handboek Groen* [10] provides guidance on the planning and management of greenery, while the *Handboek Rood* [11] offers advice on the design of urban elements.

It is also worth noting the city of Paris, which has developed a digital mapping model, created by the APUR Agency, for use from 2022 onwards by the Administration for the management of interventions on the road network. Additionally, the city has produced an *Atlas du Mobilier Urbain Parisien*, which is intended to assist in the planning of its maintenance. The relevance of the Paris case can be attributed to the mapping and systematisation activity carried out over a vast area on which highly articulated structures are triggered, as well as to the generation of an online platform, free and fully accessible, which demonstrates the replicability and transferability of this type of operation to different contexts. In the national context, the "Manuale dello spazio pubblico - Linee guida per la progettazione" [12] represents a flexible tool for the design of public spaces. In a recent resolution, the Municipality of Milan joined with *Milano Città 30* to set the speed limit in urban areas

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at 30 km/h as of 1 January 2024. This resolution anticipates the possibility of setting 50 km/h limits on some main roads after that date, a course of action that has been taken by Paris and Brussels. The Municipality of Bologna [13] also initiated the process of becoming City 30. This was achieved through the formulation of a document outlining the principles of urban quality. This document provided guidance on the design and implementation of open spaces for public use, including new urbanisation and redevelopment projects. The aim was to clarify and better interpret the concepts of quality and public use, in accordance with the prevailing regulations.

2.2 Definition of objectives and strategic development guidelines

In the context of urban public spaces, road pavements constitute the surface layer and are subject to continuous maintenance due to wear and tear and to technological and material upgrades to counter disruptive issues regarding environmental sustainability. In the compact city, the maintenance of pavements and their replacement is not a simple and interference-free process since the image and material consistency of these determine the image of the city's public spaces in their historical and material connotation rooted in the collective imagination. The surfaces of these spaces must respond to multiple needs, including those of a perceptive-landscape and historical-iconographic nature, in order to guarantee high levels of safety, well-being, usability and liveability. Therefore, the urban context and the functional requirements to which the pavements must respond according to the type of use that characterises them, necessarily influence the choice of morphology, material and installation. In the case of resurfacing an urban pavement, it is desirable, where possible, to preserve the site's construction traditions, respecting its material and chromatic characteristics, taking into account climatic and lighting conditions and the needs for comfort, efficiency and sustainability.

Careful road design can make a significant contribution to mobility, the environment, and human health. This can be achieved through the planting of trees, the adoption of specific materials to improve the microclimate, reduce air and noise pollution and increase the resilience of the urban system [14]. The road pavement construction sector is constantly evolving to optimise performance levels and durability. The following are some of the goals that can be achieved through careful road design [15]:

- Reduction of air pollution;
- Reduction of noise pollution;
- Reduction of heat island;
- Increased water drainage;
- Increased energy efficiency;
- Increased perceptive quality.

The protection of the city's historical features through the replacement of pavements with more efficient and sustainable materials from an economic and environmental impact point of view is a complex process. On a national and international (European) level, these activities have been organised and implemented through maintenance plans developed mainly in the technical sphere by the local administrations of the different cities. Noteworthy are the experiences of Barcelona, Amsterdam and Paris in the European context; of Milan and Bologna in the national context. The Experimental Study for the Definition of Guidelines and Operational Tools for the Improvement of the Urban Quality of Roadway, Bicycle and Pedestrian Pavements in the Public Spaces of Roma Capitale, prepared by the Interdepartmental Research Centre Territory Building Restoration Environment (CITERA), is a pertinent example of good practice within this context.

2.3 Urban mapping

The increased attention given to the user, the qualitative dimension of accessibility and usability of movement spaces, the heterogeneity and extent of urban contexts, and the plurality of morphological

characteristics of urban settlement fabrics require a new methodological approach for identifying standardized typological and constructive solutions aimed at meeting the needs of the diverse and resilient ecosystem. The innovative aspect of the research lies in the systemic approach that we have adopted in studying pavements. This approach differs from the purely viability-based approach that is more commonly used in modern interventions, which do not relate to the formal city in its morphological peculiarities. In an era strongly influenced by a prevailing globalisation, we believe that experimentation through the conjugation of crucial issues such as sustainability, environmental impact, reduction of heat islands and soil permeability must be integrated with the study of identity characteristics that cannot be divorced from the use of traditional materials in relation to the historicity of the fabrics. This is necessary to create new solutions that improve living conditions for citizens and preserve those characteristics proper to each settlement fabric. The conservative approach is innovative, through the original use of classic elements such as stone, which can be integrated into spatial configurations of permeable pavement fields. This approach has the potential to significantly reduce the environmental impact of total cementification, while preserving the aesthetic and formal features that constitute the collective recognition of the city by its inhabitants. The research in question therefore proposes a meticulous, cross-disciplinary approach, in continuity with the urban planning vision linked to the formal aspects of the city and in contrast with a mere viability approach typical of the post-war period and the advent of the automobile, which is highly reductive, and impoverishing compared to the richness of a formalistic approach.

The challenge in achieving this objective lies in identifying a cultural value that enhances it, as the utilisation of new technologies is employed to enhance the living conditions of users and to guarantee levels of eco-sustainability without compromising the identity imparted by the composition and materiality of the elements. To define a series of standardized solutions, it is essential to conduct a series of large-scale studies, oriented towards a critical overlap of different planning tools that can influence programming and management choices related to urban pavement characteristics. To the tissues of the regulatory plan, which identify homogeneous parts of the city, specific tools such as the general traffic plan, the urban sustainable mobility plan (PUMS), and the urban heat island map can be overlaid. Urban-scale studies must be based on a specifically elaborated basis, capable of expressing the connotation of the morphology of the city's environmental system.

2.4 Analysis, digitization and coding of the existing road platform elements and solutions

Another innovative aspect of the research is the instrumental one, namely the use of digital programmes. Given the extent of pavements and the heterogeneity of the constituent elements of the road platform in modern cities, it is deemed useful to establish a classification and a unique coding system to identify the main typologies and corresponding materials of urban pavements, as well as the interferences/nodes among the constituent elements of the road platform. The encoding of the constituent elements of the road platform serves as a starting point for the subsequent modeling of objects in the BIM environment - Building Information Modeling, to which specific technical specifications (such as materials, stratigraphy, dimensions, weight, color) and related laying and maintenance interventions can be associated to optimize the management system. The development of the case studies was carried out entirely within the BIM environment, which proved to be highly useful for the extrapolation of the graphic designs and the abacuses related to the quantities for computation [16-17]. Furthermore, software was employed for the visualisation and processing of images and renderings to simulate mood boards with the material characteristics of the pavement surfaces and road elements (driveway and pedestrian ramps, verges, tree beds, drains, manholes). 3D modeling software has been used to assess the microclimate and ensure sustainable and resilient urban design through innovative solutions aimed at enhancing thermal comfort while mitigating the heat island effect [18].

3. THE CASE STUDY OF THE CITY OF ROME

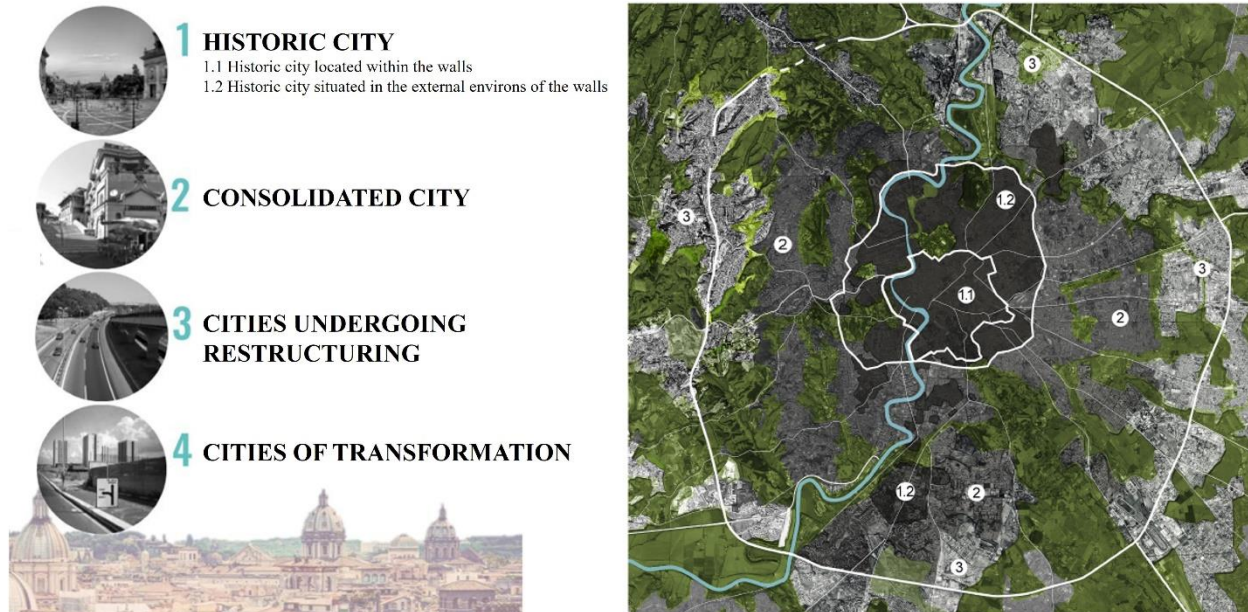


Figure 2. Division of the city into four main intervention contexts.

The investigation of the most efficacious methodologies delineated above revealed the pivotal elements employed to formulate the directives. In accordance with the overarching sustainability objectives, pioneering solutions were identified for vehicular, pedestrian, bicycle, and tram pavements, and those for car parks. Furthermore, in accordance with the strategic framework of existing urban plans, a subdivision of the city into four principal intervention settings was proposed: the historic city located within the walls; the historic city situated in the external environs of the walls; the consolidated city; and the city that is currently undergoing restructuring (Figure 2).

The articulation of the city of Rome by fabrics represents a genuine revolution because it acknowledges the diversity and typological/morphological complexity of the different parts that it is composed of. Over the course of its millennia-long history, this has resulted in the emergence of settings that differ from one another. It is therefore essential to discern these settings if the city's many identities and specific features are to be valued and preserved. It was, consequently, unavoidable that a study aimed at enhancing and improving the quality of the road space should make reference to the plurality of the typological/morphological articulation of the body of the city.

This was particularly the case in the specific instance of the mapping of Rome's road network, which required the provision of a framework that would enable the different spatial situations to be given shape and urban quality. Due to the extensive nature of pavements and the heterogeneous composition of the road platform, a classification and univocal coding were developed to identify the primary typologies, the corresponding materials for urban pavements, and the nodes in the BIM environment (Figure 3).

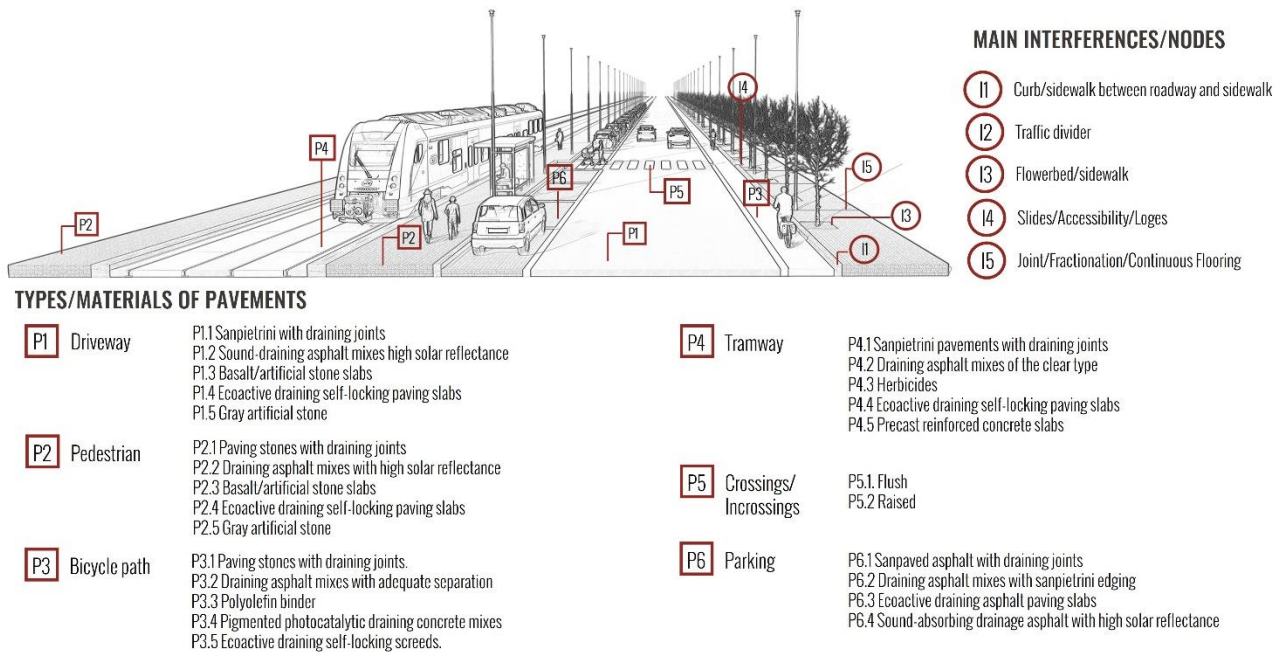


Figure 3. Coding of the existing road platform elements and solutions.

The effects on microclimate of the planned solutions for improving the urban quality of roadway, bicycle and pedestrian pavements in public spaces in Rome were tested using three-dimensional simulation software. Such software made it possible to measure the physical interactions that are generated within an urban context, consisting of open spaces (man-made or natural) and buildings, and to describe through specific parameters (temperature, humidity, wind speed, etc.) and outdoor well-being indices (Physiological Equivalent Temperature – PET, Urban Thermal Climate Index – UTCI, etc.) the microclimate (Figure 4-5). All of the activities involved in the research work have converged in the development of integrated digital models in the BIM sphere for the applied systematisation of new technologies and the prudent use of traditional materials in a sustainable manner, with particular attention to soil permeability.

This is achieved through the design of contextualised road sections in relation to the settlement fabrics. The methodology employed in the study involved considering the various options for pavement replacement in relation to urban fabrics and the building types that characterise them, with particular attention paid to urban historical-identity features. Starting from concrete cases and therefore from the detail, a typological classification was carried out in a standardised abacus (verges, drains, tree cups, manholes, paving surfaces).

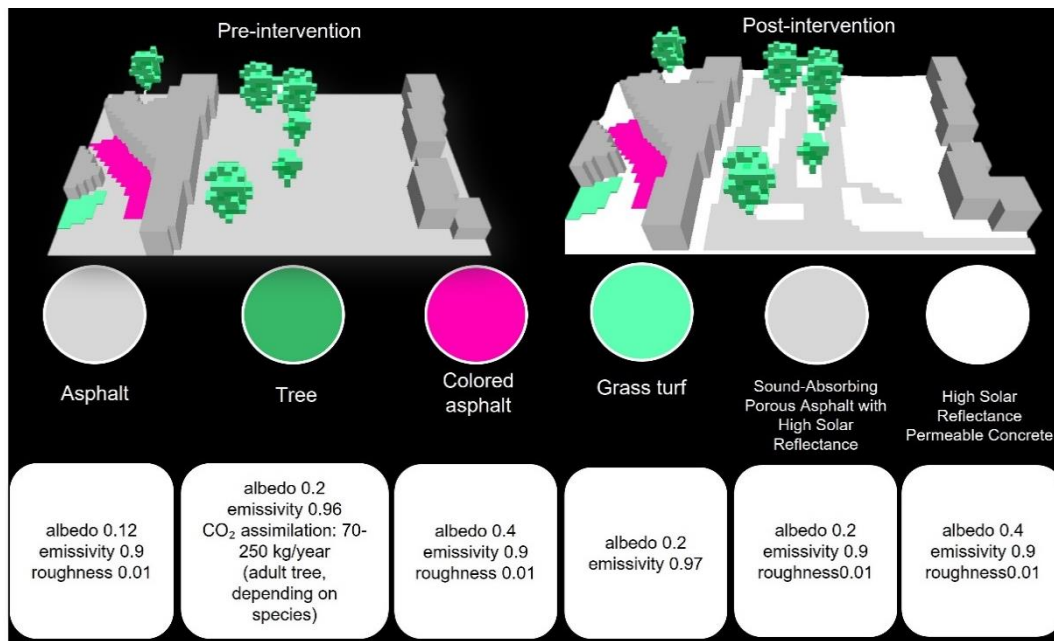


Figure 4. Example of the input data for the actual state and post operam simulations

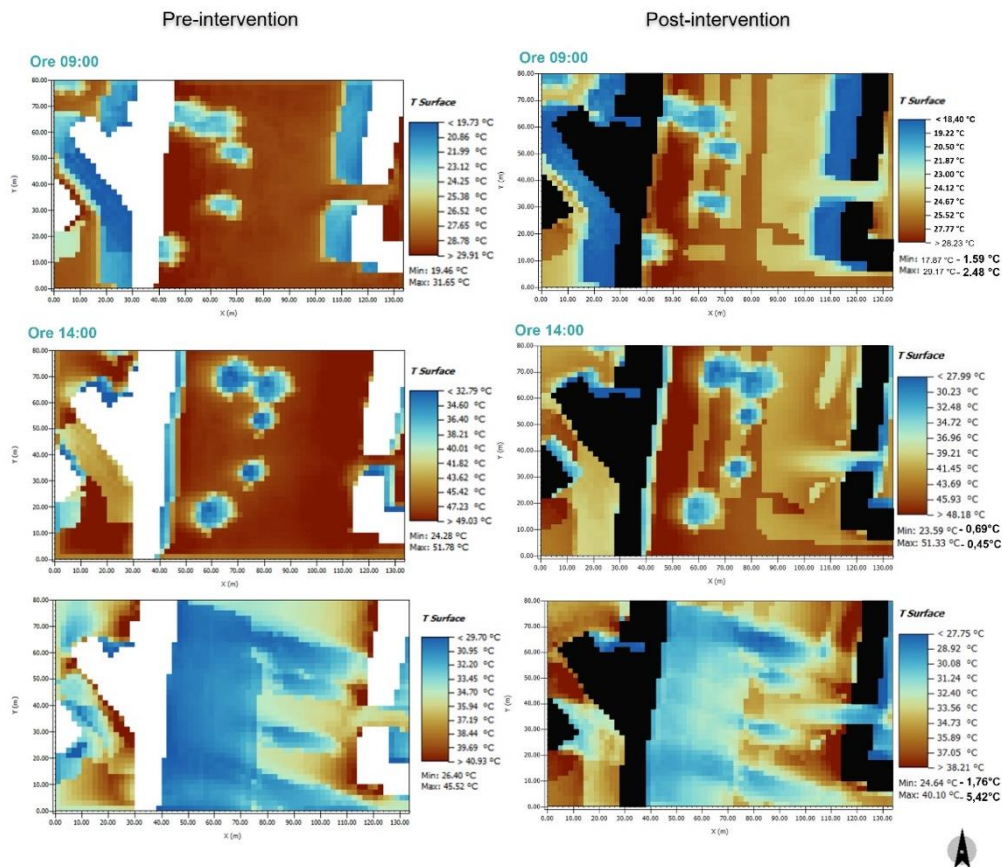


Figure 5. Results of simulations for verifying pavement surface temperatures conducted on 14/07/2023

The following section presents a summary description of the activities developed within the framework of the research project:

- The initial phase of the project, which was conceptual in nature, involved the systematic documentation of exemplary practices from both domestic and international sources. This was achieved through the use of textual cards and drawings.
- The second phase of the project involved the study and classification of urban fabrics through the identification and mapping of urban fabrics at an urban scale. This was followed by the development of projects for exemplary street sections of the city of Rome for the various settlement fabrics.
- The third synthesis phase resulted in the standardisation of the solutions in an abacus of the paving surfaces and road elements (pedestrian and vehicular ramps, kerbs, drains, tree beds) (Figure 6-7-8). Additionally, mood boards were created to simulate the material combination through the development of renders, thereby making explicit the textures and thus the aesthetic-formal result of the solutions.

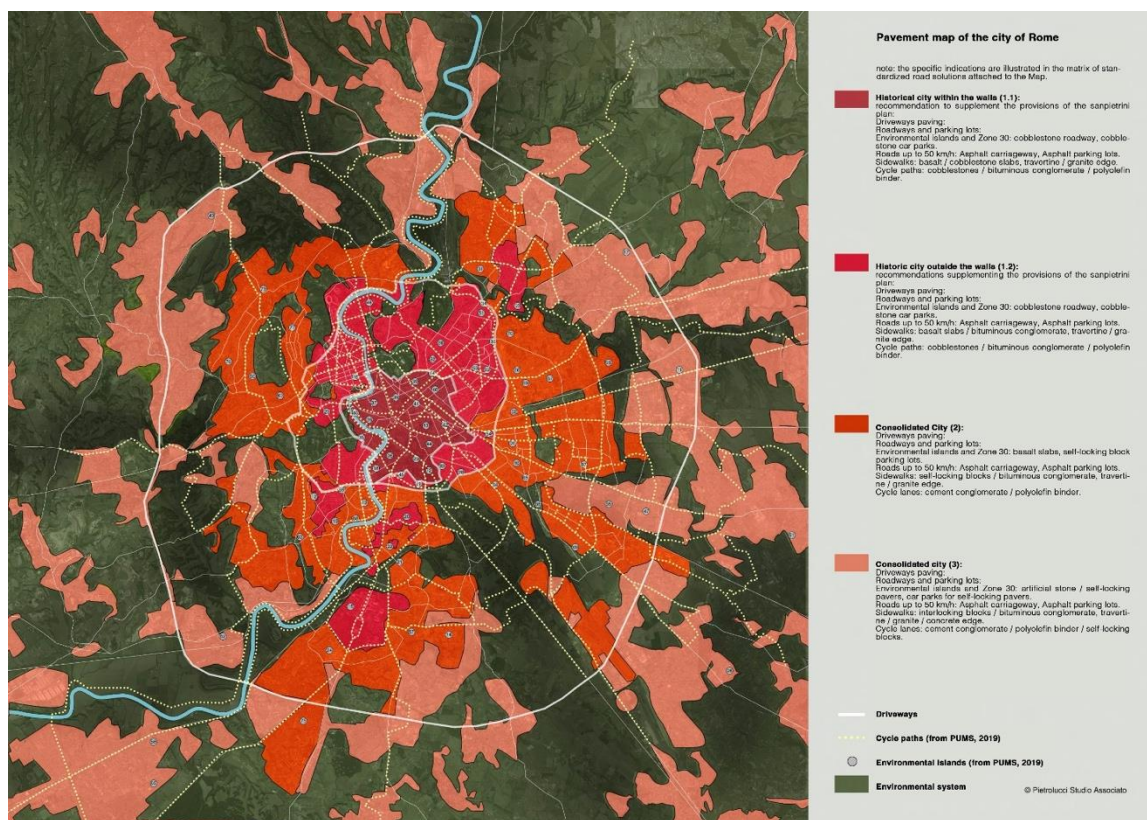


Figure 6. The map of road pavements in the city of Rome (2023): it attributes a set of materials and qualities to each of the road pavements. (source: Municipality of Rome).

4. CONCLUSION

The proposed research is characterised by its novel and original approach to the systematic integration of diverse digital tools to support regional management and facilitate the attainment of objectives pertaining to ecological transition and sustainable development, in accordance with both the fundamental tenets of the PNRR – namely, environmental sustainability and digitisation.

The system allows the creation of a dynamic and constantly updated road classification system, beginning with digital cartography processing and updating in open format and progressing to the scale of technological details through a single click transition to BIM [19] vision and logic. Further,

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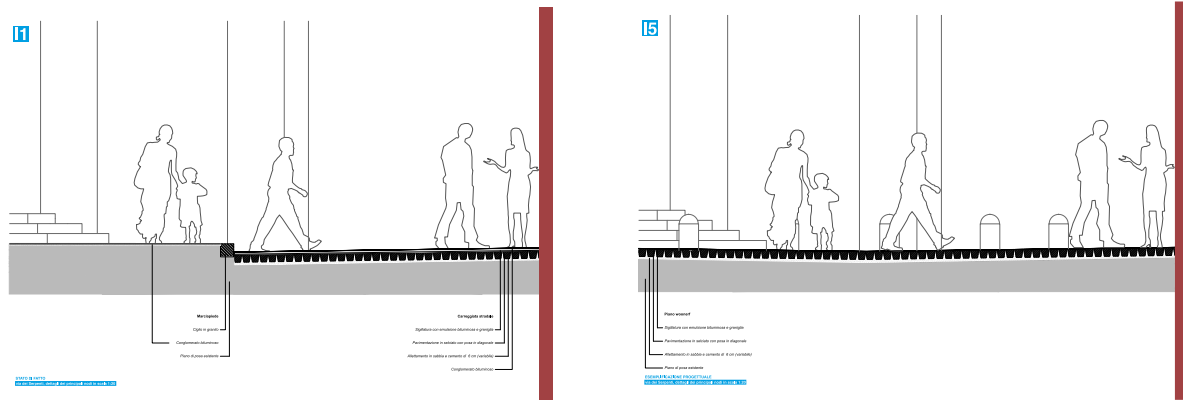
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it permits the retrieval of detailed information on architectural, interior, and infrastructural components at the requisite scales. Potential avenues of inquiry for activities aimed at enhancing the quality of urban areas may encompass the integration of sophisticated technological advances, such as AI and the IoT [20], which offer a novel avenue for promoting the implementation of ecological and digital transitions, a novel form of "sustainable innovation."

The development of digital technologies offers useful tools to facilitate planning, execution and maintenance procedures, which are essential for improving the safety and sustainability of road infrastructures [21]. One such example is the creation of a digital representation of a physical asset, which may include data such as historical conditions and relevant data. This digital duplicate can be employed in the implementation of predictive maintenance, which is of significant importance for the improvement of environmental, economic and social sustainability in accordance with the strategic objectives of the European policy framework.

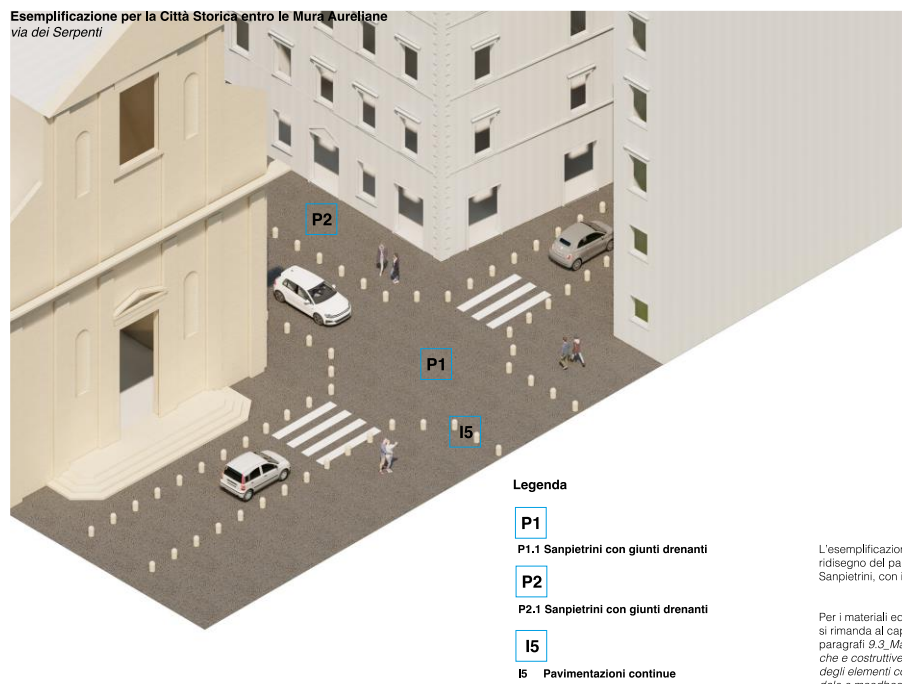
AMBITO DI PROGETTO ESIGENZE	PAVIMENTAZIONI CARRABILI				PAVIMENTAZIONI CICLO-PEDONALI				PAVIMENTAZIONI LINEE TRAMVIAE		CIGLI/BORDI		LOGES					
	CARREGGIATA		PARCHEGGIO		PISTE CICLABILI		MARCIAPIEDI											
1. Città storica 11 Città storica centrale entro la mura	Sarpietrini con giunti drenanti	Conglomerato bituminoso drenante fonoassorbente elevata riflettanza solare	Sarpietrini con giunti drenanti	Conglomerato bituminoso drenante con bordatura in sarpietrini	Sarpietrino con giunti drenanti	Conglomerato bituminoso drenante con adeguata separazione	Legante poliolefinico per conglomerati e asfalto	vincoli paesaggistici	Lastre in basalto / Pietra lavica ²	Sarpietrini	Sarpietrini	Conglomerato bituminoso drenante di tipo chiaro	Travertino	Granito	Elementi in pietra o agglomerato cementizio grigio sp. 33 mm			
12 Città storica dell'espans one extra mura	Sarpietrini con giunti drenanti	Conglomerato bituminoso drenante fonoassorbente elevata riflettanza solare	Sarpietrini con giunti drenanti	Conglomerato bituminoso drenante fonoassorbente con bordatura in sarpietrini	Sarpietrino con giunti drenanti	Conglomerato cementizio fotocatalitico pigmentato	Legante poliolefinico per conglomerati e asfalto	vincoli paesaggistici	Lastre in basalto / Pietra lavica	Conglomerato bituminoso drenante elevata riflettanza solare ¹	Sarpietrini	Conglomerato bituminoso drenante di tipo chiaro	Travertino	Granito	Agglomerato cementizio grigio sp. 33 mm			
2 Città consolidata	Lastre in basalto / Pietra lavica	Conglomerato bituminoso drenante fonoassorbente elevata riflettanza solare	Mazzoli autobloccanti drenanti eccattivi ³	Conglomerato bituminoso drenante fonoassorbente elevata riflettanza solare	Conglomerato cementizio drenante fotocatalitico pigmentato	Legante poliolefinico per conglomerati e asfalto	vincoli paesaggistici	Pietra artificiale grigia	Conglomerato bituminoso drenante elevata riflettanza solare	Sarpietrini	Irrobbita	Conglomerato bituminoso drenante di tipo chiaro	Travertino	Granito	Agglomerato cementizio grigio sp. 33 mm			
3 Città da ristrutturare 4. Città della trasformazione	Pietra artificiale grigia ²	Mazzoli autobloccanti drenanti eccattivi ³	Conglomerato bituminoso drenante fonoassorbente elevata riflettanza solare ¹	Mazzoli autobloccanti drenanti eccattivi	Conglomerato bituminoso drenante fonoassorbente elevata riflettanza solare	Conglomerato cementizio drenante fotocatalitico pigmentato	Legante poliolefinico per conglomerati e asfalto	vincoli paesaggistici	Mazzoli autobloccanti drenanti eccattivi ³	Mazzoli autobloccanti drenanti eccattivi ³ in pietra artificiale grigia	Conglomerato bituminoso drenante elevata riflettanza solare	Mazzoli autobloccanti drenanti eccattivi ³	Irrobbita	Conglomerato bituminoso drenante di tipo chiaro	Travertino	Granito	Calcestruzzo	Agglomerato cementizio grigio sp. 33 mm
	Isole ambientali - Zone 30 >50 km/h		Isole ambientali - Zone 30		Isole ambientali - Zone 30		Isole ambientali - Zone 30		Isole ambientali - Zone 30		Isole ambientali - Zone 30							

Figure 7. Matrix of standardised typological and construction solutions – materials (source: Municipality of Rome).



a)

b)



c)

Figure 9. Examples of a technical data sheet from the BIM environment, for Via dei Serpenti in Rome. a) cross section of the current state; b) cross section of the design state; c) axonometry of the proposal design. (source: Municipality of Rome)

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From *Paper architects* to Digital cities

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Abstract

The architectural visionaries of the 1960s and 1970s, including Lebbeus Woods, Paolo Soleri, Cedric Price, and the collective brilliance of the Archigram group, have left an indelible mark on the discipline, earning them the moniker "paper architects." Their avant-garde projects not only pushed the boundaries of conventional architecture but also served as blueprints for future urban landscapes. Even today, their ideas continue to echo in contemporary discussions surrounding urbanism and the rise of digital cities, underscoring the timelessness of their visionary concepts.

This paper provides an overview of the innovative and abstract concepts, represented by these paper architects, comparing them with digital urbanism. Through an examination of their groundbreaking projects, it seeks to unravel the core paradigms that underpinned their architectural visions. These architects dared to imagine audacious urban futures that transcended conventional spatial, technological, and societal norms, challenging the status quo with their radical designs.

A retrospective analysis of their master plan projects serves as a lens through which to elucidate their key principles and methodologies, offering valuable insights for contemporary urban development in the digital age. Of particular interest is how these architects leveraged artistic drawings as not just means of representation, but as tools for experimentation and communication, breaking free from the constraints of traditional architectural practice to envision bold new possibilities.

Moreover, this research endeavors to investigate the integration of digital influences into the urban design process. By synthesizing lessons gleaned from past visionary endeavors with the capabilities afforded by digital tools and techniques, it aims to chart novel pathways for urban development in the digital era. The convergence of analog visionary thinking with digital technologies presents unprecedented opportunities for reimagining urban spaces, fostering greater sustainability, inclusivity, and resilience.

Through a nuanced exploration of the intersections between analog innovation and digital evolution in architecture and urbanism, this paper seeks to inspire a renewed dialogue on the future of our cities. By honoring the legacy of these paper architects while embracing the transformative potential of digital technologies, it aspires to propel urban design towards new frontiers of creativity and ingenuity. In doing so, it aims to cultivate a deeper understanding of the dynamic relationship between past, present, and future in the ever-evolving urban life.

Keywords: *Paper architects; Digital cities; Urbanism; Architectural evolution; Architectural drawing*

1. INTRODUCTION

In today's rapidly evolving urban landscape, the intersection of architecture, technology, and urbanism has given rise to a new paradigm: digital cities [1]. It is becoming commonplace for communities, cities, and regions to create their own counterparts in the virtual world. These initiatives are often termed 'virtual' or 'digital' cities because they represent virtual renditions of physical spaces. [2] Since the emergence of the World Wide Web in 1991, there has been ongoing speculation about the concept of the 'digital city'. This digital dimension can be seen as a transformed version of architecture, considering changes in medium, context, and design processes. [3]

However, the concept of a virtual or digital city remains uncertain. Many attempts to define this phenomenon are speculative and metaphorical, addressing only parts of its complex impacts and often overlooking significant aspects. Most research on virtual cities focuses either on the design elements

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of city websites or on the possibilities of VR (virtual reality) and 3D modelling for urban simulation. [4] The terms 'virtual city' and 'digital city' have an almost infinite number of interpretations, creating a degree of interpretative flexibility that affects their definition. This occurs not only among practitioners but also within urban studies. In this context, this research offers its own interpretation of virtual cities, supported by literature and inspired by the principles of paper architecture. [5]

The interpretation of the meaning of digital cities in this paper is represented by learning from paper architects (Paolo Soleri, Archigram, Cedric Price and Lebbeus Woods) from 20th century and using the transformative potential of digital advancements in 21th century, in order to create the new meaning of the phenomenon. Visionary architects are known for their experimentalist approach (a concept borrowed from science and introduced into architecture by Peter Cook in his 1970 book *Experimental Architecture*), which they portrayed through analog media; artistic drawings and abstract diagrams. By integrating their analog with digital approach, this research emphasizes that the essence of architectural production lies not in the medium itself but in the experimentation. Revisiting the past, in which paper architects predicted and proposed innovative analog solutions for future cities that would utilize digital technologies, can provide valuable insights into how our digital future might look.

The desire was to go beyond architecture, to define new languages and energies for projects destined to an 'invisible city', a city without architecture as it had been traditionally understood, but conceived for the future, based on the sensitivity and intuition of the present. [6]

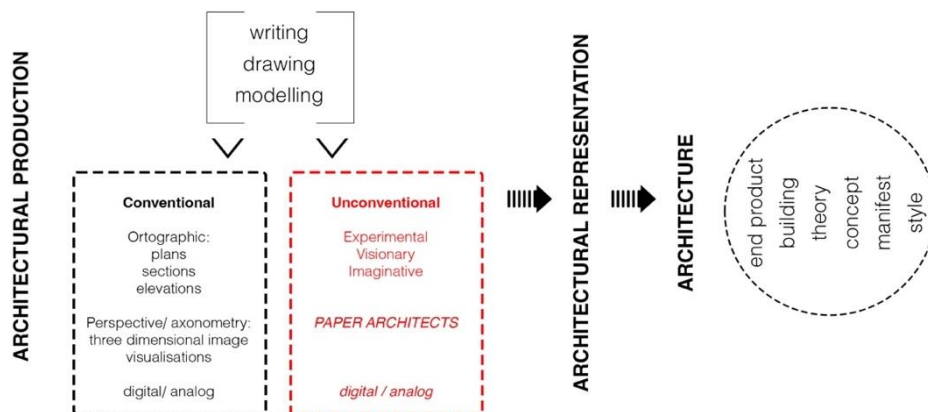


Figure 1. Conceptual diagram of architectural methodology, Drawn by the author.

The Paper architects produced a number of design projects on the subject of digitality, either imagining how computers might affect the life of city dwellers, or investigating what changes such machines would bring to architecture. Working with analog tools and thinking about an abstract digital future, paper architects deployed concepts that would have come to be crucial in recent discussions in architecture based on digital reality. Their research into digitality, conducted without the aid of computers, led them to explore fundamental questions about the intersection of technology, society, and the built environment. By envisioning how computers might impact urban life and reimagining the relationship between time, space, and architecture, these visionary architects laid the groundwork for contemporary discussions on digital reality.

From selected projects such as Babel II by Paolo Soleri, Plug in City by Archigram, Potteries Thinkbelt and Fun Palace by Cedric Price, and Centricity by Lebbeus Woods will input for the creation of digital cities will be drawn.



Figure 2. Paper architects and their notable projects: It features Paolo Soleri's *Babel IIB*, Archigram's *Plug in City*, Cedric Price's *Potteries Thinkbelt* and *Fun Palace*, and Lebbeus Woods' *Centricity*.

At every instant there is more than the eye can see, more than the ear can hear, a setting or view waiting to be explored. Nothing is experienced by itself, but always in relation to its surroundings." [7]

2. PAPER ARCHITECTURE

2.1 Paolo Soleri and *the Babel II*, Cyber city

"Architecture is the physical form of the ecology of the human, that configuration of matter which allows for the best energetic and willful flux." [8]

"The city is a human problem that has to find its answer within ecological awareness." [9]

Urban density, protection of undeveloped land, zero-impact cities—these are just some of Paolo Soleri's concepts, hastily labeled as utopian by zealous reactionaries, that have entered the consciousness of an entire generation of aspiring architects and have become the main expressions of contemporary sustainable design. By the end of the 1950s, the Italian American architect he explored

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the concept of creating megastructures, self-contained urban environments that function as self-sufficient cities. He developed the Arcosanti project which was based on the principles of arcology — the fusion of "architecture" and "ecology" — where Soleri proposed megastructures that minimize land use and support a living, organic system, encouraging human ecology. Soleri's projects marked an important era for future city visions. His approach sought to radically reshape fragmented cities and foster collectivity in an expanding urban population, framed within a global and environmental understanding.

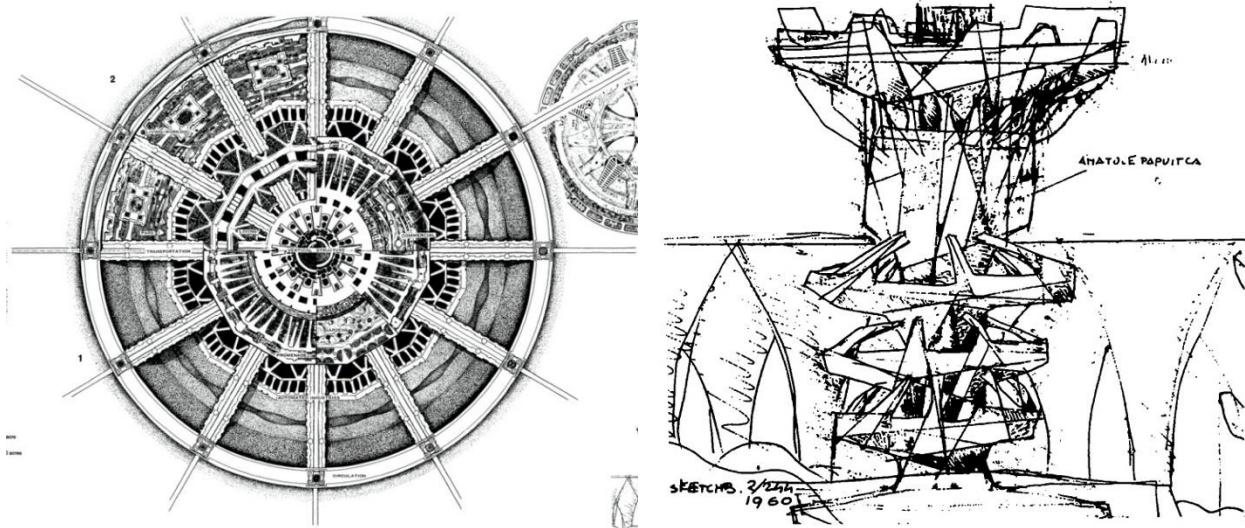


Figure 3. Paolo Soleri's *Babel IIB*, floor plan and drawing of an elevation, source: *The city in the image of a man*, Paolo Soleri

The future city, in Soleri's view, is Babel II, conceptualized for a population of 520,000 people. The design featured vertical shafts for transportation, with platform-grounds anchored to these shafts. The periphery housed residential spaces, the medial belt contained gardens and waste processing plants, and the center included civil facilities and workplaces. The top platform-ground was designated for cultural institutions such as schools, labs, studios, theaters, and libraries. At ground level, parks, gardens, and playgrounds comprised the hyper-structure.

Soleri's work on Babel II was innovative for several reasons. Firstly, it proposed a high-density urban environment that integrated ecological principles. By minimizing land use and emphasizing vertical growth, Babel II aimed to reduce the environmental footprint of urban development. Soleri's approach was to view the city as a living organism, where each part is interconnected and interdependent, much like the elements of a natural ecosystem. Secondly, Babel II incorporated cybernetic principles, viewing the city as a system with feedback loops that enhance its functionality and sustainability. Soleri believed that the built environment should operate similarly to a biological organism, where the flow of matter and energy is abundant and uninterrupted. "Life is where the flow of matter and energy is abundant and uninterrupted," Soleri wrote, emphasizing the importance of efficient energy transformation in urban design. Soleri employed traditional architectural techniques on a massive scale, using drawing and conceptual models as tools for exploring and communicating his ideas. His methodology was deeply influenced by his understanding of natural systems and his commitment to creating sustainable urban environments.

Soleri's visionary ideas, particularly those embodied in Babel II, provide valuable insights for the development of digital cities. The decentralized and networked nature of Babel II, with its emphasis on feedback loops and systemic integration, parallels the structure of digital cities. In digital environments, where virtual and physical spaces intertwine, Soleri's principles of arcology and cybernetic urbanism can guide the creation of sustainable, efficient, and resilient urban systems.

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"The city," he says, "is a bio- mental organism of a thousand minds." [10]

2.2 Archigram and the Plug in City, Cluster city

Archigram's "Plug-in City," conceived by Peter Cook in the 1960s, presents a radical urban design vision challenging conventional static infrastructure. It proposes a dynamic megastructure where modular, mobile units adapt to evolving needs and technologies. This approach shifts from top-down planning to an organic, bottom-up process, fostering a continuously evolving cityscape. Modular units, movable within the megastructure, accommodate changing population sizes and societal needs, reflecting an organic growth model. The project's emphasis on decentralization and modularity aligns with contemporary digital cities, emphasizing flexibility and real-time responsiveness. User participation and customization, central to Archigram's vision, resonate with digital city principles, fostering inclusive urban ecosystems. Moreover, "Plug-in City" has influenced architectural theory, inspiring futuristic urban concepts. Its plug-in design offers insights for urban regeneration, advocating for incremental, context-sensitive interventions. In essence, "Plug-in City" anticipates many aspects of digital cities, providing a visionary framework for adaptable, resilient urban environments. [11]

2.3 Cedric Price and the Potteries Thinkbelt & Fun Palace, Moving city

Cedric Price, an architect and urban planner, envisioned transformative projects aimed at revitalizing stagnant communities and fostering dynamic interactions between education, industry, and culture. Two of his most revolutionary proposals, the Potteries Thinkbelt and the Fun Palace, offer profound insights into the development of modern digital cities. These projects exemplify the integration of technology, flexible infrastructure, and collaborative spaces—key elements that underpin the concept of digital urbanism. [12]

The Potteries Thinkbelt, proposed between 1964 and 1967, was conceived as a bold response to the economic decline in northern Staffordshire, an area historically dependent on pottery manufacturing [13]. Price's revolutionary proposal aimed to transform this industrial wasteland into a vibrant hub of advanced technical education and research. This networked, mobile learning facility for 20,000 students was designed to transcend conventional educational buildings, catalyzing institutional and economic revitalization. [14] Price imagined the Thinkbelt as a lifelong learning facility, offering flexible, adaptable educational environments throughout users' lives. The project's dynamic nature was reflected in its infrastructure, which included student accommodations, transport systems, and various configurations of teaching units such as inflatable lecture theatres, capsule facilities, and fold-out decks. These components allowed the Thinkbelt to adapt to changing needs and demands, embodying the principles of flexibility and mobility [15].

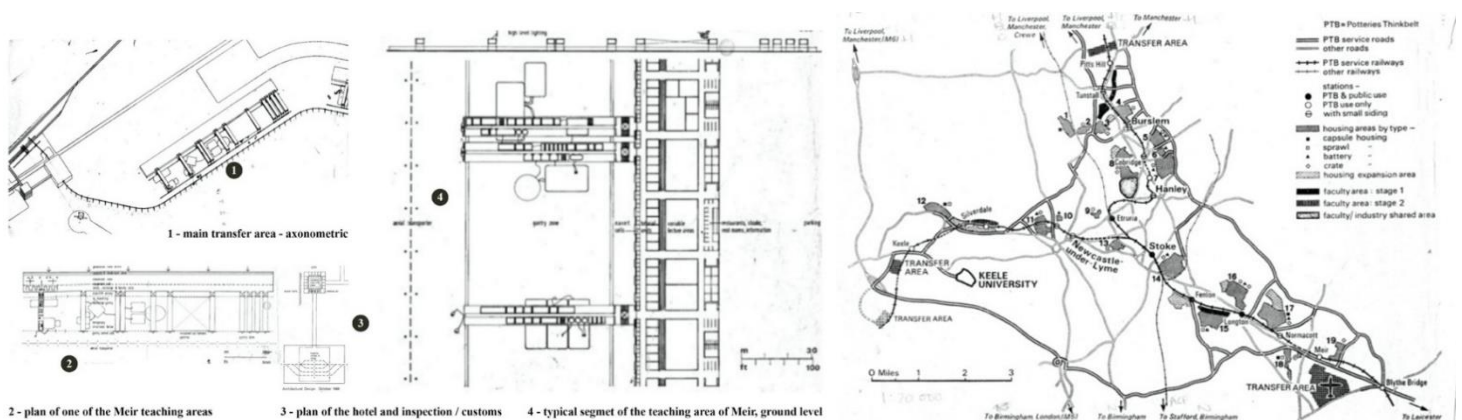


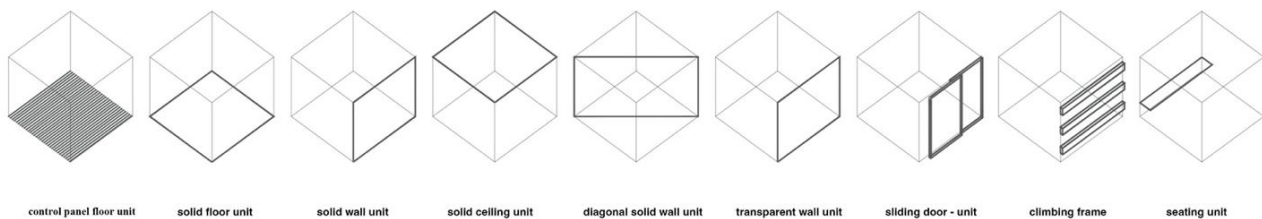
Figure 4. Cedric Price, the Potteries Thinkbelt, source: *Architectural design* 1966

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Key elements of the Potteries Thinkbelt included utilizing railway carriages and mobile structures to create adaptable learning environments that could be easily relocated based on need and demand. Encouraging local industries to develop in close conjunction with university training and research programs, eliminating the divide between education and practical application, and aiming to restore a sense of community by aligning educational pursuits with local economic needs and cultural heritage were also crucial aspects. Housing for professors, researchers, and students was categorized into ‘crates,’ ‘sprawls,’ ‘capsules,’ and ‘batteries,’ ensuring varied and flexible living arrangements. [16] The Thinkbelt was envisioned to connect to broader infrastructural networks, reflecting Price’s belief that buildings and technologies must be catalysts for social and spatial interaction. [17] The Fun Palace, co-designed with theatre director Joan Littlewood, was another ground-breaking project that envisioned a flexible, adaptive structure dedicated to cultural and educational activities. Described as "a laboratory of fun," the Fun Palace was intended to be an ever-changing space that could accommodate a wide range of activities—from theatre performances and art exhibitions to scientific experiments and community gatherings. [18]

Fun palace: an axonometric showing the basic range of physical components



Fun palace: a type base that displays virtual elements - screens

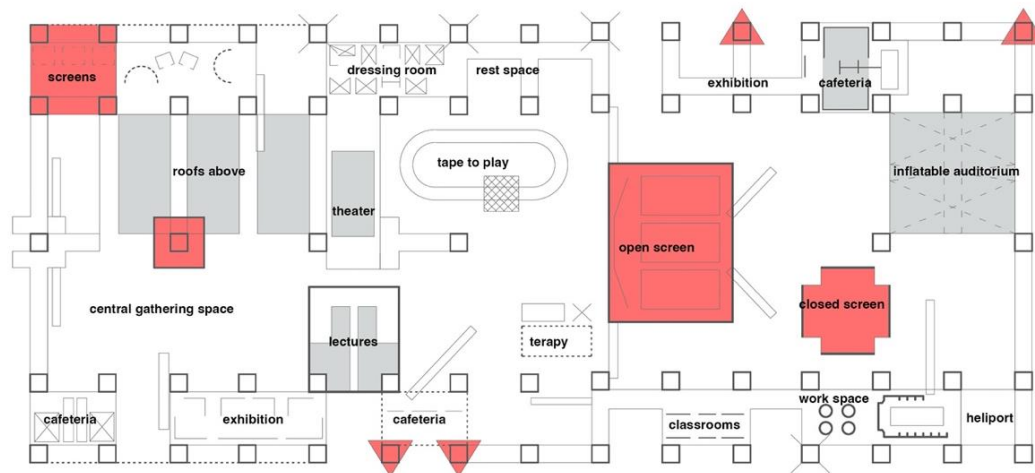


Figure 5. Comparative analysis of virtual and physical elements in the Fun Palace project, source: Drawn by author

Its adaptive architecture utilized modular and movable components to allow the space to be reconfigured based on user needs and activities. Emphasizing the role of users in shaping the space, the Fun Palace reflected Price's belief in architecture as a participatory and democratic process. Incorporating emerging technologies to enhance interactive experiences and facilitate learning and creativity was also a core element.

Both the Potteries Thinkbelt and the Fun Palace embody ideas that are highly relevant to the development of digital cities today. These projects show how important it is to have flexible, adaptable infrastructure that can keep up with technological changes and evolving user needs. The way the Potteries Thinkbelt integrates education, industry, and culture highlights the need for collaboration across different sectors to drive innovation and economic growth. Similarly, the participatory design of the Fun Palace underscores the importance of involving citizens in shaping urban spaces, a principle that digital cities can enhance through ICT for better user engagement and co-creation. Moreover, the Potteries Thinkbelt's potential for national and international connectivity fits well with the global interconnectedness of digital cities. Price's vision of buildings and technologies as catalysts for social and spatial interaction highlights the importance of creating urban environments that are not only functional and efficient but also vibrant and engaging. [19]

2.4 Lebbeus Woods and the Centricity, Radical city

"Maybe I can show what could happen if we lived by a different set of rules." [20]

"Centricity is a city in which architecture is not merely a background for living, a paradigmatic convenience, and even less a luxury afforded by the few; rather, it is an active part of the knowing and doing of each inhabitant, nothing less than a medium for living founded in physical knowledge and knowledge of the physical." [21]

Lebbeus Woods, a visionary architect renowned for his radical approach to urban design, viewed architecture not as a static construct but as a dynamic instrument for exploration and experimentation. Inspired by his fascination with science, particularly physics, Woods saw architecture as a medium to probe the underlying principles of the universe. His iconic project, "Centricity," embodies this philosophy, proposing a city characterized by overlapping centers and complex interactions reminiscent of emergent patterns observed in natural systems.

Contrary to its name, "Centricity" presents a decentralized notion of the center, depicting a city where numerous centers unpredictably overlap and interpenetrate each other. These centers constantly interfere with each other, creating disturbances and conflicts while simultaneously amplifying a collective energy akin to atoms. Woods envisioned "Centricity" as a hypothetical city governed by universal laws, embodying unpredictable forms and infinite variations. This concept mirrors individual human beings, forming the basis for community and emphasizing communication as the foundation of its architecture. For Woods, "Centricity" transcends purely material need, with structures serving both as instruments of play and as means of acquiring physical knowledge. He referred to these structures as "laboratories of living," highlighting their role in facilitating experiential learning. In developing "Centricity," Woods employed a distinctive methodology, using drawing as a tool for inquiry and communication. His sketches and illustrations went beyond visual representations, serving as a means of conceptualizing and articulating complex ideas about urban dynamics.

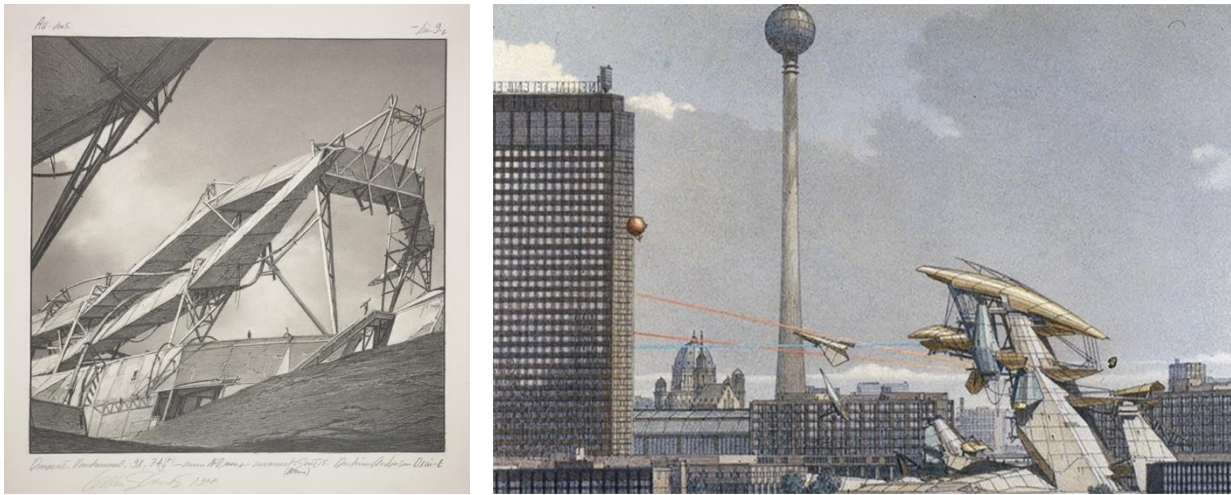


Figure 6. Lebbeus Woods: Centricity, source:

https://archive.org/details/centricitydrawings/1988.02_LWoods_Centricity_55.jpg

Beyond Woods' individual contributions, scholars like Crang (2000) recognize his work as instrumental in formulating new ideas of cities, including the concept of "centri-cities." These parallel cities, according to Crang, are characterized by complex interactions and differences, standing in opposition to classical notions of urban hierarchy. Woods' vision of "centri-cities" reflects a heterarchical city of dialogue, emphasizing incompleteness and incoherence as essential qualities. The decentralized nature of "Centricity," with its emphasis on overlapping centres and complex interactions, aligns with the dynamic and interconnected nature of digital urban environments. In digital cities, where virtual representations of physical spaces intertwine with real-world interactions, the principles of emergence and complexity espoused by Woods become increasingly relevant.

3. TOWARDS DIGITAL CITIES

The transition from paper architects' speculative visions to the realization of digital cities illustrates a profound evolution in urban design, driven by technological advancements and changing societal needs. The conceptual projects of Cedric Price, Paolo Soleri, Archigram, and Lebbeus Woods laid the groundwork for reimagining urban spaces in ways that transcend traditional architectural constraints. Cedric Price's Potteries Thinkbelt and Fun Palace introduced the idea of flexible, mobile infrastructure capable of responding dynamically to shifting educational and cultural demands. These projects anticipated the modular and adaptable nature of contemporary digital cities, where smart technologies enable real-time adjustments to urban environments based on data-driven insights.

Paolo Soleri's Babel II proposed an ecological mega-structure that minimized land use while promoting vertical growth and sustainability. This concept aligns closely with today's green architecture and smart city initiatives that integrate environmental consciousness with technological innovation. Soleri's vision of a cybernetic city, operating as a living organism with efficient energy and resource flows, prefigures the interconnected systems and feedback loops fundamental to modern digital urbanism.

Archigram's Plug-In City conceptualized a modular urban framework, where interchangeable parts could be easily reconfigured to meet changing needs. This idea resonates with the principles of digital cities, where infrastructure is designed to be flexible and scalable, incorporating IoT (Internet of Things) devices and smart grids to optimize urban functionality. Similarly, Lebbeus Woods' Centricity explored radical, decentralized urban forms, emphasizing the transformative power of architecture to create equitable and resilient communities. This vision is mirrored in the

decentralized, networked nature of digital cities, which leverage technology to enhance connectivity and democratize access to urban resources.

Collectively, these projects from paper architects highlight the importance of adaptability, sustainability, and integration in urban design. They offer valuable insights for the development of digital cities, emphasizing that the essence of future urban environments lies not just in technological adoption but in the holistic integration of social, ecological, and spatial dynamics. By drawing on these visionary ideas, contemporary urban planners and architects can craft digital cities that are not only technologically advanced but also human-centric and ecologically responsible. This synthesis of past visionary thinking and present digital capabilities provides a robust framework for addressing the complex challenges of modern urbanization.

4. CONCLUSION

Creating visionary projects has often been marginalized as insignificant to the progress of urban development in the real world. However, as Neuman and Hull suggest, "if we cannot imagine, then we cannot manage," [22] highlighting that the practices of conceptualization, envisioning, and performing future cities are essential for addressing their increasing complexity. This research methodologically approached the topic by first selecting significant 20th-century works that vividly express potential future collective life. These projects were then categorized and analysed to identify principles applicable to the development of digital cities. By examining the agency within these visionary concepts, this research aims to provide a valuable visual resource and guide for catalysing new perspectives and rethinking the application of future digital city visions. By connecting the past visionary work of architects like Paolo Soleri, Archigram, Cedric Price, and Lebbeus Woods with the emerging paradigm of digital cities, this paper underscores the continuity and relevance of their innovative ideas. These historical projects offer essential insights into adaptability, sustainability, and integration, which are critical for the evolution of digital urban environments. Consequently, revisiting and integrating these experimental approaches with contemporary digital tools can enrich our understanding and implementation of future urban designs, ultimately creating more dynamic and human-centric.

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EU Biodiversity Strategy for 2030 on the example of Belgrade Linear Park Project

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Abstract:

The European Union recently introduced the Biodiversity Strategy for 2030, encompassing guidelines for cities to define plans for greening urban spaces to protect ecosystems. These guidelines encourage cities to create natural spaces within the urban landscape, providing numerous benefits such as improved well-being and pollution reduction. As part of this strategic plan, a draft guide was published in 2021 to assist cities in preparing greening plans.

The research focuses on the Linear Park project in Belgrade as a case study, aiming to examine the challenges and opportunities associated with implementing the EU Biodiversity Strategy by 2030. Belgrade, as the capital of Serbia, serves as a good example for studying the application of these strategies. Its rich historical and cultural heritage, coupled with rapid urbanization pressure, underscores the urgency of sustainable urban planning. The location of Belgrade, between the Sava and Danube rivers, provides conditions for realizing biodiversity strategies. Recent initiatives for urban development create a favorable environment for investigating the effectiveness of integrating natural solutions into urban planning processes.

The linear park is a project of public space spanning 4.5 km along a former railway track. The goal of this project is to create new public spaces with a predominant park function, fostering innovative and sustainable solutions. Through a case study of this project, initiated in 2021, an analysis of the quality of such a solution in relation to the EU Strategy for 2030 can be conducted. The research's methodological approach is based on the analysis and application of general strategies from the draft document "Urban Greening Plan" which is a part of the EU Biodiversity Strategy for 2030.

The research aims to identify the problems and potentials of the Linear Park Project in comparison to the main goals and research methods in the "EU Biodiversity Strategy for 2030". This work will contribute to the research on Belgrade's urban greening strategies, following the principles of integrating natural solutions into urban development processes, using the example of the Belgrade Linear Park.

Keywords: *EU biodiversity strategy; Urban greening plan; Belgrade Linear Park; Urbanism; Nature*

1. INTRODUCTION

In the last few years, there has been a growing global focus on urban sustainability, emphasizing the role of green urban solutions in addressing the challenges of climate change. This shift in paradigm highlights the importance of collaborative approaches in designing and implementing strategies that integrate nature into the urban fabric. The most significant strategy that deals with biodiversity and nature conservation in urban environments is the EU Biodiversity Strategy for 2030. This strategy, which is part of the broader agenda of the European Green Deal launched by the EU Commission in 2019 [1], focuses on species conservation, nature protection, and the introduction of changes that will help address these issues. The main goal of this article- bringing nature back to cities is the starting point for the case study selection. The urban renewal project of industrial heritage currently under implementation, the Belgrade Linear Park, was chosen as a case study. This case study was selected due to its close connection with the principles and goals of biodiversity strategies. The project transforms 47 hectares of various neglected and contaminated areas into a unique ecosystem that

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spans along the banks of the Danube River. The study aims to present, evaluate, and identify the qualities and potentials in the projects of the Linear Park from the perspective of the thematic framework set by the EU Biodiversity Strategy for 2030 [2]. One of the particular features of this park is that it was designed and planned by different architects and planners, so a wide range of applied solutions are presented.

This study contributes to the broader discourse on urban sustainability by examining how localized projects can embody the fundamental goals of the EU Biodiversity Strategy, providing a blueprint for other cities aspiring to integrate the main goal of this Strategy into their urban development processes. Additionally, this study will provide guidelines regarding the potential for further implementation of solutions based on green infrastructure, nature-based solutions, and healthy ecosystems in the existing architectural and urban projects in the Linear Park.

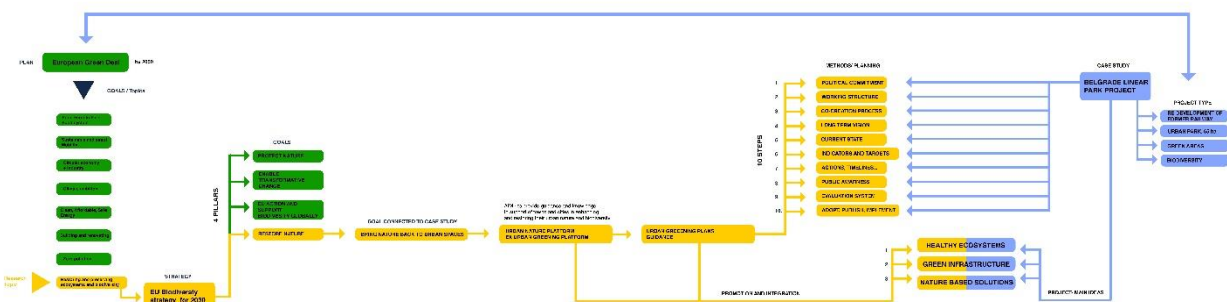


Figure 53 Research diagram, Goals and Plans, source: drawn by author

2. MATERIALS AND METHODS

In the initial step of the research, the primary goals and topics of the European Green Deal agenda and the EU Biodiversity Strategy were defined. The strategy represents a document that outlines objectives regarding environmental conservation and ecosystem protection. This step is significant as it demonstrates the relevance of the chosen research and the importance of the topic in the contemporary context. A continuous selection of goals was carried out, with an emphasis on those related to the reintroduction of nature into urban spaces. By identifying three main objectives derived from the strategy and associated documents (Urban Nature (Greening) plan), the foundations are set for the evaluation and recognition of implemented features within the case study. Through these three objectives and the case study, guidelines are established for the further development of the specific Linear Park project as well as potential future projects aimed at reintroducing nature into urban environments. The material used in the research can be divided into three types. The first type comprises planning documents (EGD, EU Biodiversity Strategy for 2030, Urban Greening plan), the second relates to the research process and planning of the Linear Park, and the third includes architectural and urban projects developed within the park. The materials from which aspects of urban planning solutions were analyzed consist of diagrams, graphical supplements, drawings, and textual descriptions of the projects.

2.1 The European Green Deal

The EU Green Deal, launched in December 2019 by the European Commission [3], represents a comprehensive agenda aimed at making Europe the first climate-neutral continent by 2050 [4]. The need to achieve the goals of the EU Green Deal arose as a necessity in the context of significant environmental degradation. The Commission points out that environmental and climate-related challenges are this generation's defining task [5]. As one of the goals of this agenda, the preservation and restoration of ecosystems and biodiversity were set. In addition to this goal, elements of the green

agreement include goals and strategies connected with the food system, mobility, circular economy and industry, climate, energy, pollution problems, and renovation.

2.2 EU Biodiversity strategy for 2030

The goal of preservation and restoration of ecosystems and biodiversity was introduced with the large strategy named the EU Biodiversity Strategy for 2030 - "Bringing Nature Back into Our Lives," published in 2020 by the European Commission [6]. The EU Biodiversity Plan 2030 is the most significant strategy launched by the EU Commission in 2020. The framework of this plan covers the member states of the European Union as well as states that want to be involved in the mentioned project. The need to nurture nature and ecosystems arose after the global pandemic of COVID-19, which drew attention to the problems of destruction and poor maintenance of nature. The great importance of this biodiversity conservation strategy would be reflected in both industry and capital, the business sector. According to the document there are 4 main pillars on which this plan rests: i. Nature protection, ii. Restoring nature, iii. Enabling transformative change, iv. A global biodiversity agenda [7]. The key aspect of this strategy that is connected with urban project is mentioned in the second pillar with the aim of restoring nature. *The Biodiversity Strategy aims to stop and reverse this trend by promoting the systematic integration of healthy ecosystems, green infrastructure and nature-based solutions into all forms of urban planning* [8].

2.3 Urban Nature (Greening) Plan

EU Biodiversity Strategy for 2030, pillar 2, identifies the greening of urban and peri-urban areas as one of the key commitments by 2030. This document and commitment are recommended by the EU Commission for all cities with a population larger than 20,000 inhabitants. Establishing green spaces can provide a wide range of benefits for cities. "Air and water pollution can be reduced by greening, provide protection from flooding, droughts and heat waves, and maintain a connection between humans and nature" [9]. The document defines crucial phases and steps for cities to reverse the process of urban nature ecosystems destruction. The strategy promotes nature-based solutions, green infrastructure, and healthy environments. These should include measures to create biodiverse and accessible urban forests, parks and gardens; urban farms; green roofs and walls; tree-lined streets; urban meadows; and urban hedges. They should also help improve connections between green spaces, eliminate the use of pesticides, limit excessive mowing of urban green spaces, and other biodiversity harmful practices. Such plans could mobilize policy, regulatory, and financial tools.

Currently, the Urban Nature Plan is in the preparation phase. So far, guidance has been published to help local authorities achieve the plan's goals "develop ambitious Urban Greening Plans" (now called Urban Nature Plans). This guidance was developed in collaboration between Eurocities and ICLEI [10]. They emphasize that developing an urban plan needs to include citizens and stakeholders. They invited cities with experience in implementing urban greening plans, and through this collaboration, the document was created. *The Urban Nature Plan is defined in 10 steps (mentioned in figure 1).*

3. CASE STUDY BELGRADE LINEAR PARK PROJECT

Belgrade Linear Park is a project aimed at redeveloping the old railway corridor that connects Beton Hala Waterfront and Pancevo Bridge. This project, currently awaiting realization, is located in the capital of Serbia, Belgrade. The redevelopment aims to transform the old railway into a green space within the Plan of General Regulation of Belgrade. The project area spans 46.7 hectares. In September 2018, the Assembly of the City of Belgrade adopted a Decision on the Development of the Plan of Detailed Regulation (PDR) for Linear Park, Belgrade. In December 2019, the CLEVER Cities Co-Creation methodology was applied in planning the Linear Park. This methodology provides "a complete co-creation pathway that encourages decision-makers to embed citizen engagement methodologies as an approach to co-design and co-implement nature-based solutions"[11]. During

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the process of co-creation and implementation of the park planning methodology, surveys and questionnaires were organized through which users and residents of the area expressed their ideas and nature-based solutions. This applied methodology in planning included a long-term vision for the project. Between December 2018 and December 2019, various analyses and evaluations were conducted, leading to clear priorities. Although this project was initiated before the publication of the EU Biodiversity Strategy for 2030, its planning includes steps highlighted in the draft document Urban Nature (Greening) Plan, with a special emphasis on co-creation. After setting goals and implementing ideas, the process resulted in a call issued by CEUS, the Office of the Chief Urban Planner, the Association of Belgrade Architects, and the EuPOLIS consortium, inviting young architects and planners to propose their solutions for the Linear Park spaces. The call was announced in December 2019 [12]. The reasons for issuing the call were defined with four goals: i. to contribute to the resilience of the central city zone to climate change by increasing the extent and quality of greening and surface water regulation of this area, recognizing several risks to public health and well-being, ii. to simultaneously improve the quality of the environment and promote the strategic development of Belgrade as a healthy and green city through the application of nature-based solutions, iii. by creatively and innovatively selecting programs of activities and contents specific to such a space, the Linear Park can contribute to the urban transformation of the surrounding area and enhance the attractiveness of the central city zone and the city as a whole, creating conditions for sustainable economic development. iv. With the help of sustainable urban mobility measures, through the promotion of pedestrian, bicycle, and environmentally friendly public city transport in the broader zone around the Linear Park, accessibility and connectivity of central urban areas and the waterfront will be improved [13]. A total of 145 young people in 28 teams responded to this call. At the end of February 2020, the ten teams were chosen by a Professional Committee comprised of 10 members to develop conceptual designs for 10 sections of the Linear Park. The park was separated in 10 zones that were divided to selected teams for future project development. The idea was to create 10 specific zones that will remain connected with parks linear form and movement patterns.

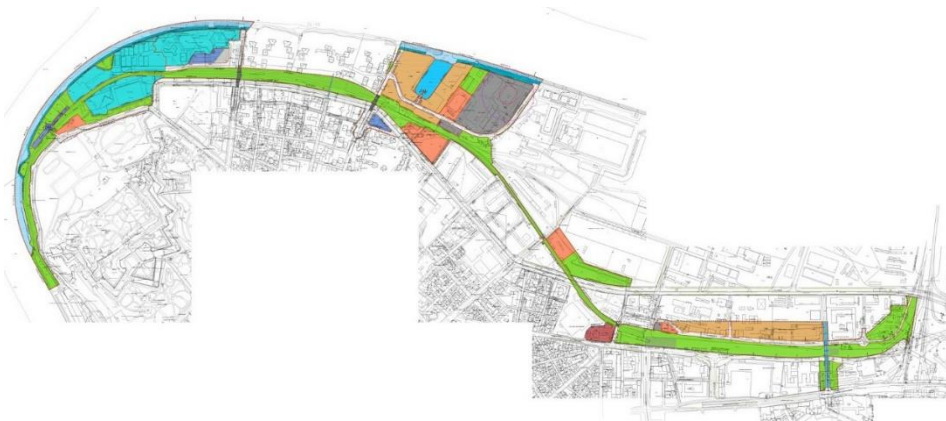


Figure 54 Belgrade Linear Park, map, source, PGR Linear Park

According to the Plan of General Regulation for Linear Park, that was published later, in August 2021, the general goal of the development of the plan is the urban transformation of the railway corridor. This transformation is based on few key principles, i. *formation of the public urban space which connects other public spaces in the city*; ii. *the offer of various public contents within the plan of green areas*, iii. *v. realization of environmental, social and economic function of the linear park, as an ecosystem in the urban space, by improving the microclimate characteristics, biodiversity, functional characteristics of space, public health and well-being of citizens, etc., for by calming the*

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ecological corridor by continuously planting ra-similar forms of vegetation (tree rows, groupings of trees, etc bushes, massifs of trees, flower beds, different nature-in- spirited solutions, etc.) [14].

The case study analysis was conducted through its relationship to the three established research goals and the biodiversity strategy: **1. Creation of healthy ecosystems, 2. Promotion of green infrastructure, 3. Integration of nature-based solutions.**

3.1 Healthy ecosystems

Healthy ecosystems can be described as systems that are resilient, capable of sustaining a diverse array of species. These ecosystems in urban areas contain various plants that improve air quality and regulate temperature differences in cities during the summer months with their natural surfaces. Healthy ecosystems neutralize pollution and enhance human well-being. To create such ecosystems in cities, it is necessary to design spaces that are in line with sustainability and nature-based concepts. They are most commonly achieved through the design and construction of parks, forests, and various green public areas [15]. Implementing nature-based solutions is one way to create healthy ecosystems. As part of the planning of the Linear Park in Belgrade, a significant step in creating a healthy ecosystem is the division of the park into 10 units, each separately designed to promote different ideas regarding biodiversity, environments, pollution prevention systems, etc. These units create a public network of green spaces, which is the basic idea of revitalizing this former industrial waterfront zone of the city.

3.2 Green infrastructure

Green infrastructure, according to the European Commission, refers to a strategically planned network of natural and semi-natural areas designed to deliver a wide range of ecosystem services, such as water purification, air quality improvement, climate regulation, and biodiversity conservation. It encompasses various types of green spaces, including parks, forests, wetlands, green roofs, and urban gardens, as well as blue spaces like rivers, lakes, and coastal areas [16]. The European Commission emphasizes the multifunctionality of green infrastructure, highlighting its role in enhancing urban resilience, promoting health and well-being, supporting biodiversity, and fostering social cohesion. Green infrastructure is seen as a critical component of sustainable urban development, providing a cost-effective approach to addressing environmental challenges and improving the quality of life in cities and regions across Europe.

3.3 Nature based solutions

The Commission defines nature-based solutions as "Solutions that are inspired and supported by nature, which are cost-effective, simultaneously provide environmental, social and economic benefits and help build resilience. Such solutions bring more, and more diverse, nature and natural features and processes into cities, landscapes and seascapes, through locally adapted, resource-efficient and systemic interventions." [17] Architectural and urban interventions falling under nature-based solutions aim to integrate nature into their interventions. The integration of nature-inspired solutions implies that they are efficient, sustainable, cost-effective, and provide various types of positive impacts on people. Such solutions can be designed and planned at different scales, from the scale of park furniture to interventions on buildings, to interventions in public, urban space, and infrastructure projects. Some of these solutions include green roof projects, urban gardens, vertical farming, at the level of urban interventions: green spaces, eco-urban furniture, the concept of a living garden, and many others. As part of the call for young architects to propose their solutions for the Linear Park, the competition brief required architects to integrate various types of nature-based solutions into their designs of individual park segments. The main goal of the call for conceptual solutions was to achieve urban renewal of the former railway space through innovative and sustainable solutions involving bioclimatic design principles, integrated planning, and the application of nature-based solutions. One

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of the documents referenced in the competition brief is the UNALAB Technical Handbook Of Nature-Based Solutions, prepared by the University of Stuttgart [18], which contains individual nature-based solutions in space of various scales, providing detailed information on technical and design parameters, implementation methods, and technical explanations. For this research 14 of these solutions are presented as a types that can be inserted into a Linear Park projects.

3.4 Linear Park segments

From the 28 young teams and their proposals within the competition, 10 solutions were selected for the 10 zones of the Linear Park. The solutions largely relied on the required aspects of efficiency, biodiversity, sustainability. A special emphasis in this article is given to the relationship between the selected 3 projects, 3 units, and the jointly set goals of the Linear Park project and the EU biodiversity strategy, namely green infrastructure, nature-based solutions, and healthy ecosystems.

3.4.1 Segment 3: LINKPARK

This solution heavily leans on the principles of connecting green spaces. Corridors are designated with various purposes: the main line, active line, tram line, eco-auto line, and biodiversity line. [19]

Nature-Based Solutions: To promote biodiversity, the landscape design includes the planting of 20 different species of low and high vegetation, aiming to enhance the well-being of space users. Aromatic gardens along paved paths serve as a nature-inspired intervention. The potential for utilizing solar energy is recognized, offering the opportunity to create systems that function independently in terms of energy.

Green Infrastructure: This approach seeks to integrate spaces with different types of paths and corridors, which, combined with other sections, can represent significant green infrastructure. The Eco-auto line aims to reduce carbon dioxide emissions by allowing only zero-emission cars. Opportunities for establishing green infrastructure and a healthy system are presented. Biodiversity line has been applied as the fundamental principle of connectivity between spaces, with the main idea of creating a new element of green infrastructure

Healthy Ecosystems: While nature-inspired solutions aren't the main focus, their easy implementation remains possible. Leveraging the potential for waterfront access is achieved by placing a cantilevered public space above the river. Measures outlined in the EU Biodiversity Strategy, such as creating accessible amenities for residents and improving the connectivity of green public spaces, are evident. This project also mitigates pollution and negative impacts like car traffic on biodiversity.

3.4.2 Segment 4

The project for segment 4 is located in a park zone surrounded by residential neighborhoods and adjacent streets. The characteristic feature of the solution is the sloping, hilly terrain resulting from accentuating the existing leveling. [20]

Nature-based solutions: In line with the objectives of implementing nature-based solutions, the project for segment 4 incorporates a variety of solutions: i. Solar-powered street furniture, ii. Rainwater harvesting for park irrigation, iii. Thermal canopies, iv. Green roofs. The urban furniture used represents an innovative solution due to the use of recycled materials. This segment prominently incorporates existing infrastructure, such as a steel bridge, transforming it into a walkway that brings users closer to water bodies. Green roof systems are utilized on two pavilions designed to promote biodiversity.

Healthy ecosystem: Through a wide range of designed solutions, this segment can meet the conditions outlined in the EU Biodiversity Strategy for 2030 through an urban greening plan and its goal of promoting healthy ecosystems. Creating a healthy ecosystem requires the implementation of various plant species and ensuring the entire system is self-sustaining and resilient. This project for

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segment 4 implements a series of modern solutions for regulating temperature in summer and winter, utilizing the natural ground temperature to achieve thermal balance. Nature-inspired bench solutions using solar energy significantly contribute to the formation of a healthy ecosystem. Noise protection is achieved by creating continuous embankments on the park's edges. Research has been conducted regarding existing strong winds at the location, and tall vegetation has been planted accordingly.

Green Infrastructure: In line with the goal of promoting and implementing the concept of green infrastructure, similar to other segments, there is a strong emphasis on connecting and complementing natural spaces. Unlike segment 3, which did not create new water surfaces, segment 4 features the creation of two lakes that complement the park's green oases.

3.4.3 Segment 7

Segment 7 of the Linear Park has a distinctive linear shape and is situated between significant urban zones. The project in this section emphasizes the introduction of new amenities at the location. The proposal includes the construction of a museum and outdoor pavilions, as well as the design of continuous pathways through low and high greenery.

Nature-Based Solutions: Unlike other sections, the primary focus of nature-based solutions in Segment 7 is the implementation of green roofs on the new buildings. This nature-inspired solution contributes to reducing the urban heat island effect and improving air quality. Although the project is still in its conceptual phase, this implementation opens up possibilities for additional solutions in terms of energy efficiency and system sustainability. Green bus shelters are planned.

Healthy Ecosystem: The museum and pavilion projects, as well as the designed public spaces, use natural materials such as stone and wood. These materials can help regulate temperature differences during summer days and nights. A key aspect of the project, aligned with healthy ecosystem principles, is its focus on human well-being, featuring amenities for recreation, education, and relaxation. The structures have an alluvial form to create micro-natural environments with greenery interwoven between the buildings.

Green Infrastructure: Segment 7 continues the park's continuity by creating pathways that connect to surrounding sections. Emphasis is placed on permeable pavements that mimic natural processes. Water features are designed as corridors that traverse the park, ensuring that this section integrates with the park's green corridor without disrupting it.

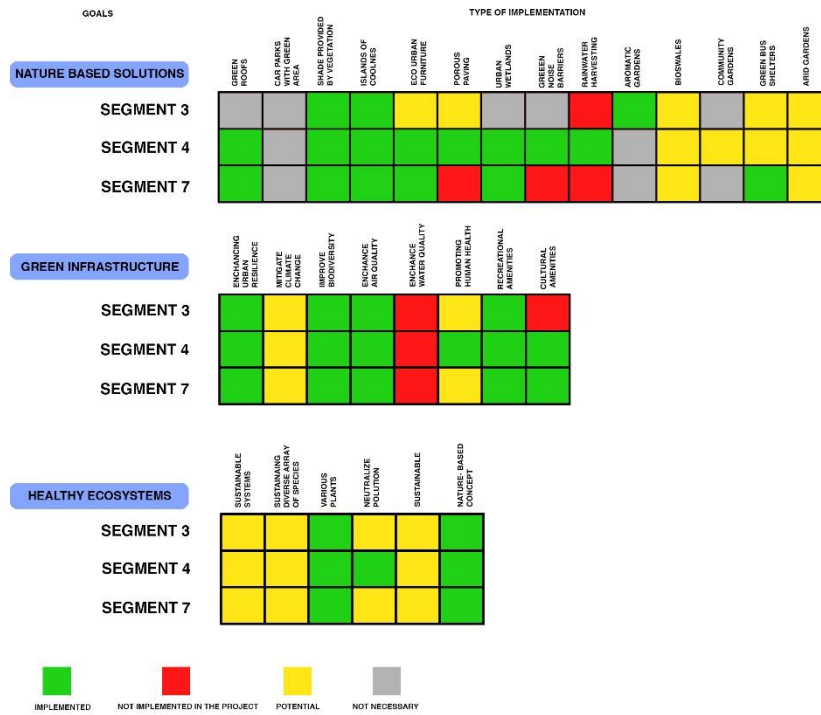


Figure 55 Diagram, Analisis of solutions in accordance to the main goal, source: drawn by author

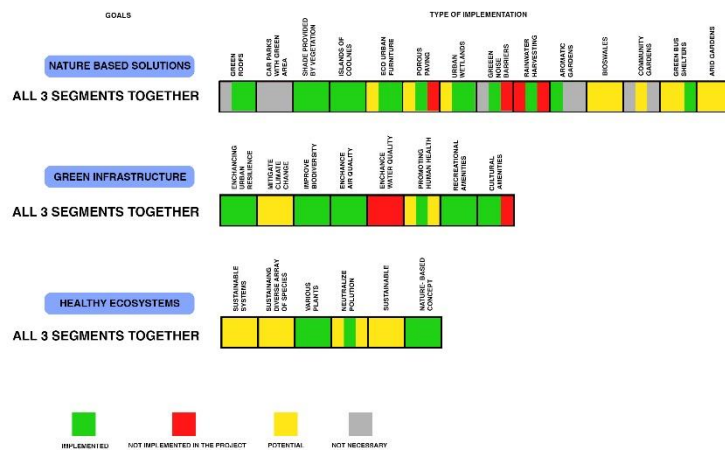


Figure 56 Simultaneous presentation of implemented solutions, source: drawn by author

4. CONCLUSION

The project of the Belgrade Linear Park implements various concepts related to the core goals of the EU Biodiversity Strategy in a specific manner. By segmenting it into 10 units that implement principles of nature-based solutions, green infrastructure, and healthy ecosystems in different ways, a wide range of solutions is achieved. In terms of nature-inspired solutions, these segments implement anywhere from 3 to 8 different types of solutions. This spectrum of implementing various solutions represents significant potential for development. To meet the needs of healthy ecosystems, the entire park must become sustainable in terms of energy, maintenance, species diversity, pollution neutralization, and the implementation of self-sustaining systems. To ensure the park aligns with these

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goals, priority can be given to high-quality solutions that can be implemented throughout the park. Through analysis, it is noticeable that at least one solution has been implemented for each of the selected systems possible to install in this context, affirming the idea of achieving a large number of different solutions. The quality of segment separation is reflected in the diversity of plant and animal species, as well as the presence of various microenvironments contributing to community well-being. By displaying a comprehensive final table, it can be clearly seen that one of the units has included a greater number of quality systems than others, leading to an imbalance at the unit level. In terms of green infrastructure, such an approach, with a division into 10 units, affirms the basic principle of connecting green and water spaces within the park. All units equally contribute to enhancing urban resilience, improving biodiversity, enhancing air quality, and providing numerous recreational amenities. What is not present in the solutions but could be significant due to the park's location and proximity to the river is the possibility of implementing water quality improvement systems. In terms of realizing global strategies at the local project level, based on research, there is a clear link in the initiative to apply various principles of biodiversity conservation. To realize these solutions, it is necessary to integrate all necessary stakeholders and enhance the received projects in terms of mutual synergy and joint implementation of systems to bring nature back into urban environments. By using data collected within this case study, future projects can balance the relationship between project units and segments through system synergy and the integration of quality solutions. Additionally, the process in planning the Linear Park, which is applied and relies on processes and goals defined by the EU Biodiversity Strategy, can represent a significant pilot project for future local projects in Serbia and worldwide.

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Exploring Fractal Dimensions in Shenzhen's Urban Villages: Natural Pattern for Stress Reduction in High-Density Environments

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Abstract

Rapid urbanization presents challenges for designing future cities that enhance residents' quality of life and well-being. Literature has shown that dense environments can potentially contribute to heightened stress levels. Urban stress reduction is a critical concern in contemporary urban studies, involving multiple disciplines to understand how density environments positively impact well-being. Research shows that people tend to seek out natural environments, and aesthetic responses to natural settings positively impact psychological stress and emotional states. Moreover, literature has explored the beneficial impact of fractal dimensions, typically found in natural environments, on cognitive processes and stress reduction. Previous research often used images of natural scenes to calculate fractal dimensions and explore nature's restorative effects. However, there is a lack of deeper exploration of fractal dimensions within dense urban settings. This study sets its foundation in Shenzhen, one of the world's youngest cities, and more specifically in its urban villages, selected here for their unique character and high-density characteristics. This research aims at providing an exploratory analysis of the fractal character of those villages. High-resolution images and eye-level viewpoints are here systematically analysed to provide a different perspective on urban high-density environments through the lenses of spatial geometrical properties and visual complexity. A Python-based box-counting method for determining the fractal dimensions of photographic images is used. The results illustrate that the fractal dimension of urban village street patterns ranges from 1.73 to 1.89, indicating mid-to-high complexity. Secondary commercial streets show the highest complexity, while newly built secondary cluster streets exhibit the lowest complexity. By applying fractal analysis to high-density environments, we explored possible connections between natural patterns and built environments, as well as highlighted important methodological considerations. A deeper understanding of fractal properties within urban settings can shed light on how people perceive complex environments. This study highlights significant potential for future research to explore the fractal characteristics of dense urban areas and their impact on individuals' perceptions.

Keywords: *Fractal Dimensions; Urban Villages; Stress Reduction; High-Density Cities; Visual Complexity*

1. INTRODUCTION

Increasingly fast worldwide urbanization leads to more and more dense environments within cities. High-density environments are characterised by high population density, high-rise building complexes, and crowded streets. Besides, citizens in high-density cities are facing challenging psychological stress [1], making urban stress reduction an urgent issue in contemporary urban and architectural studies [2, 3].

Urban villages are one of the high-density environments that have developed in response to rapid urbanization processes. They are characterized by central location within the city, affordable rent, an abundance of employment opportunities, and diverse land-use types [4]. They feature extremely high-density mid-rise building blocks, often referred to as hand-shake buildings with narrow alleys and high population densities.

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Urban villages in Shenzhen represent a unique urban phenomenon, reflecting the city's fast-paced urbanization from a small town into a modern metropolis. These villages effectively accommodate a substantial influx of migrant populations and foster vibrant commercial areas. The high-density construction prevalent in these villages often lacks of sufficient public open space, thereby making the streets between buildings critical as public domains. Urban villages exhibit a vibrant street system for non-motorized vehicle and pedestrian activities, diversified living services, and face-to-face interactions among people promoted by its small scale. High-density construction, combined with a lack of vegetation, significantly impacts the quality of the urban environment and the living experience of residents.

To better understand urban villages and their streets' fractal character, this study aims to provide a systematic fractal analysis within one village and its streets, a setting that has not previously been analysed for fractal dimensions. Specifically, images were collected and analysed from one of the urban villages in Shenzhen, named Tangshuiwei Village, to determine the fractal character of its streets. In the context of rapid urbanization and urban stress reduction, this study aims to detect potential natural patterns within high-density urban environments using fractal dimension analysis.

2. FRACTAL DIMENSIONS IN BUILT ENVIRONMENTS

Fractal patterns are prevalent in natural scenes [5, 6, 7, 8, 9], and they display self-similarity and scale-free characteristics. The fractal dimension (D) is a statistical parameter used to measure the complexity of geometric fractal patterns [10, 11]. The intrinsic link between fractals and natural environments enhances individuals' aesthetic appreciation for fractal patterns. The pervasive presence of fractals in nature, particularly those of mid-complexity, has led to the adaptation of the human visual system to process them efficiently. Humans display an aesthetic preference across fractal images, regardless of whether these images are generated by nature's processes, by mathematics, or by the human hand [6]. Studies have revealed that fractals elicit psychological reactions in people, with mid-complexity fractals linked to alleviating stress [7, 14, 32].

The fractal character of an image can also be quantified by its fractal dimension (D). For fractals described by a D value close to 1, the patterns observed repeat in a way that builds a very smooth, sparse shape. However, a D value closer to 2 manifests repeating patterns building the shape of an intricate and detailed structure [15]. Therefore, fractals are widely used as a graphics tool for simulating and generating natural-like geometrics.

Within studies of the built environment, urban form, urban residential patterns, and transportation networks exhibit fractal characteristics [16, 17]. Fractal dimension analysis can be applied to these complex systems. All these examples of the measurement of urban form are focused on plan views or aerial photographs to analyse their geometrical properties. Besides, fractal dimensions have also been applied at smaller scales, such as streetscapes or street vistas.

In studies of fractal dimensions of street views, most researchers employ integrated software like ImageJ, and correlate the analysis results to physical features such as greenery, boundaries, and street furniture [18, 19, 20]. Cooper (2008, 2013) focused on everyday streets to explore the relationship between visual quality and fractal dimension and identified a positive correlation between fractal dimension and visual quality ratings, noting that a city street with a mean fractal dimension of 1.718 scored highest in visual quality. Research has also related the results to self-rating visual quality surveys, such as visual variety, visual interest, and visual complexity [21]. Furthermore, most research on fractal dimensions and visual perception mainly utilizes generated images instead of real-world scenes [22]. However, there are few studies measuring the overall visual perception of street scenes using real-world photographic images and a Python-based calculating program.

According to the prevalence of fractal patterns in nature and their restorative effect, the ability to quantify fractal characteristics of an image within built environments is an insightful perspective through which to investigate visual complexity in high-density settings.

3. METHOD

3.1 A case study in an urban village

Minzhi Urban Village is one of the many urban villages in Shenzhen. It is located in Longhua District, between Minzhi Avenue and Longhua Avenue. Tangshuiwei Village is one of the urban villages within the Minzhi Village complex, located in the northeastern part of Minzhi Urban Village; it is neighbored by Shaxia Village.



Figure 1. Tangshuiwei Village in Minzhi Urban Village (Longhua District, Shenzhen)

Image resource: <https://images.app.goo.gl/bBkY9j9ut5ad5KQD8>

3.2 Data collection

The images were taken using a Sony α 6400, and the collecting parameters were set at image size as 6000 \times 3376 pixels (max), 300dpi, field of view = 50°, camera pitch = 0°, and the height of the camera was set as 1.55m. Sampling points were set at 10-meter intervals along various street types, totalling a sampling distance of 3 kilometres, to represent a sequence of views for each street typology.

Based on the Urban Residential Area Planning and Design Standards [23], and the Shenzhen City Urban Planning Standards and Guidelines [24], Table 1 summarizes urban road systems categories and typologies.

Table 1. Classification of Shenzhen's Urban Road Systems

	Typology	Function
Urban Road System	Freeways	Handle through traffic, port traffic, and external city transport functions.
	Arterial Roads	Accommodate long-distance rapid transit and freight movement within city districts.
	Secondary Roads	Manage medium and short-distance passenger and freight traffic, distributing traffic from main arteries.
	Distribution Roads	Promote a network system of small blocks and dense road networks.
Residential Area Roads	Main Streets	Urban Secondary Roads accommodate both motorized and non-motorized traffic.
	Cluster Streets	Main access routes for entering and exiting residential neighbourhoods, usually including one bicycle lane and one

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Alleys	pedestrian path. The road surface width should not be less than 4.0 meters. Final level of access to residences, primarily used by residents for entry and exit. These roads mainly accommodate bicycle and pedestrian traffic. The road surface width should be no less than 2.5 meters.
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Main Streets are the main access routes for entering and exiting residential neighbourhoods, serving as a main thoroughfare, connecting various parts of the development. In residential areas, they typically reach a minimum carriageway width of 7.3 meters to ensure adequate space for vehicles. Secondary Streets are secondary roads within a residential area intended for moderate traffic, providing access to properties or facilities. They reach a minimum width of 5.0 meters. Considering the unique characteristics of urban villages, where secondary streets also serve as important commercial streets and feature streets between building clusters, we categorized street types within urban villages into four typologies (Table 2).

Table 2. Street Typologies in Urban Villages

	Typology		Function	Circulation
1	Main Streets		Urban roads within the residential area	motor vehicle lanes, non-motor vehicle lanes
2	Secondary Streets	commercial streets	Auxiliary roads within the residential neighbourhood	non-motor vehicles, pedestrians
		cluster streets		
3	Back Alleys			non-motor vehicles, pedestrians

3.3 Fractal dimensions calculation

There are various methods for calculating fractal dimension, including standard box-counting, partitioning, and differential box-counting [25, 26, 27]. Box-counting method is frequently adopted for the estimation of fractal dimensions [11], and has been used to quantify the characteristic complexity of a city, including its growth patterns, road and rail networks, open spaces, and skylines [28].

Box-counting method involves covering computed pattern O with a grid of boxes and counting the number of non-empty boxes that contain any part of the pattern. This process is repeated while gradually reducing the box size. The number of grids $N(\epsilon)$ and the size of the box ϵ are recorded and plotted to a log-log diagram in each repeated step [29].

$$D(O) = \lim_{\epsilon \rightarrow 0} \frac{\log(N(\epsilon n))}{\log(1/\epsilon n)}$$

Previous studies analysing the fractal dimensions of built environment's images have often used integrated software such as ImageJ. With advancements in computer image processing technology and programming, it is now possible to further explore fractal analysis of built environment images. In this study, we programmed and coded the box-counting method in Python. To be processed, each image was first converted to grayscale. Gaussian blur was applied to reduce noise and smoothen the image. Otsu's thresholding method was then used to create a binary image, which segmented the image into foreground and background. Additionally, canny edge detection was applied to the blurred image to highlight edges. These edges were combined with the binary image and the resultant combined image was further cleaned for subsequent fractal analysis. Following pre-processing, the fractal dimension analysis using the box-counting method involved Box Size Determination, Box Counting, and Log-Log Plotting. The box sizes were determined through a geometric progression

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from half the minimum dimension of the image down to 2 pixels. The counts were plotted against the box sizes on a log-log scale. A linear regression was then performed on this plot to determine the slope. In conclusion, this method effectively combines a pre-processing step, box-counting calculation, and presentation of the fractal dimension value using a log-log diagram, providing valuable quantitative measures of the complexity of the street typology images.

4. RESULTS

Each street typology was analysed to determine its mean fractal dimension (D) for all images in the sample ($n = 60$), which quantifies the complexity of patterns within spatial streets' layout (Table 3).

Table 3. Average fractal dimension ranking of 4 street typologies

Ranking	Street Typologies in the Urban Village	Mean D
1	Secondary Commercial Streets	$D=1.829$
2	Main Streets	$D=1.827$
3	Back Alleys	$D=1.823$
4	Secondary Cluster Streets	$D=1.796$

In terms of mean D , secondary commercial streets present the highest mean D of 1.829. The lowest mean D is demonstrated by back alleys at 1.796. Secondary commercial streets present a fractal dimension of 1.829, which was the highest among the categories analysed, manifesting repeating patterns and detailed structure, likely due to their multifunctional nature. The highest index of fractal dimension was interpreted as the presence of numerous service functions within the specific zone [30]. This type of street holds multiple functions, supporting a variety of commercial activities and high pedestrian and vehicular traffic, leading to a dense and intricate road structure. These streets form vibrant commercial zones of the urban village, offering a wide range of dining and essential services. The shops are predominantly ground-floor establishments adjacent to residential areas, making them the most important and active public spaces within the urban village.

Main streets within urban villages possess a fractal dimension of 1.827, the second highest among the street typologies. This suggests the street pattern of this typology is complex, serving a broader array of urban traffic demands including higher volumes and more diverse types of vehicles and pedestrians.

Back alleys, with a mean D value of 1.823, show slightly greater complexity compared to secondary cluster streets, reflecting the function of connecting individual residences within more compact and possibly irregular layouts, catering to very local needs.

Secondary cluster streets have a fractal dimension of 1.796, indicating a relatively high level of self-similarity typical for residential areas. These streets are likely characterized by a more regular, integrated network. This type of street is in the new district of Tangshuiwei Village, which is a newly built and designed pedestrian area. Finally, best approximation value was calculated to show the street photographic images that can best represent the four street typologies, as well as the maximum individual D and minimum individual D value in each street typology (Table 4).

Table 4. Best approximation D value

Main Streets	Secondary Commercial streets	Secondary Cluster Streets	Back Alleys
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$D=1.829$



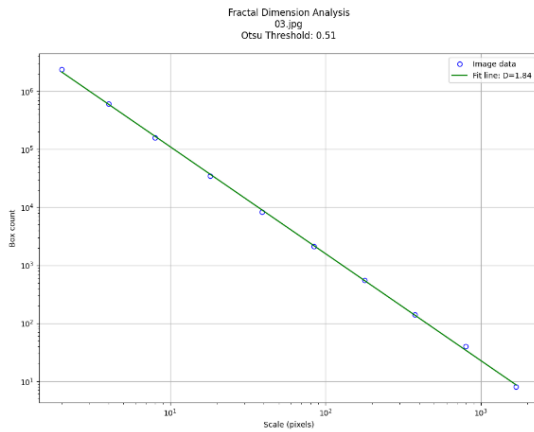
$D=1.844$



$D=1.795$



$D=1.828$





Step	Grid Size	Marked Boxes(N)
1	1688	8
2	798	40
3	377	141
4	178	547
5	84	2125
6	39	2125
7	18	34660
8	8	160586
9	4	612313
10	2	2372836

(b)

diagram (b) grid size

A log-log diagram of secondary commercial streets illustrates the appearance of a fractal dimension within an urban village’s street patterns. From this diagram, the straight line indicates that from half the minimum dimension of the image down to a size of 2 pixels, the images of urban villages have self-similar textural characteristics like fractals. Spaces with a fractal structure usually appear a hierarchical order, rhythm and diversity, and such spaces offer visual quality by influencing individuals’ perception positively [31, 32].

Table 5. Maximum and minimum D value and representative images

Street typologies in Urban Villages	max_value_image	min_value_image
1 Main Streets	$D=1.900$ 	$D=1.757$ 

2 Secondary Commercial Streets

 $D=1.866$  $D=1.769$ 

3 Secondary Cluster Streets

 $D=1.836$  $D=1.760$ 

3 Back Alleys

 $D=1.882$  $D=1.736$ 

The maximum individual D was recorded for main street and it's approximately 1.9. The minimum individual D was recorded for the back alley at 1.736.

D values of four street typologies in the data set fell within 1.73-1.89, indicating a mid-to-high visual complexity range ($D=1.5-2.0$) of detailed textures that have more visual excitation and visual diversity [29, 33]. The resulting fractal dimensions of different scenarios often fall into the interval of 1.0–2.0. The intervals between 1.0–1.3 and 1.3–1.5 are defined as the low-to-mid level, where the scenarios can be seen as 'well-recognized' and 'better for goal-directed navigation'. The interval between 1.5-2.0 is defined as mid-to-high level, where the scenarios can be seen as 'arousing' and 'exciting' [29]. Meanwhile, visual diversity increases as the D value increases from 1.3-1.7 [33].

5. DISSCUSSION

Tangshuiwei Village in Shenzhen was selected as a case study for the exploration of its fractal characteristics. A Python-based box-counting method was used to calculate the fractal dimension of photographic images at eye-level on the streets. Data sets were pre-processed using Canny edge detection and binary images, preserving detailed architectural features and small alleyways, and clear delineation of building edges and pathways was ensured. The results obtained here manifest that

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urban villages show a certain fractal pattern along their streets; their fractal dimensions fall into 1.73-1.89, manifesting mid-high complexity. Secondary commercial streets show the highest complexity, while newly built secondary cluster streets exhibit the lowest complexity. The maximum individual D was recorded for main streets and it's approximately 1.9. The minimum individual D was recorded for back alleys at 1.736.

By applying fractal dimensions analysis to high-density environments, this study attempts at searching for natural patterns within built high-density. Fractal dimensions are a natural property [10, 33], showing fundamental fractal character can help describe how complex systems are organised. Like natural environments, high-density environments display self-similar textural details, leading to higher fractal dimensions due to clustered lines [35]. They have complex scenes where the human visual system tends to perceive the overall profile (e.g., building, forest) rather than finer details (e.g., building facades, leaves) [36]. Fractal characteristics at eye-level within high-density environments can support the perception of detailed textures and patterns.

Through this presented Python-based box-counting method, some considerations when using box-counting method in high-density environments can be concluded. Preserving detailed architectural features and small alleyways during preprocessing is crucial for accurate analysis. Hence, reserving clear delineation of building edges and pathways is vital for understanding the spatial organization and density of these areas. Furthermore, varied lighting conditions caused by narrow streets and high buildings can affect the thresholding methods used in preprocessing, making it important to account for shadow and light variations.

These measurements could provide pivotal insights for urban planning and development, providing new perspectives on the visual complexity of street patterns within high-density environments such as urban villages.

6. CONCLUSION

This study sheds light on an alternative method for the exploration and quantification of spatial visual complexity in high-density urban environments, and more specifically in a unique condition typical of Shenzhen: urban villages. The purpose of this study was to find natural patterns within built high-density, and further compare different street typologies of urban villages according to their fractal character. In the process, methodological considerations were provided, establishing a reference for future research.

Further investigation can consider exploring the relationship between fractal dimensions in high-density and how people interact with and perceive complex environments, including how the visual complexity of street scenes in high-density affects visual perceptions, or how different street typologies influence psychological states (e.g. relaxation or stress). These results may inform the perception of urban high-density environments, driving design strategies to address positive visual impacts, and potentially contributing to inform design guidelines for the future of urban density.

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Storytelling Green: Tools for Re-imagining the Sustainable City

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Extended abstract

Frequently, initiatives aimed at establishing sustainable urban environments overlook the input of city dwellers. Inclusivity is paramount, and the decision-making process should actively involve citizens, including those with disabilities, allowing them to play a meaningful role in shaping decisions about the places they reside in. This paper delves into the realm of storytelling, examining its potential as not only a valuable data source but also as a conduit for fostering community engagement and a way of amplifying the voices of the residents.

Building from participatory narrative inquiry methods, this research pursues the value of telling and sharing stories, in the processes of regeneration and development of green spaces in the city of Sofia, Bulgaria. In doing so, the investigation endeavours to reconcile the prevalent top-down sustainability strategies frequently adopted by city councils with the more organic vision of green city development articulated by its citizens. Recognising the escalating demand for a harmonised understanding among all stakeholders involved, the research methodology incorporates the three pivotal phases of participatory narrative inquiry: collection, sense-making, and return. By embracing this approach, the investigation aims to foster a collaborative and inclusive framework that integrates the perspectives of both city authorities and residents, promoting a more holistic and effective approach to sustainable urban development.

Stories have the power to enhance the intrinsic value of a locale, infusing it with personality and a distinctive identity. This prompts a crucial question: how does the individual narrative serve as a tool for comprehending and re-imagining the urban landscape? Furthermore, in what ways can these singular stories contribute to shaping a broader vision of a sustainable and eco-friendly environment? The significance of this research lies in its potential to foster citizen engagement through the art of storytelling, a fundamental human activity. This approach serves not only as a means of learning but also as a conduit for introducing innovative ideas. Consequently, it promotes a more inclusive and grassroots approach to addressing the sustainability goals of the city of Sofia. The exploration of narratives becomes a cornerstone for cultivating a collective consciousness that aligns with the values of citizen involvement, propelling towards more sustainable urban futures.

Keywords: *sustainability; storytelling; participation; citizen engagement*

Ageing in a Changing Climate: Unpacking the Layers of Health Vulnerability

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Extended abstract

The impact of climate change on the health and well-being of older adults is multifaceted and demands a nuanced understanding. As global temperatures continue to rise, older individuals' vulnerability to heat-related illnesses intensify, creating a pressing health concern. Moreover, the increasing frequency and intensity of extreme weather events pose additional risks, from flooding to extreme temperatures, affecting the health and quality of life of the older population.

In the urban context, transformations driven by climate change adaptation efforts contribute to the complexity of these challenges. Rising air pollution levels, the emergence of heat islands in densely populated areas, and inadequate infrastructure increase the health risks for older populations.

The consequences of climate change on the urban environment also have social implications. Evolving community structures may lead to social isolation among older individuals as traditional support systems shift, underscoring the need for solutions that address not only environmental factors but also the social aspect of urban life. Understanding this intersection of climate change, ageing, and urbanization is essential to protect the health and overall well-being of older adults.

To deepen the knowledge of how climate change affects the health and quality of life of older adults, a systematic review was conducted. Employing the PICO strategy and adhering to Cochrane guidelines, the review searched three databases (PubMed, Scopus, and Greenfile) for relevant articles published between 2015 and 2022. Nineteen studies were included in this comprehensive analysis.

The findings of these studies reveal a compelling association between various climate change phenomena and heightened risks of mortality and morbidity among older adults. Cardiovascular, respiratory, renal, and mental health issues, alongside physical injuries, emerged as significant outcomes. Importantly, vulnerability factors such as gender, socioeconomic status, education level, and age were identified as key influencers shaping the impact of climate change on older adults' health.

Direct health impacts were linked to ambient temperature variability, extreme temperature events, strong winds, sea temperature fluctuations, extreme El Niño-southern Oscillation (ENSO) conditions, and droughts. Indirect effects manifested through air pollution resulting from wildfires, further exacerbating health challenges among older populations.

This systematic review emphasizes the urgent need for prompt and efficient strategies to address and alleviate the repercussions of climate change on the older population. As climate change events become more severe and frequent, it is imperative to facilitate population adaptation for survival.

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However, there are inherent limitations to human adaptation and temperature tolerance, particularly within more vulnerable groups. Therefore, prioritizing the implementation of public health initiatives aimed at the dissemination of bioclimatic design guidelines aimed at reducing exposure to the impacts of climate change is crucial, namely high temperatures, which includes the development of resilient urban environments that specifically cater to the needs of vulnerable populations.

Keywords: *climate change; ageing; bioclimatic urban design; health and quality of life*

URBAN GREEN AND FREE SPACES: An urban renewal study with the creation of an arboretum with wood constructions at the University of Thessaly in Karditsa

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Abstract

The modern way of life, combined with the rapid technological, economic and social changes, led to the movement of a large part of the population of many western countries, from rural areas and their settlement in large urban centers. The innate need for contact with nature led to the creation of urban green spaces, which are however quite often degraded and encroached upon, amid bad urban building practices and economic over-exploitation, by activities stemming from the modern capitalist system. In the theoretical framework of the present paper, the concepts of green economy and sustainability are studied, as well as the historical evolution of urban green spaces and their role, while it is attempted to evaluate sustainable regeneration methods, with the aim of protecting the natural environment and improving the living standards of local communities. As far as the practical context is concerned, this includes the regeneration procedures design of the area near the University of Thessaly facilities, in the city of Karditsa and the enactment of a proposal regarding the creation of a model botanical garden, describing its structure and individual functions.

Keywords: *green economy, sustainable development, urban regeneration, urban green spaces, botanical garden*

1. INTRODUCTION

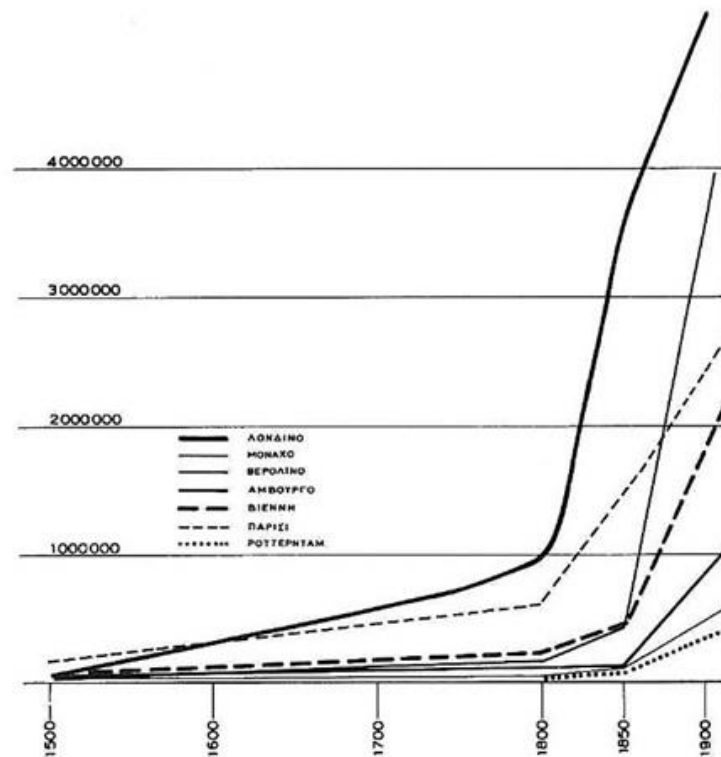
1.1 General introductory and bibliographical information

Urban green areas were already developed from the first years of population movement from rural areas and the formation of the first cities. The removal of populations from the nature, contributed to establishing the need to include a part of the natural environment in their daily life (Spencer & Cross, 2017). As a consequence, the creation of the first urban tissues, was accompanied by the development of the first green spaces, in the form of parks or botanical gardens, while applying the established urban planning standards.

The rapid growth of the industry, resulted in the degradation or complete destruction of green spaces, by creating factories, roads, housing or work structures. During the later years, the aforementioned environmental degradation and the significant benefits of urban green spaces were perceived, while several initiatives were implemented to create green spaces and integrate them into the urban fabric (Marini, 2016).

During the modern era, the intense phenomenon of urbanization has as a consequence the concentration of large sections of the population in the large urban centers, at the same time that the rate of development of the mentioned phenomenon is rapidly increasing. The said increase further reinforces the need to create new urban green spaces, easily accessible by the inhabitants for free and daily use. At this point, it is worth noting, that in several regions of the Greek territory the

phenomenon of anarchic construction is extremely intense, damaging the free urban spaces and particularly the public green spaces, causing intense negative consequences in the wider urban environment, directly degrading the quality of life of the residents.



Picture 1 The rapid growth of cities during the industrial revolution (Sarigiannis, 1987)

Parks, due to the extent of the area in which they belong, occupy the largest percentage of the total urban green spaces. However, in several modern cities, the number of parks is not sufficient in terms of ensuring the needs of all residents, with a significant part of the existing parks showing an image of destruction and abandonment. The regeneration of the existing urban green areas, accompanied by the creation of new ones, through the utilization of unused urban lands, could be a drastic solution to the aforementioned problem. Already, in many foreign countries, many similar actions are under development, at the same time that in the Greek reality, only a few proposals are put into the implementation stage (Marini, 2016).

1.2 Types of urban recreations

In order to improve the quality of life of residents in a city or an urban area, it is necessary to create and ensure certain conditions. These conditions are not only about improving economic parameters, but residential development through social, environmental and cultural improvement and development. That is why, although historically, an urban regeneration originally referred to the reconstruction and reuse of old buildings and other facilities, today, urban renewals generally refer to targeted interventions in the existing urban environment, to improve the conditions and quality of life of the residents. (Αραβαντινός, 2011).

The forms and types of regeneration vary and depend on the characteristics of the cities that are applied each time. They are of course also determined by the nature of the changes and the targeting. When urban regeneration first appeared, it involved definitions related to urban renewal, reconstruction, restoration and therefore were exclusively concerned with the regeneration of the urban shells. Along the way, the renovations concerned the restoration of the uses and functions of

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the cities, so the definitions were related to remediation, re-use and re-installation. In the modern era, the definitions of urban regeneration concern modernization, revival and reconstruction, with the aim of improving the conditions and the standard of living of the inhabitants of urban centers (Stefanou & Mitoula, 2002).

The two main categories of urban regeneration are distinguished according to the degree of intervention, into partial and radical. The category that is selected each time depends on the needs of each region. According to article 8 of the Law, 2508/1997, urban regeneration is the set of interventions that have an urban planning, social, economic and special architectural character, which arise from related studies with the aim of improving the living conditions of the residents, the built environment, highlighting the cultural, aesthetic and other characteristics of an area (Aravantinos, 1997).

A partial regeneration has a sanitary character with the aim of improving the existing network of an area. The partial renovations concern the creation of free spaces, green spaces, changing the facades of buildings, changes in their interior layout, completion of necessary infrastructure, etc.. This method avoids the strong negative economic, social and political effects of radical renovations (Aravantinos, 1997).

Despite all the effects of their implementation, radical renovations were deemed necessary and took place at least from the end of World War II until the 1970s in urban centers in the US and Europe. It is about leveling and total demolition of the existing building volume and the rebuilding of an area for its reconstruction. Post-war modernism (1945-1970), characterized by a contrast between modernism and tradition and essentially promoted dealing with everyday practices as a priority (functional design) with the parallel pursuit of an ecological balance and integration of the built space into the natural environment (monumental and naturalistic design). After WWII, high-rise apartment buildings begin to spread significantly in Greece, especially in the capital, but its construction begins to become rough and unattractive and its materials mediocre. Due to high urbanization many old houses were demolished to make way for huge building complexes. Among these old houses there were also remarkable examples of neoclassical architecture (Skoulatoy, Dimakopoulou, & Kondi, 2001).

This phenomenon was and still is quite intense in the city of Karditsa itself in which the building capital with architectural and urban planning interest, to the extent of its utilization requirement, it is even today, despite its obvious deterioration, large, which nevertheless continues to decline. In many cases and after a radical renovation, organized building with an urban layout plan was not followed and thus many problems arose, such as expropriations that financially burdened the municipality, concentration of land ownership in a few companies, development of construction companies that undertook renovations based on profit-making criteria only, abandonment of areas by low-income residents due to an increase in the cost of living in the redevelopment areas, etc (urenio.org, 2023).

During the early 1970s the theoretical approach of modernist planning is abandoned and is replaced by small-scale and limited-cost regeneration actions, preservation, conservation and utilization of cultural heritage in the context of a current of eclecticism, historicism and romantic reminiscence of the past. Therefore, a shift in traditional morphology, formality and the past of each country is observed, which coexists with advanced prefabrication techniques.

The free arrangement of the buildings is removed, as is the spatial continuum of the urban fabric and the synchronic virtual multiplicity of cubist layouts. Instead of free composition historicism brings back elements such as the street, the square and the block, which are constitutive features of the city fabric (urenio.org, 2023).

2. THE FOREST BOTANICAL GARDEN OF THE UNIVERSITY OF THESSALY

2.1 Introduction

The aim of a botanical garden can be one of the following, or under certain circumstances all of them:

- 2 The preservation and protection of biodiversity through the conservation of rare species
- 3 Further scientific study of the plant species
- 4 Environmental education and awareness
- 5 Recreation

An additional goal should be the harmonious coexistence of all the above functions, especially when such a space exists in a purely educational space such as a University, where an additional educational character can be served, such as the area of this paper.

The location of the Garden is proposed to be on the premises of the University of Thessaly (former Technological Educational Institute (T.E.I.) of Thessaly) and specifically in its facilities, which are utilized for the needs of the Department of Forestry, Wood Sciences and Design and Department Public and One Health.

For the needs of this work and especially for the needs of the writer's thesis under the supervision of the other members of the co-authoring group, from which the present publication arose, a complete Topographic survey of the area was made as well as a survey of the existing Town Planning elements that apply to the area which are summarized below. Specifically, with the use of complete Topographical equipment, i.e. Total station SOKKIA Set630RK, with angular accuracy 15cc as well as dual-frequency GPS with measurement accuracy H: $\pm 8\text{mm} + 0.5\text{ppm}$ και V: $\pm 15\text{mm} + 0.5\text{ppm}$ (RTK), the exact location of which is shown in the relevant picture. With the use of GPS, the mapping became dependent on the Greek Geodetic Reference System (G.G.R.S. '87) and by solving the routing any errors were corrected. All horizontal and, secondarily, elevational elements of the survey area were then mapped, as shown to the picture below:



Picture 2 Excerpt of Topographic Survey of the study area. Own survey

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2.2 Structure of the proposal

In the Forest Botanical Garden of the University of Thessaly the subdivision of the area described above is proposed of the surroundings of Building A which houses the needs of the aforementioned Higher Education departments of the University of Thessaly, in individual areas and their distribution in the areas below:

1. Walking & recreation areas
2. Historical forest plants area
3. Medicinal and aromatic plants area
4. Ornamental plants of the region area
5. Foreign forest plants area
6. Area of native forest plants of the Greek area
7. Forest plants of the region area
8. Herbarium and systematic section area
9. Greenhouse area
10. Recreation area- refreshment room
11. Wooden structures and more specifically:
12. Wooden hut at the proposed entrance to the Garden
13. Wooden fencing, for the discreet separation of the individual parts of the garden
14. Wooden table seats, especially in the recreation area
15. Wooden urban equipment
16. Outdoor amphitheater with mixed construction

3. PROPOSALS AND CONCLUSION

3.1 Urbanization and green spaces

It is a fact that the phenomenon of urbanization has not only affected the size and number of modern cities, but it has determined to a huge extent the way the urban environment is structured. One of the parameters of these alteration is the change in the natural environment, both inside the cities and outside them. During the great systemic changes of the last century and the transformation of many Western economies, including Greece's, urban green spaces began to disappear or shrink on a massive scale and were replaced by new building structures, bringing about the fragmentation of residential construction. It is estimated that to date, around 30% of the open spaces and green spaces of major European cities has been disappeared, providing the required space for the construction of new building facilities (Hrehorowicz - Gaber, 2015). The loss of urban green spaces is recorded in both developed and developing countries of the world, while it becomes directly dependent on the prevailing socio-economic factors (Gairola & Noresah, 2010).

The ever-increasing population density and continued urban spatial expansion has brought about a number of negative impacts on green spaces, having literally wiped out a large part of them. The last few years, numerous studies have recorded the rate of urban growth and mainly the subsequent loss of free open spaces and urban green spaces or the consequent negative environmental effects (Odindi & Mhangara, 2012), while all of them recognize the human factor as the cause και τη μεταβολή της οικιστικής του εγκατάστασης στα νέο-διαμορφωμένα αστικά κέντρα (Yuan, 2005). Additionally, remaining urban green spaces have been recognized as the most valuable resource of modern urban ecosystems (Gairola & Noresah, 2010).

More generally, it is concluded that urban green spaces, can stop the negative effects of intense urbanization, significantly improving the quality of life of societies (Li & Pussella, 2017), since, as it has been formulated, this depends on the balancing of the distribution of the building facilities, of transport infrastructure and natural environment areas (Gulgun, 2015). The types of urban green

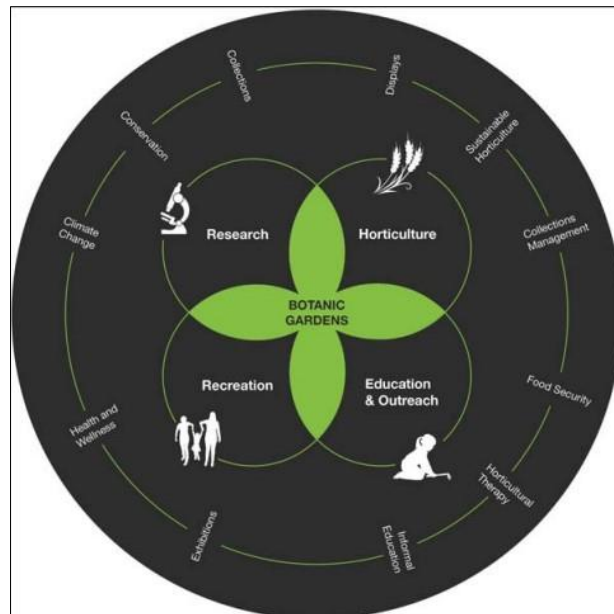
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spaces, as well as their individual functions, have a direct impact on the quality of life of the residents and for that reason underestimating their importance endangers the sustainable development of urban areas.

3.2 The multidimensional role of botanical gardens

Urban green spaces take a number of forms, one of the most important being botanical gardens. Botanic gardens are considered to be "sources of growing plants for public entertainment and preserving them for scientific or educational purposes, while having a local, national or international role" (Aldous, 2007), while some bibliographic references are talking about their important role "in the tourism development of specific areas and the support of regional or international networks regarding the conservation, sustainable utilization and recording of native or alien flora" (Willis, 2005).



Picture 3 The multidimensional role of botanical gardens

[source: <https://www.publicgardens.org/resources/role-botanic-gardens-twenty-first-century>]

More generally, botanical gardens are considered as structures for the protection and preservation of flora and biodiversity, while providing opportunities for environmental and scientific education, as well as economic or tourism development resources, while their functions and services have a direct impact on the cultural and social development of local societies (Aldous, 2007).

Botanic gardens undoubtedly play a crucial role in the conservation of many plant species, while their wider natural or artificial landscapes raise public awareness of biodiversity issues, acting both as collectors of living and preserved plant species, as well as supporting structures for the protection of rare and endangered species of flora, which are no longer found in their natural environments (Jorgenson, 1986). Equally important is the contribution of botanical gardens to the environmental education of society, spreading the importance of protecting the natural environment, through the multi-faceted approach and awareness of different audiences (Aldous, 2007). Regarding the environmental benefits offered by the operation of botanical gardens, these are found in the regulation of the urban microclimate, the improvement of internal hydrological processes, the absorption of atmospheric pollutants and the restoration of the biodiversity conditions of the areas in which they are located (Nowak, Stevens, Sisinni, & Luley, 2002). Recent studies have shown that large urban green spaces, such as botanical gardens, contribute to the reduction of global warming, significantly

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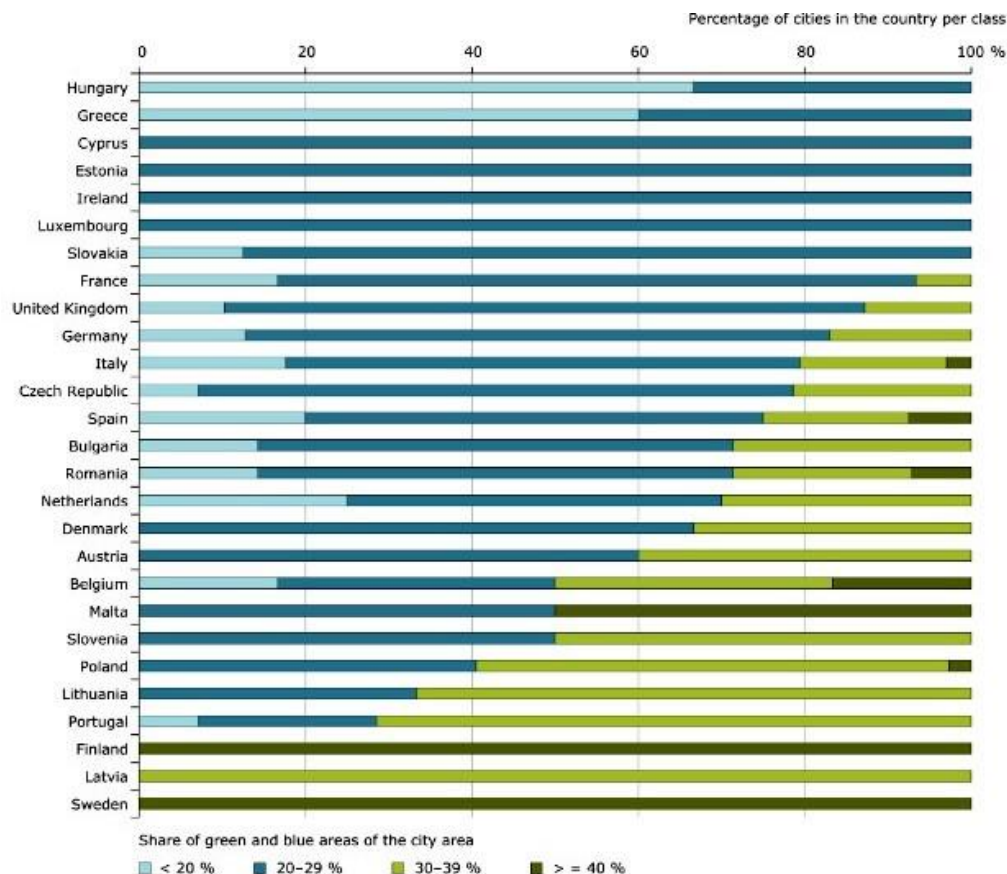
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slowing the accumulation of carbon dioxide in the atmosphere (Primack, Ellwood, Galliant, & Miller-Rushing, 2021).

The benefits of the operation of the botanical gardens, in addition to the environmental, also have a financial sign, since by acting as visitor attraction poles which they contribute to the tourism development of many areas, offering work and activity opportunities to local communities and of course scientific and educational. Additionally, many economic benefits arise from the reduction of energy costs associated with the existence of natural green spaces. Reducing local air temperatures, through water transpiration and the provision of natural shading, the need of energy use to cool buildings is significantly reduced, especially during the summer months (Aldous, 2007). Finally, from a social point of view, researches have shown that the mental upliftment offered by the operation of botanical gardens for the inhabitants of cities, is inextricably linked with their socialization, the adoption of a healthier lifestyle, their productivity increase (Kaplan, 1992) and crime reduction (Kuo & Sullivan, 2001). Also, through the opportunities for cultural activities and events, not a few examples around the world have shown that the operation of botanical gardens can also contribute to the cultural development of previously degraded urban areas.

3.3 The Greek reality

Comparing the urban green spaces of most European cities with those of large Greek urban centers, it can be easily established that Greece lags significantly in the number of green spaces, occupying the penultimate position among 27 countries of the European Union.



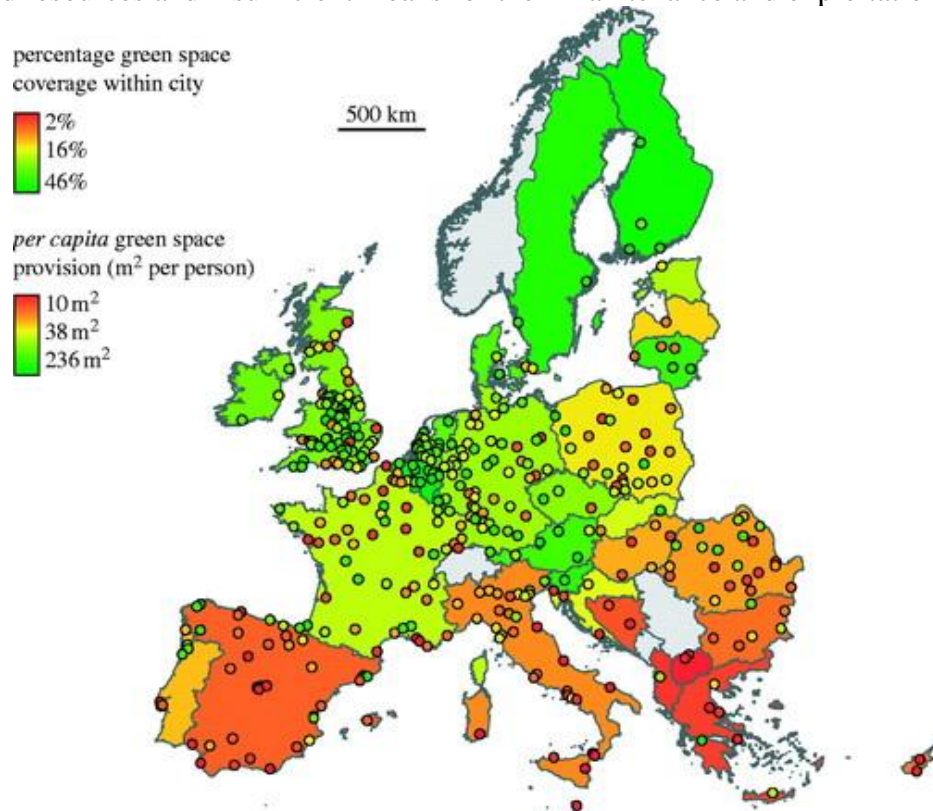
Picture 4 The urban green in the EU countries (European Environment Agency, 2013)

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According to the report of the European Environment Agency, in 60% of Greek cities the percentage of green spaces is less than 20%, while in the remaining 40% the coverage rate does not exceed 29% (European Environment Agency, 2013). From these data, it can be concluded that Greek cities do not incorporate elements of the natural environment, while the encroachment of green spaces and natural forest areas has been a common practice during the urban planning of the last decades. Furthermore, in many urban centers, degraded and abandoned spaces are found, which are factors of further economic and environmental degradation, limiting the possibility of substantial development of the specific areas. The regeneration of such spaces is considered a necessary condition for the transition to sustainable urban development and the optimal use and exploitation of every free space in modern urban centers. In any case, all invasive actions for the regeneration of degraded areas should be implemented with a view to protecting the natural environment, the non-alteration of any historical or cultural value of the premises and upgrading the standard of living of the local communities.

Regarding the Greek botanical gardens, their number and size is noticeably smaller compared to the counterparts of the European urban centers, despite the fact that Greece is a country with enormous territorial and climatic diversity and many rare species of vegetation can thrive in many of its areas. From the study of the most important Greek botanical gardens, it was found that in most of them, the building infrastructure is not sufficient to host a wide variety of plant species, while in the Athens's historic botanical gardens, an image of abandonment is presented, with the relevant state agencies having limited resources and insufficient means for their maintenance and exploitation.



Picture 5 The existence of green spaces in European countries and cities (Fuller & Gaston, 2009)

3.4 The Forest Botanical Garden of the University of Thessaly

The Forest Botanical Garden of the University of Thessaly, as designed and proposed in the context of this paper as well as in the corresponding thesis as described above, is proposed to operate on an area of 29,829.8 square meters, with the parameters described above, constituting a modern and model botanical garden of Central Greece. The operation of the Garden is mostly focused on facilitating and enhancing the education of students in the Department of Forestry, Wood Science and

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Design, covering a large part of the research needs of the specific department, with the collection, cultivation and utilization of native plant species. Furthermore, through educational programs, in collaboration with the bodies of Primary and Secondary Education of the Prefecture of Karditsa, the opportunity is given to promote the awareness of students and the general public on critical environmental issues as is the huge contribution of flora to the balance of local ecosystems. The operation of the Garden is believed to strengthen the ex-situ efforts to preserve the biodiversity of the wider area, while it will be a pole of attraction for the residents of neighboring areas, acting as a special place of recreation and entertainment.

The building structure of the Garden will include, among others, a multi-purpose building, recreation area, herbarium, greenhouse, parking areas, etc., while the wooden structures that include gazebos, flower beds, benches, waste bins, fences and walkways, are expected to further enrich the aesthetics of the Garden, since the use of natural materials, mainly wood, will not burden the overall environmental landscape. To improve the architectural structure of the Garden, the proposed interventions concern the opening of new paths and their appropriate coating with the recommended materials, while the creation of a small lake will allow the hosting of aquatic vegetation, while at the same time it will aesthetically enrich the overall structure. Furthermore, the creation of sloping ground, through earthworks processes, aims to facilitate the general cultivation and irrigation process. Regarding the hosted species of the Garden, is recommended to include plants that show an increased ability to adapt to the particular climatic and hydrological conditions of the area such as trees and shrubs of the sub-mediterranean vegetation zone, as well as hydrophytic azonic species.

In conclusion, it should be mentioned that both the planned urban green space and urban parks in general, should be integrated into the wider urban fabric through efficient traffic connections. Generating income from many sides, however, utilizing the existing south-east corner of the campus as the main one, is considered that will facilitate access by visitors, who can move on foot, by bicycle or by car, while the target is, through the corresponding interventions proposed above, the accessibility of the area with alternative means of transportation such as the bicycle, the use of which is anyway particularly increased overall in the city of Karditsa, and other means of micromobility, such as the electric scooter, providing visitors with the possibility of safely parking and/or charging them. At the same time, due to the imminent increase in the traffic load, as a natural continuation of the operation of an attraction pole, such as the proposed Forest Botanical Garden, may lead to the need of taking a series of Traffic-related measures, such as cutting off through-flows within the University area, difficulty of entry-exit conditions as well as transit within it, boosting accessibility from the West entrance of the campus to prevent visitors from using the local road network, etc. Furthermore, the use of the garden should extend to its entire area and include activities aimed at a wide range of age groups and be free for all visitors. All of the above, in combination with the performance of a supra-local public benefit, in the zone that extends around the perimeter of the garden, is assumed that they will contribute to the maximum extent to the increase of the visitation of the area, utilization and long-term sustainability of the project and they will definitely not burden the area in which the specific infrastructure is located in terms of traffic or in any other way. After all, the disengagement from motorized means of transport and the shift to other, more environmentally friendly means, including Public Transport not so much due to fuel used but mainly due to capacity (a single bus can transport dozens of visitors to the Garden as well as any other destination) presents a very high degree of overlap with the corresponding environmental footprint which is attempted to be given to the area through the construction and operation of the proposed Forest Botanical Garden.

Finally, it is pointed out that the basic character of the wider academic area within which the specific land use is proposed to be located, it is assumed in advance that it remains unchanged and non-negotiable, with all the conquests of the previous years which govern the way a campus of this type operates, such as maintaining asylum, the utilization of all the spaces by the official bodies of the

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academic community with special emphasis on the students and their student associations for use of the spaces etc.

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**CLIMATE CHANGE, CIRCULAR ECONOMY AND
SUSTAINABLE DEVELOPMENT**

**CHANGING
CITIES**



Changing Cities VI, Rhodes, 24 - 28 June 2024

Decarbonizing Communities Through Planning for Change and Adaptability

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Extended abstract

Planning for change is a way to rise to the challenges presented by the constantly changing technological, social, and economic realities in today's urban environments. An adaptable design approach can also help decarbonize cities by reducing demolition and material waste.

Depending on location, cultural and economic realities in which they are embedded, large-scale developments can take years to build. Municipal planning approval can also be lengthy and given the time that lapses between a project's inception and its execution, the fate of a plan is subject to the whim of changing market demands. Sometimes, a development project's relevancy does not survive the time it takes to be built. Therefore, housing design that follows current practice may rendered inappropriate for an unpredictable future.

This paper argues that neighborhoods can be planned to flexibly respond to the alterations they may face over the course of their development process and the years that follows. It challenges the traditional large scale residential planning paradigm to introduce a flexible approach. The modified approval process offers a piecemeal method to planning one that can easily be altered according to market demand and newly emerging economic and social realities. The process was implemented by the author in the planning of a community in the town of La Prairie, near Montreal, in Quebec, Canada in collaboration with a private developer and a municipality.

The paper also regards design for adaptability in the unit level. Subdivisions built in North America are undergoing extensive change to make them suitable for contemporary lifestyle and technology changes which results in waste that ends up in landfills. The author introduces a dwelling design that facilitates interior modification while reducing the need for extensive demolition. The energy efficient design includes demountable partitions and special conduits for the introduction and upgrading of utility lines.

By looking at the macro and micro levels the author will outline the rationale for the need for planning adaptable communities and homes, introduce relevant concept and design and will illustrate them using the planning of a community and a home that were designed for change.

Keywords: *Adaptability, Circularity, Sustainability*

Investigation of the compatibility of national waste management policies in the European Union and proposal of a common decision-making process

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Extended abstract

Economic growth, urbanization, and industrialization have increased the volume of various non-hazardous and hazardous wastes, worldwide. Waste management deficiencies on the part of some countries are one of the causes of environmental degradation. This paper aims to identify the compatibilities between the European Union's member countries concerning the national factors considered for defining the suitable location of waste management units and to create a common multi-attribute documentation model as a tool for deciding the suitable location of such units.

The first issue is resolved through the comparative evaluation of countries with the relative importance (rating) of each of the attributes (location criteria) assigned by the stakeholders per country, structured in levels to create a tree of weighted attributes, known as *the value tree of the multi-attribute utility theory (MUAT)*. The categories of attributes were selected from the literature research.

Solving a location problem for this industry affects a wide range of participants: units, governmental authorities, and civil society. Considering that the paper aims to create a common decision-making model, the agreement among different parties is pursued. MUAT is the case of the multicriteria analysis method where participation of interested parties is possible and aims to reach a *consensus*. The model should also be flexible and subject to improvement as conditions change. This can be reached with the MUAT since as the structured factors are changed, the model allows the factors to be re-evaluated by the participants.

Initially, the attributes are evaluated regarding their competence by a group of experts, the planners. Weights were attributed by stakeholders for each factor in terms of suitability for facility location. Attributes are also evaluated by the civil society actors in terms of the impact of such installations on society. To formulate a common model, the *consensus of the parties* is the objective pursued. It is therefore appropriate, for the factors to be re-evaluated by the stakeholders to obtain common weights.

The new element this paper introduces in addition to the literature, concerns the pursuit of consensus in a large group of participants of different interests who are active in the EU. Therefore, it can be applicable at the EU geographical scale. It also pursues the inclusion of the civil society in the decision-making process. Although the model is simple, consensus from all different parties and consistency and validity of the factors are difficult to achieve. In the next stage of the research, the final common weights will be used in formulating the common decision-making model. The final purpose of the proposed model is that it can ensure applicability in any case of location decision process of the waste industry in the EU.

Keywords: *multi-attribute evaluation; stakeholders; common decision-making model*

“Terrains Cultivés”-Experiential textiles-clothing recycling Center in Ioannina city

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Extended abstract

The abstract is based on the Diploma Thesis entitled “Terrains Cultivés-Experiential textiles-clothing recycling Center in Ioannina”, presented in February 2023, which regards the design of a recycling complex for clothes and fabrics integrated in the urban tissue of the city of Ioannina.

Based on a thorough examination of the clothing industry worldwide the Thesis explores the possibilities of shifting from a linear process of treating textiles to a circular one by extending a garment’s life cycle. As a result, a new way of thinking about clothes is proposed to be cultivated with the establishment of an Experiential Clothing Recycling Center in Ioannina city center. The first step in creating a grounded recycling system is to familiarize the public with the sustainable mentality by bringing it into their daily life, making it a habit. The starting point for the concept was the mandatory measures that are to be applied by the EU to all countries-members in 2025 as far as garment recycling is concerned and their strategy for 2030.

The Diploma Thesis investigates how architecture and urban design can contribute as experiential and programmatic tools in familiarizing people with a new sustainable and ethical model of textile products management, which is based on the circular economy model and aims to minimize the waste of clothes. For that cause, the Textiles Recycling Center is proposed to be designed in Ioannina, a city of northern Greece. Through its holistic design and connection to the city-life it can constitute a collective environment that creates a community by bringing together people and experts from different artistic and scientific fields to cooperate and be part of this educational process.

The site is chosen because it is characterized by three key points that are used strategically for the integration of the complex in the urban life. Primarily, it is located next to the Center of Traditional Crafts near the historical center and the old neighborhood "Siarava", where the tanneries of the city were located until the 20th century, preserving the character of the city as “a vast workshop”. Secondly, it serves as an interface between the city center and the lake, because of its location and scale, thus creating an urban passage that can be transformed into a designed experiential place. Additionally, its close proximity to the city center facilitates the establishment of links between the functions of the complex and the local professionals, not just the visitors. Finally, constituting another episode of the lakefront the complex can function as an urban apparatus that enhances the municipality’s urban planning vision for the expansion of the lakeside route and the connection of more urban areas with a promenade by the lake.

In conclusion, the proposal addresses an issue of a supralocal nature by scaling it down to the local, attempting to cultivate the conditions for a more sustainable management of the fashion derivatives by engaging and integrating the local community both socially and commercially.

Keywords: *textile-clothing recycling; strategy; urban experience; education; local community.*

Not Copy-paste, but Nature-based! A Discrete Choice Experiment in Greece and the Netherlands

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Extended abstract

Nature-based solutions (NBS) are perceived as key for many sustainability challenges in cities such as climate change adaptation and mitigation strategies. However, the preconditions and advancements on implementation for green NBS in cities vary among European countries. One factor influencing the uptake of green infrastructure in urban settings is acceptance by citizens. Previous research has explored the acceptance of NBS in particular cities or countries, yet so far, the literature comparing differences between countries and influences of urban environments on preference for NBS remains scarce.

Therefore, this paper investigates the different patterns of acceptance for urban NBS in two European countries. The study was conducted within the Horizon 2020 project UPSURGE funded by the European Union, which aims to enable the uptake of NBS for the mitigation of air pollution and climate change. UPSURGE focuses on generating guidance for the implementation of NBS in European cities. In this context the present study surveyed the socio-economic background and built environment in cities in Greece and the Netherlands. Additionally, preferences for NBS were tested via the application of a discrete choice experiment (DCE). In particular acceptance of different types of NBS and forms of benefits such as temperature reduction, participation and additional costs were explored in the DCE. Next to an analysis of the utilities derived by the features of NBS, we studied whether there are latent classes in each of the countries from which varying preference for NBS can be identified.

The results indicate that citizens show similar preferences for the type of NBS and the aspects of NBS such as temperature reduction and accessibility in Greece and the Netherlands. However, the comparison of the latent classes of the two countries reveals that there are diverging drivers for the acceptance of NBS in the two countries. While in Greece preference for NBS between the different latent classes is distinguished by spatial characteristics, the latent class segmentation in the Netherlands is rather linked to values and attitudes. Furthermore, in the Netherlands the utilities derived from green infrastructure are less prominent when compared to Greece due to differences in exposure to climate change and the felt and experienced effects. As a result, it must be recognized that the relevance and functions of NBS will vary among European countries, due to aspects such as climate change affectedness and characteristics of the built environment. The results also offer practical implications for securing the success of NBS within different neighborhoods and population segments.

Keywords: NBS; Climate adaptation, Urban green space; Discrete Choice Experiment

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Sustainable Urban Development Policies in Greece. The perceptions of Citizens

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Abstract

The purpose of this research is to investigate the perception of Greek citizens regarding Green Growth and in particular to the research questions: a) whether Green Growth can lead to a more environmentally and friendly entrepreneurship, b) whether the financing for the transition towards Green Growth either from the European Union or from national resources is sufficient, c) if personal responsibility plays a role in the creation of sustainable consumption and production models, d) if there is an intention of Greek citizens' active participation to protect the environment and e) what are the most important policies that will lead Greece to a Green Growth.

The profile of the participants in this survey was 378 citizens from different regions of Greece and it was conducted in 2023. The statistical processing of the data was carried out using IBM SPSS ver. 26. We analysed them using the tools of descriptive statistic, crosstabulation, calculation of demographic means and frequencies, and non-parametric Kruskal-Wallis tests for independent samples.

The results of the survey showed that Greek citizens believe in a large percentage that "Green Growth" in Greece and the turn to a more environmentally and friendly entrepreneurship seems to be a realisable aim. From them the women are more optimistic about the issue, in relation to men. The financing of the green growth from EU is considered as moderate. About this thematic the younger people are more hesitant than older people. Majority of Greek citizens consider as very important the role of personal responsibility in society's transition to sustainable models of consumption and production, with women having a statistically more positive opinion than men. A significant portion of Greek citizens declare their intention to active participation for the protection of the environment, which may also be a challenge for the Greek state to take measures in order to promote the importance of the environment and to provide incentives for the active participation of Greek citizens. Using the non-parametric Kruskal-Wallis statistical test, the statistical analysis showed that there is no statistically significant difference for the participation of citizens in environmental actions in relation to their age. Finally, energy saving actions and taxation of polluting business activities are considered very important for the promotion of the Green Growth.

This research contributes to the national and international debate on the green and just transition of European economies based on citizens' needs and challenges emerging at national level.

Keywords: *Green Growth, Green Innovation, Green Entrepreneurship, Financing, Personal Responsibility of Citizens.*

1. INTRODUCTION

In scientific research, the concepts of sustainable development have become highly relevant to policies related to environmental management and there is an evolving discussion about the concept of sustainability that introduces a new way of understanding the society-nature relationship [1].

According to [2] *“climate change and environmental degradation are a threat for the existence of the European Union and for all the World. To address these threats, the European Green Deal is Europe's new growth strategy, which will transform the E.U into a modern, resource-efficient, and competitive economy. The European Green Deal aims to make Europe climate neutral by 2050, boosts the economy through green technology, creates sustainable industry and sustainable transport and reduces pollution”*. It is worth noting that the European Green Agreement is financed with 1.8 trillion. euros both from the Next Generation EU recovery plan and from the EU budget.

According to the Global Green Growth Institute, green growth is defined as *“the approach that seeks to deliver an environmental and economical sustainable and inclusive society. It thus seeks opportunities for economic growth with low carbon emissions and low climate impact, prevents or remediates pollution, keeps ecosystems healthy and productive, and leads to the creation of green jobs as well as poverty reduction and enhanced social inclusion”* [3].

In the context of the Green Growth Index [4], which the Global Green Growth Institute [5] published first time in 2019, the protection of natural capital is one of the four important dimensions of green growth [6]. It links with the efficient and sustainable use of resources, green economic opportunities and social inclusion [7].

In addition, natural capital [8], is a core to green growth because of its role in creating new sources of growth and expanding economic opportunities in the form of green investment and jobs, among the others [9]. But green growth also emphasizes the role of people, so social inclusion becomes a key mechanism for people not only to contribute, maintain and distribute economic benefits, but also to protect the sources of that growth, i.e. natural capital.

Cities and regions have emerged as catalysts for green growth around the world: organizations such as C40 Cities are bringing together mayors from around the world to commit to a Global Green New Deal [10]. Of all the international actors, Europe was most firmly on the path to a green and digital transition before COVID-19, and now looks poised to lead the way with the "greenest recovery in the world", through continued support for Green Deal across the continent. It mobilizes around the goal of being carbon neutral by 2050, incorporating a just transition mechanism to support the phasing out of fossil fuel industries and a green industrial strategy, which is seen as a 'compass' and an 'engine' for recovery [11].

2 LITERATURE REVIEW

Research on the achievement of the United Nations Sustainable Development Goals (SDGs) [12] has shown that developed countries benefit more by focusing on social and environmental factors.

According to research [13] the adoption of a holistic planning process and sustainable urban development creates a possibility to further support the progress towards achieving the sustainability agenda of cities.

Researchers report that Sustainable Urban Development can be implemented through an integrated analysis of different modes of governance [14].

Governments have a wide variety of tools in their arsenal to redirect economic activity towards a green transition and must adopt an approach involving the range of financial and non-financial levers as a fiscal stimulus [15].

There is the recommendation for a shift to a new form of economic theory that is more environmentally friendly: a) the creation of ambitious green public investment packages to revitalize the global economy in the required direction and b) the formation of innovation systems by financing

economically and socially weaker teams, and c) cross-sector partnerships for green innovation and ambitious missions to accelerate climate solutions [16].

The concept of green entrepreneurship [17] is in its infancy at the moment, but is moving towards the maturity phase, while environmental sustainability and entrepreneurship focus on the production of green goods. However, this research concludes that the impact of the green market on Sustainable Development and Green Entrepreneurship has not yet been explored in depth.

According to the Neumann [18], the effect of green entrepreneurship on sustainable development, showed that higher levels of green entrepreneurship are positively related to economic and social development but not to environmental development. And it concludes that the recognized economic and social importance of green entrepreneurship warrants intensified with the policy efforts to support the discovery, creation and exploitation of green business opportunities.

The governments in recent years, increasingly, seek to become more active in pursuing environmental initiatives for the success of sustainable development. In this effort, models are being developed that focus on cooperation between local governments, residents and organizations [19]. After all, a sustainable development strategy can serve as a tool of management and political control. To develop and implement such a strategy at the local level, municipalities may use citizen participation approaches. In their article Meschede and Mainka [20], developing a model of citizen participation's approaches during different phases of adopting a sustainable development strategy in German. The results show that most municipalities count on citizens' participation mainly in the implementation phase of the strategy and less during its development.

Regarding the personal responsibility of citizens to achieve sustainable development, Tkáčová et al [21], emphasize the necessity of a balance between human needs and the carrying capacity of these needs in the context of sustainable development through interdisciplinary higher education curricula in Slovakia. In this the individual tasks of sustainable human behavior and individual responsibility analyzed from the perspective of university students regarding the roles and individual responsibilities that exist for sustainable development.

In Greece, research [22] showed that urbanization quality indicators have a positive effect on sustainable development goals. It has also been shown that there is a significant relationship between integrated land use strategies and sustainable development goals, while some general recommendations are formulated regarding sustainable urban development and the importance of creating the necessary conditions for its implementation, through significant changes in all social levels.

3. THE RESEARCH OBJECTIVE

The main purpose of this research is to investigate the perception of Greek citizens regarding to the Green Growth. Other objectives of the research are to investigate: a) whether green growth can lead to a more environmental friendly entrepreneurship, b) whether the funding for the transition to green growth, either from the European Union or from national resources, is sufficient, c) whether personal responsibility plays a role in the creation of sustainable consumption and production models, d) whether there is an intention of active participation of Greek citizens in protection the environment and e) what are the most important policies that will lead Greece to a green growth.

Based on the literature review and the objectives of the research, the following research hypothesis are investigated:

1. $H_{1.1}$: Green Growth leads to a more environmentally friendly entrepreneurship.
2. $H_{1.0}$: Green Growth doesn't lead to a more environmentally friendly entrepreneurship.
3. $H_{2.1}$: The personal responsibility of women in the transition of society to sustainable models of consumption and production is considered more important than that of men.
4. $H_{2.0}$: There is no significant difference between the man's and woman's responsibility regarding the transition of society to sustainable models of consumption and production.

5. H_{3.1}: Younger citizens do not plan to take part in actions for the environment.
6. H_{3.0}: Younger citizens plan to take part in actions for the environment.

4. METHODOLOGY

Considering the objectives, the questionnaire was chosen as an appropriate methodological tool, which is mainly used in "field or overview research", which includes the present research. Regarding the approach to citizens, the basic principles of ethics, anonymity and voluntary participation were fully respected [23].

The size of the research sample amounted to 378 Greek citizens from all over the country. The distribution of the questionnaires took place in the period of November 2023- February 2024. The questions were formulated through the Google Form template and the link sent either via email or via social media (Facebook, Messenger, Viber). Before conducting the main survey, a pilot survey was conducted on 10 citizen respondents to ascertain the clarity and understanding of the questions.

The main statistical analyzes to calculate the results were done using SPSS ver. 26. Also we use the Cronbach Alpha reliability coefficient (estimated at 0.92), which shows the reliability of the responses according to Siomkos and Vasilikopoulou [24], the descriptive statistical analysis, the crosstabulation analysis, the calculation of the means and frequencies of the demographic data as well as the non-parametric Kruskal-Wallis tests for independent samples, as the sample did not follow a normal distribution, after applying the Kolmogorov-Smirnov test ($p < 0.05$).

Finally, regarding the demographic characteristics of the participants in this research, were found: In terms of gender, a total of 143 men (37.8% of the participants) and 235 women (62.2% of the total sample of participants) participated. Regarding age, the majority of participants i.e. 43.4% belonged to the age group of 18-25 years. The 26-35 age group comprised 9.8% of the total sample, while the 36-45 age group comprised 12.7% of the participants. A large number of participants (30.7%) also belonged to the 46-60 age group. Finally, 3.4% of the participants belonged to the over 60 group. Regarding the educational level, the majority of the participants, a total of 42.6% were university graduates, while 28% of the total sample held a Master's degree. High school graduates also took part in the survey, with a percentage of 17.5%, while 9.3% of the participants were PhD holders. Regarding occupation, 44.4% of the sample were students and 37.8% worked as civil servants. Private employees (7.1%), freelancers (6.1%), unemployed (2.6%) and retired (1.9%) also participated in the survey, of which the majority (60.3%) said residents of a city with 50,000 inhabitants. 18.8% live in a city of over 50,000, while only 8.7% live in a village, 6.6% in a town and 5.6% on an island.

5. RESULTS

Green Growth in Greece and the turn to a more environmentally friendly entrepreneurship seems to be an achievable goal, as 59.7% of the citizens answered surveyed estimate that this can be achieved to a large to very large extent. So, research H_{1.1} is confirmed that "Green Growth", according the citizens can lead to a more environmentally friendly entrepreneurship.

The correlation analysis (crosstabulation) showed that there is a statistically significant correlation between green growth as a realizable goal and the gender of the respondents ($X^2=19.996$ for $\alpha < 0.001$), i.e. women are more optimistic about this issue than men (Fig. 1).

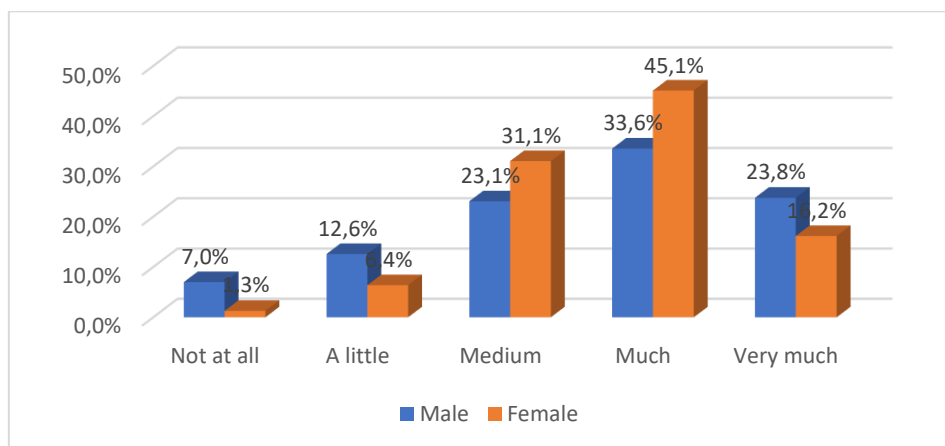


Figure 1. Will the Green Development contribute to the promote of more environmentally friendly entrepreneurship in relation to the gender of the survey respondents?

One of the main issues for the implementation of green development in Greece is the adequate funding from the EU. The survey showed that 44.4% of respondents believe that it will be moderate, 25.4% that it will be insufficient and 30.2% that will be sufficient. In other words, hesitancy appears, but also moderate optimism on the issue of financing.

The correlation analysis (crosstabulation) showed that there is a statistically significant correlation between the adequate financing of green development by the EU. and the age classes of the respondents ($X^2=27.087$ for $\alpha<0.05$), i.e. the younger people are more hesitant than the older ones on the issue of adequate financing of green development by the EU.

In parallel with the financing of green growth by the E.U., 68.6% of Greek citizens believe that national funds will be mostly required for this purpose. The older Greek citizens (84.6% for over 60 years) who have more experience in their lives believe that national funds will also be required to finance green growth.

Quite interesting is the opinion of Greek citizens about the important role of their personal responsibility in society's transition to sustainable models of consumption and production, as 86.5% of them consider it as very important. Only 5.3% of them consider it little or not at all important. In fact, women consider it very important at a rate of 64.7% and in fact there is a statistically significant correlation between the role played by the personal responsibility of citizens in the transition of society to sustainable models of consumption and production and the gender of the respondents ($X^2=27.200$ for $\alpha<0.001$), with women having a more positive opinion than men (Table 1). Therefore, the hypothesis $H_{2.0}$ is confirmed, that the personal responsibility of women in the transition of society to sustainable models of consumption and production is considered more important than that of men. It is also worth mentioning that 47.9% of the participants in the survey of Greek citizens consider that the actions for the protection of the environment have a great influence on the decisions of international organizations such as the UN, OECD, etc., with men being more cautious.

Particularly interesting seems to be the intention of Greek citizens to active participation for protection the environment, this is expressed to a relatively moderate degree (25.9%), but it is worth noting that 38.4% of them wants to do that and (Figure 2) , and this is encouraged factor. Perhaps this result can also be a challenge for the Greek state to take measures to promote the importance of the environment and provide incentives for the active participation of Greek citizens.

The data were then analyzed using the non-parametric Kruskal-Wallis statistical test for more than two independent samples, because the sample did not follow a normal distribution, after applying the Kolmogorov-Smirnov test ($p<0.05$). The statistical analysis showed that there was no statistically significant difference in means of planning citizens' participation in environmental protection actions between ages, $H(4)=5.291$, $p= 0.259>0.05$.

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Based on the above, it is verified the Research H_{3.0}, according the third question that there is no statistically significant difference for the participation of citizens in actions for the environment in relation to their age. Thus, younger citizens do not plan more than older ones to take part in actions for the environment.

Table 1. Crosstabulation of the sex to the role of personal responsibility in society's transition to sustainable consumption and production models

			Sex		Total	
			Male	Female		
How much important is the personal responsibility in society's transition to sustainable consumption and production models?	Not at all	Count	4	0	4	
		Expected Count	1.5	2.5	4,0	
	A little	Count	12	4	16	
		Expected Count	6.1	9.9	16,0	
	Medium	Count	10	21	31	
		Expected Count	11.7	19.3	31,0	
	Much	Count	53	58	111	
		Expected Count	42.0	69.0	111,0	
	Very much	Count	64	152	216	
		Expected Count	81.7	134.3	216,0	
	Total		Count	143	235	378
			Expected Count	143,0	235.0	378.0
Chi-Square Tests						
		Value	df	Asymptotic Significance (2-sided)		
		27.200 ^a	4	0.000		
		28.244	4	0.000		
		378				
a. 2 cells (20,0%) have expected count less than 5. The minimum expected count is 1,51.						

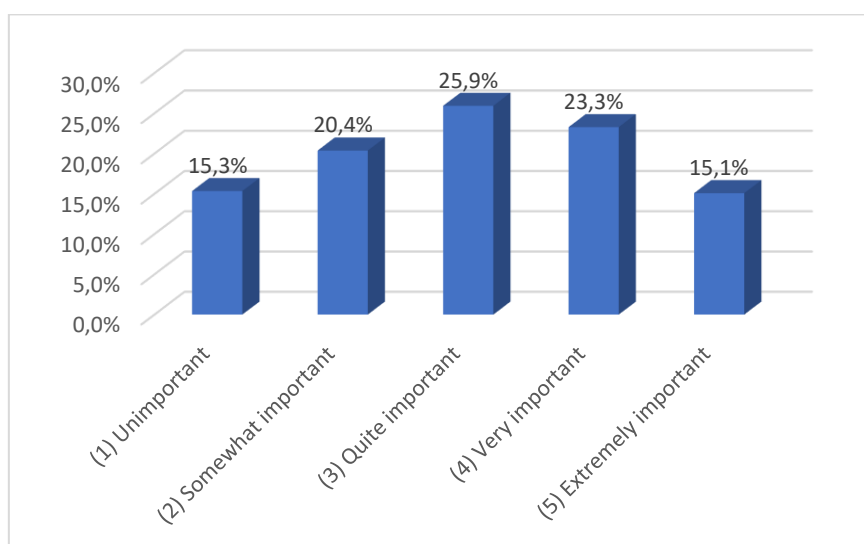


Figure 2. Intention of Greek citizens to actively participate in actions for the protection of the environment

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Finally, during the investigation of citizens' views on Green Growth, it was examined how important they consider certain factors as policies to promote. According to the statistical analysis, very important policies for the promotion of Green Growth (Table 2) considered energy saving actions (M=4.38) and the taxation of polluting business activities (M=4.15).

Table 2. Suggested Policies for Green Development (*Likert scale: 1-5; 5= extremely important*)

Policies for Green Development	Means	(1) Unimportant	(2) Somewhat important	(3) Quite important	(4) Very important	(5) Extremely important	(5)+(4)
Energy saving actions	4,38	0,8	2,9	8,2	54,5	33,6	88,1
Taxation of polluting business activities	4,15	3,2	6,1	13,5	50,3	27,0	77,3
New green jobs and training	4,09	1,9	4,8	18,0	41,8	33,6	75,4
Financing green innovation for the benefit of some weaker economic groups	4,08	2,4	6,6	14,3	43,1	33,6	76,7
Creation of green investment packages	4,06	2,4	4,5	15,3	37,0	40,8	77,8
Bioeconomy	4,04	2,1	5,8	17,5	39,7	35,0	74,7
Circular economy	3,92	2,6	6,1	24,3	36,0	31,0	67,0
Green financial system	3,65	4,0	9,5	31,0	27,0	28,6	55,6

6. CONCLUSION

From the results of the research, we can conclude that Greek citizens believe in a large percentage in achieving sustainable development and that "Green Growth" in a developed country like Greece can lead to a more environmentally friendly entrepreneurship, focusing on social and environmental factors, as also investigated [12]. Therefore, this can be a valuable tool in a holistic State planning to support progress towards achieving the urban sustainability agenda [13],[14]. After all, the concept of green entrepreneurship in Greece is currently in its infancy and has not been investigated in depth [17], so this research gives even more value, as environmental sustainability and entrepreneurship focus on the production of green goods. Additionally, through this research it appears that the economic and social importance of green entrepreneurship justifies intensified policy efforts to support the discovery, creation and exploitation of green business opportunities, as Neumann [18] also argues.

In the effort to implement green growth, it is deemed necessary to finance it from the European Union, as well as the national resources of Greece. After all, according to the European Commission [2] it is a priority for the European Green Agreement which is financed with 1.8 trillion. euros both from the Next Generation EU recovery plan and from the EU budget. Although it appears that the younger Greek citizens are more hesitant than the older ones regarding the adequate financing of green development with EU funds.

The fact that the vast majority of Greek citizens consider very important the role of their personal responsibility in society's transition to sustainable models of consumption and production, with women having a statistically more positive opinion than men, should to develop the study programs in both higher and secondary education, regarding the sustainable development of cities and the wider regions of Greece, in order to strengthen the knowledge about green sustainable development through experiences and at the same time to analyze the individual tasks of sustainable human behavior and individual responsibility [21].

As a significant portion of Greek citizens declare through this survey their intention to actively participate in actions for the protection of the environment, it is proposed that the Greek State develop an appropriate strategy with a modern model that focuses on cooperation between Ministries, Regions, Municipalities, their residents, but a support network organization, for the active participation of citizens in environmental actions, similar to what has emerged from research [19] in Germany. After all, as the same research notes, "most municipalities count on citizens' participation mainly in the implementation phase of the strategy and less during its development".

Finally, it is proposed that the Greek State develop special indicators of quality of life resulting from green sustainable development through the creation of the necessary conditions and structural changes at all social levels, as Kalfas et al [22] mention in their research.

Limitations of the research could be mentioned both in terms of the larger sample size and the conceptual content of the research, since the concept of green development, while it is well known, nevertheless does not seem to have been easily understood in the present research, the social and its economic dimension. After all, until now there are no clear support programs and financial tools for both businesses and citizens. Therefore, any answers were given according to the ideological and general life attitude of the respondents.

In a further research, entrepreneurship and green professions could be linked with citizens' knowledge and their connection with green development in all three of its main pillars.

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Architectural Narratives in the Anthropocene Era, the Contemporary Ecological Condition as a Design Praxis

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Abstract

In contemporary society, the term ecological degradation refers to the alteration of territories by anthropogenic activities and at the same time to the awareness of the exhaustion of the natural resources that sustain the survival of humanity. The practices of modernity, addressing the environmental issue, are inspired by the narrative of harmonious nature and explore the changes in the planetary landscape with a focus on their impact on humans, ignoring the transformations of more-than-human landscapes. Architectural proposals, as material registrations of the contemporary way of living, are oriented towards the creation of bounded inert landscapes, whose development depends solely on the adequate control of their conditions by the human factor and socio-economic considerations

The current study examines contemporary ecological theories interwoven with new-materialism approaches to the social question and the human-non-human interaction, in an attempt to highlight the multiplicity of the ecological degradation phenomenon. At the same time, the field of architecture will be explored by examining qualities inherent in the narrative of the Anthropocene Era.

The first section analyses key points of contemporary ecology, which raise questions about the multiplicity of entities and their interrelationships in the geological present. Focusing on the work of the French philosopher Bruno Latour, we will examine narratives of the mythological existence of nature, highlight correlations between artificial and natural environments, and analyse the term society-social, questioning both the primacy of the term man and the term nature.

The second section focuses on the role of architecture in our geological present. International design practices and strategies that include both biotic and abiotic systems will be explored, revealing the multiplicity of each landscape. In contrast to organized boundary design, the proposals that will be presented are oriented towards composing conditions and highlighting the interrelationships between the entities that make up dynamic shifting landscapes of coexistence.

Keywords: *ecological degradation; new-materialism; Anthropocene; Bruno Latour; dynamic shifting landscapes*

1. INTRODUCTION

The first section explores contemporary philosophical considerations intertwined with social and territorial approaches, aiming at highlighting the complexity of the ecological issue and exploring the interrelationships between entities in the geological present. By studying the history of human habitation of the earth, practices of modern societies are analysed as expressions of modernity's perceptions of the nature-culture scheme and human-non-human relations. This path seeks to identify and redefine the agents that intensify ecological degradation, inspiring a narrative of the earth beyond human exceptionalism, oriented towards the development of ecological practice and the emergence of new ways of inhabiting Earth and alterity.

1.1 ECOSOPHY THEORY, THE THREE ECOLOGIES | F. GUATTARI

The French philosopher and psychoanalyst Felix Guattari in his book *The Three Ecologies* describes the modern age as a field where fundamental categories of society are being degraded. He observes that the practices of capitalist society are evolving into an ideology of unlimited competition and introduces the term Integrated World Capitalism or IWC to describe the factor that influences the domains of production which contribute to the framing of subjectivity. The perceptions and necessities resulting from subjectivities are shaped by the forces of a global market, which makes Integrated World Capitalism a catalytic factor in ecological degradation and capable of widening the gap between human and environment.

The urgent need to rehabilitate and save the degraded natural landscape often focuses human praxis on a one-dimensional study of environmental instability. Guattari attempts to highlight the complexity of the ecological question by developing the concept of Ecosophy. In contrast to the considerations of Deep Ecology, Guattari's Ecosophy constitutes the set of interactions between three fundamental categories: human subjectivity, society and environment. These categories are related to the Three Ecologies: mental, social and environmental.

Mental ecology is oriented to the correlation between subject and individual, rethinking the agents that influence their interaction, calling for the creation of autonomous subjectivities that evolve affectively by eliminating the extensive influence of the agents of Integrated World Capitalism.

Social ecology refers to the primordial subjectivity which must be reorganized through the affective interrelation of social coordinates.

Environmental ecology describes the ecosystem as the domain where social interactions take place, and refers to the productive interrelationships between them. Environmental ecology encompasses the set of entities and actors that shape the landscape, articulating an aesthetico-political narrative of the environment, contrasting with the advocacy of the ideal figure of nature as observed in Deep Ecology.

Ecosophy is an ethico-political partnership of the three ecologies, concerning the understanding of existence as part of the environment. By presenting the redefinition of fundamental units, it reveals the interrelationships that we, as conscious environmental beings, need to understand in order to decelerate the rates of ecological degradation. In other words, Ecosophy refers to the interrelationships of constantly shifting entities, such as subjectivity and society, that contribute to the development of "an environment in the process of reinvention."

1.2 THE ECOLOGICAL CONDITION FOLLOWING INDUSTRIALISATION, INTRODUCTION TO THE ANTHROPOCENE

The Modernism era, which is a crucial point of reference for post-war considerations, expressed the 'purity' of the image of nature free from man-made interventions, creating a narrative of human exceptionalism. Contemporary ecological theories interpret geological developments as inextricably linked to the individual and collective practices of society. The study of geological history is oriented towards the inclusion of the acting entities of the planetary landscape and examines the multiplicity of interrelationships between them.

In the post-industrial period (after the 19th century) geological changes are characterised by a Great Acceleration, as the needs of human habitation expand. Mass production and the redefinition of the energy economy, as a discharge for the needs of overpopulation and economic competition, contributed to the transformation in sectors of production. Anthropogenic ecosystems spread rapidly and invaded the territories of wildlife, leading the scientific community to describe the last two centuries as the period of the Sixth Mass Extinction of Species.

The phenomenon of global climate change has stimulated the development of a public debate, initially structured by the natural sciences, but at the same time provoking a more interdisciplinary

examination of ecological issues. The work of the Danish chemist Paul J. Crutzen became a focal point for subsequent ecological approaches. Crutzen studied anthropogenic activities and became aware of their ability to alter the chemical equilibrium of the environment and, by extension, the geological processes. His research interest is oriented towards reading human history as a chronology of chemical correlations and changes. In 2000 he introduces the term Anthropocene Epoch to describe a turning point in the identification of geological and human history. In Anthropocene studies, the term environment is understood as a synergy of subjectivities, natural and artificial structures as the ability of human agency to influence geological change is identified.

The main issue in Anthropocene theory lies in the generalised rendering of the human term, as the term presents a homogeneous human impact, unable to include the social inequalities of contemporary reality. The American philosopher Donna Haraway suggests that the term Anthropocene needs to be transformed, introducing the alternative narratives Capitalocene, Phytocene and Chthulucene.

In the Capitalocene, the role of the geological factor is attributed to the antagonism nurtured by capitalism and the anthropogenic practices encouraged thereby. The term Phytogeocene describes the process of forced labour, slavery, colonialism, and racism, through the placement and movement of plants, human animals and microbes, which formed modernity and capitalism by constituting the industrial revolution.

Anthropocene-related considerations are a springboard for the redefinition of the natural and social sciences, while at the same time intertwining with compositional practice and architectural approaches. The Finnish thinker Jussi Parikka refers to the term global systems, which are ethico-political partnerships of human history that develop through intersecting transformations and incorporate the discharges of anthropogenic practices.

In Parikka's descriptions, the evolution of architecture is a material narrative of man's interaction with the land in the consecutive shifts of history. In the attempt to redefine the limits set by global systems, a demand is made for a reconfiguration of architectural thinking, which is called upon to invent new practices that will reverse the depletion of land resources and create conditions for coexistence by enhancing biodiversity in the planetary landscape.

1.3 EARTH AS A LIVING ORGANISM | B. LATOUR, J. LOVELOCK

Modernity narrative, interwoven with the reflections of Deep Ecology, conveys the image of a self-sufficient nature, an inexhaustible landscape capable of covering the needs of human habitation in eternity. The earth is presented as a vast inorganic machine whose underfunctioning is due solely to man's insufficient control of it. As the French philosopher Bruno Latour argues, the antagonism fostered by globalised capitalism opposes the earth to the economy, with the result of considering the discharges of the climate crisis exclusively in terms of their impact on humans, without regard to the energies of the earth and non-humans.

Latour opposes Galileo's view of homogeneity in the solar system as he observes the differences between the Earth and the other celestial bodies in terms of their equilibrium conditions. Latour's observations coincide with the work of British thinker James Lovelock, whose focus is on understanding the Earth as a living organism, embodying all the entities associated with the terrestrial world and the interactions between them in the critical zone between the earth crust and the atmosphere. Lovelock introduces in 1960, in collaboration with the American biologist Lynn Margulis, the Gaia hypothesis, which describes the earth "as a self-regulating and living body composed of microorganisms, bacteria and chemicals". In contrast to Galileo's inert earth "in motion", Gaia is active, reacting and transmuted by the biotic and abiotic forces developing in its soils.

Lovelock's Gaia refutes anthropocentric readings of harmony in nature. In his study, each entity can be transformed into an agent of geological transformations, as the organisms that are part of Gaia do not adapt to an environment, as in the Darwinian view, but instead shape the surrounding territories

in search of the most favourable conditions for their development. The constant modifications of neighbouring entities make it impossible to separate the action of the organism from the environment before the influence of that action.

The typical understanding of the study of "nature" through the one-dimensional reading of its layers does not apply to Gaia. Nothing is considered inert or external. Space in Gaia is a derivative of time, shaped by the interaction of life and climate, "the space in which we live, that of the critical zone, is the same space towards which we congregate; it extends as far as we do; it lasts as long as the entities that make us breathe". Gaia theory therefore invites us to recognize the influences of acting entities on the planetary landscape, regardless of the scale they occupy. Latour describes the phenomena of reciprocal boundary transgressions between neighbouring entities as "waves of action" and argues that these overlaps between them constitute the real actors as they constitute the conditions regulated by the necessity of habitation of living entities. The waves of action reflect the energies of Gaia in the continuity of the geological epochs, turning her narrative into a grounded study of life that calls for new modes of habitation directed towards the Earth.

1.4 NEW WAYS OF INHABITING EARTH, THE CONCEPT OF "EARTHING" | B. LATOUR

Latour also introduces the term New Climatic Regime to describe the modern era, in which the survival of the human species is based on its relationship with the Earth. The waves of action generated by social actors bring about changes in the geological continuum and create contradictions in the relationship between humans and the Earth. The changes caused by globalisation in the sectors of production and subjectivities have led to the broadening of inequalities and the distancing of people from the Earth. Latour examines socio-political developments by considering the study of poles of attraction, a term he inserted to describe "the vectors along which the various political actors are positioned". He refers to the Local and the Global as the dominant poles of attraction that influence social developments and, by extension, the trajectory of geological history.

The Global constitutes the basic instrument of globalisation as it embodies the narrative of an ever-expanding progress that presupposes the abolition of local qualities, in order for a new global culture to emerge.

Latour understands globalization as a mixture of two contradictory elements, globalization-plus and globalization-minus. The first term describes progress as a form of expansion of mental and territorial boundaries, the transition from a local to a global perspective that contributes to the emergence of complexity, characterizing the coexistence of entities with the earth. On the contrary, the realisation of globalisation created the narrative of a shared vision, but expressed by a small part of the total population of the earth, with the result that the global became "a robust local vision"

Globalisation has contributed to widening the gap between the local and the global and at the same time eliminated the common ground created by the claims of modernisation. The finite quantity of natural resources and detachment from the land, combined with the inconsistency of attractions, led to the disorientation and inertia of society. These conditions contributed to the emergence of a new pole of attraction, which Latour calls the Out-of-this-world. The third attractor does not recognize the material limitations and territorial barriers of nature and sees the planet as an endless landscape of natural resource deposits. People who embrace the prescriptions of the Outworld claim that they do not inhabit the Earth of climate crisis, and in this light fail to recognize the impact of their actions in disrupting the ecological balance, while developing a narrative of escaping the Earth and seeking alternative forms of habitation on other planets. For Latour, the third attractor is the main factor that contributes to the reinforcement of phenomena of localism, as the concept of coexistence on a common planet is abandoned and, at the same time, to the increase in migratory flows due to the limitation of habitable lands and the extensive widening of inequalities.

The ecological movements, in their attempt to react to the forces of globalisation, intensified the dichotomy of modernisation - ecologize, or in other words modernity - anachronism. According to Latour, the resolution of the ecological question presupposes the creation of a common world, a place that is not defined by the contradictory relationship between the Local and the Global and the actions of geopolitics. In examining the necessity of redefining the social spectrum, he refers to finding a fourth pole of attraction, which he places opposite the Out-of-this-World. The new attractor, in contrast to the narrative of escape from the Earth, is directed towards it, calling for new ways of re-inhabiting territories, expressing the need for society to "land on Earth" , what Latour calls the Terrestrial.

Latour embodies in Terrestrial a philosophical context for inhabiting the critical landscape of the Anthropocene. The political expression of returning to the land fails to be situated within the existing political system, raising questions about the necessity of redefining political actors and abolishing the Left-Right and Local-World dichotomies. The boundaries set by the notion of society are extended to include more-than-human entities whose interactions are characterised as social actors. The Terrestrial Attractor, in contrast to modernity, approaches the definition of progress as the ability to recognize the multiplicity that characterizes the planetary landscape and the effort to preserve diversity.

The redefinition of the nature image in the Gaia narrative, combined with the dissolution of the boundaries imposed by the Earth, are proposals for inhabiting the landscape of the climate crisis, while at the same time attempting to reshape the fields of earth sciences and architectural thought. Fundamental architectural considerations are subject to redefinition in the New Climate Regime, in the attempt to free the compositional process from the influences of the Local and the Global. Architectural form is released from the norms of the past, and creates a ground for the development of alternative narratives that aim to problematize society by highlighting the complexity of critical issues.

2. COMPOSING LANDSCAPES OF CO-EXISTENCE

The second section is concerned with the explanation of applied architectural examples in the light of the above-mentioned philosophical baggage. Through the work of Gilles Clement, James Corner, Anhuradha Mathur & Dillip Da Cunha, correlations between ecological and compositional practice are attempted, aiming to create new territories for understanding, thinking and analysing spatial experience.

2.1 THE LANDS OF BIODIVERSITY | GILLES CLEMENT

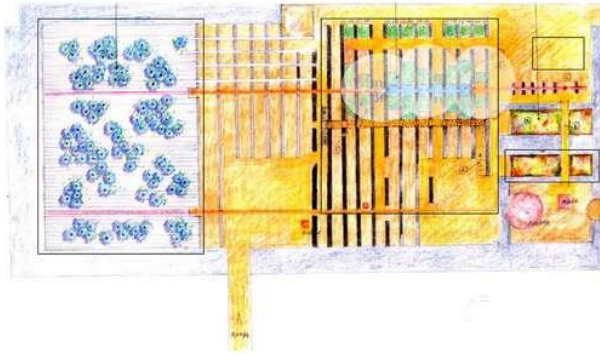
Gilles Clement's work is oriented towards highlighting and enhancing the diversity of a landscape, recognising the immaterial and material forces exerted on it. He rejects planning that favours the development of singular species in the landscape as this discourages the development of new forms of life. Diversity refers not only to the coexistence of different species, but also to the difference in interactions between similar entities.

Third Landscape theory refers to territories located in the intermediate space between natural and urban landscapes, in which the dominant actors are non-human entities, providing narratives of autonomous entities from which human agency is absent. These landscapes develop intense biodiversity as their evolution is not constrained by the homogenizing practices of modernity and the antagonism fostered by capitalism.

In defining the autopoietic ability of the Third Landscape, Clement does not attempt to remove anthropogenic practices from his study. The lands of the Third Landscape are material records of the Anthropocene epoch, and refer to the intermediate of the human-non-human relationship. The complexity and biodiversity found in these lands are based on the overlapping interrelationships of

the entities that inhabit them, through which the conditions for the development of a shifting landscape in constant reshaping are created.

The Garden of the Third Landscape is located in the Saint Nazaire region of France, an area with a history of maritime transport. In 1940, German troops occupied the town and built the submarine base in the port of Saint-Nazaire, an oversized building made of concrete that lost part of its roof as a consequence of the bombing of the area.



The Third Landscape Garden is a system of three smaller gardens, the Garden of Labels, the Garden of Aspen Trees and the Garden of Stone and Grasses. These gardens survive on the dry concrete roof without extensive technical maintenance.

The gardens Clement designs are places of unpredictability, where visitors encounter the rhythm and mobility of nature: the seasonal changes of flowering and the process by which leading species are gradually replaced, ensuring that the profile of the garden is constantly transformed.

These territories embody the heterogeneities that inhabit urban landscapes and constitute fields for redefining the complexity that characterizes the coexistence of entities with the land. Clement envisions a network of acting entities, a form of society in which human influence is limited, creating the conditions for the development of an autopoietic shifting landscape. The diversity presented by the Garden contrasts with the homogeneity of its metropolitan landscape of installation, raising questions about the redefinition of the entrenched practices of modernity and their influence in limiting the evolution of species.

2.2 DESIGNING "SPONGES" IN COASTAL LANDSCAPES | JAMES CORNER- FIELD OPERATIONS

The architect James Corner conceives of nature as a whole composed of the practices of evolution and habitation of heterogeneous entities. His work is part of landscape urbanism through which he critiques the distinction between natural and artificial environments, as he identifies the homogeneity that characterizes cultural and natural landscapes in an era of accelerating geological change.

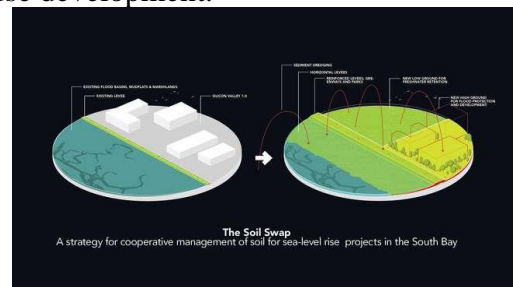
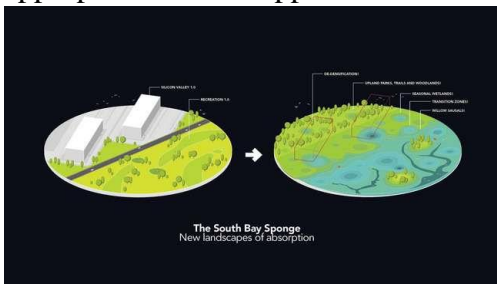
His studies are characterized by the integration of multiple disciplines and media of representation that contribute to the development of a multifaceted design approach. The mobility presented by a landscape is expressed by Corner's mappings, which transform the compositional practice into a process of discovering the complexity that characterizes the architectural intervention.

In Corner's design practice, the principles of contemporary ecology can be found, which are transformed into urban qualities. The term urbanity now includes the intangible and material relations that constitute an ecosystem, reinforcing the view of the non-separability of artificial and natural environments.

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Corner's architectural work refers to interventions related to the Terra Fluxus model, a term that characterizes interventions and landscapes that are assimilated by the environments they are applied to rather than imposed on them. In contrast to the Terra Firma narrative, which refers to fixed and immutable constructions, Terra Fluxus is a condition in which the architectural proposal seeks to create a landscape in constant redefinition, a sympoietic process in progress rather than a final form. The South Bay Sponge project is located in San Francisco Bay, California. The South Bay is composed of several cities sited on the shoreline with near-zero altitude, vulnerable to upcoming sea level rise. East Palo Alto, one of the South Bay cities, is the lowest altitude community and is selected as the planning springboard for Field Operations because of its vulnerable nature. Flooding is the primary problem of East Palo Alto and neighboring cities, resulting from rising sea levels and the alteration of the natural drainage system provided by the area's creeks. In addition, the area has a shortage of usable land and at the same time, a misdistribution of embankments along the shorelines. Field Operations decided that their work should be a form of collaborative planning, aiming to achieve new forms of cooperation at the social and political level. By organising meetings and discussions with the residents of the Bay on the design and qualities of the proposal, they attempted to establish a shared ecological thinking and practice, a way of inhabiting this peculiar landscape. Identifying the wetlands and salt marshes element, the team starts by proposing a soil swap. Through this 'swapping', the protection of the coast is achieved while at the same time creating areas of suitable altitude for the installation of new infrastructure related to transport, commerce, housing and recreation.

Complementing this background is the strategy of land use exchange. The character of this strategy is twofold. The first objective is to decongest low-lying areas in order to create the space needed for proper flood management in the area. At the same time, a practice of densifying building in appropriate areas is applied to encourage dense and mixed-use development.



The sponge landscapes that complement the coastline are large-scale green infrastructures that present a range of ecological conditions, lakes, marshes and even large green spaces that concentrate residential and recreational uses in combination with existing housing estates. The 'sponges' help to maintain sea levels, while at the same time forming areas for controlling water pollution and hosting rainwater harvesting 'reservoirs'.

Observing the prevailing conditions of the streams in the area, it is proposed to widen them at points to enhance their drainage capacity and slow down the velocity of the flood waters. At the same time, the micro-delta created by their outlets in the bay will be redesigned to create areas of high biodiversity.

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South Bay Sponge, by combining the factors that constitute the immaterial and material forces of the landscape, creates conditions, soils that favour the interaction between the elements that make up the landscape. The buffering design that Field Operations employs enables the landscape to change over time and maintain its ecological balance. Sponge's methods of design and dissemination of the Sponge idea, through talks, ongoing public outreach and collective planning, reflect the way of coexistence envisioned by James Corner in the societies where the ecological condition is established.

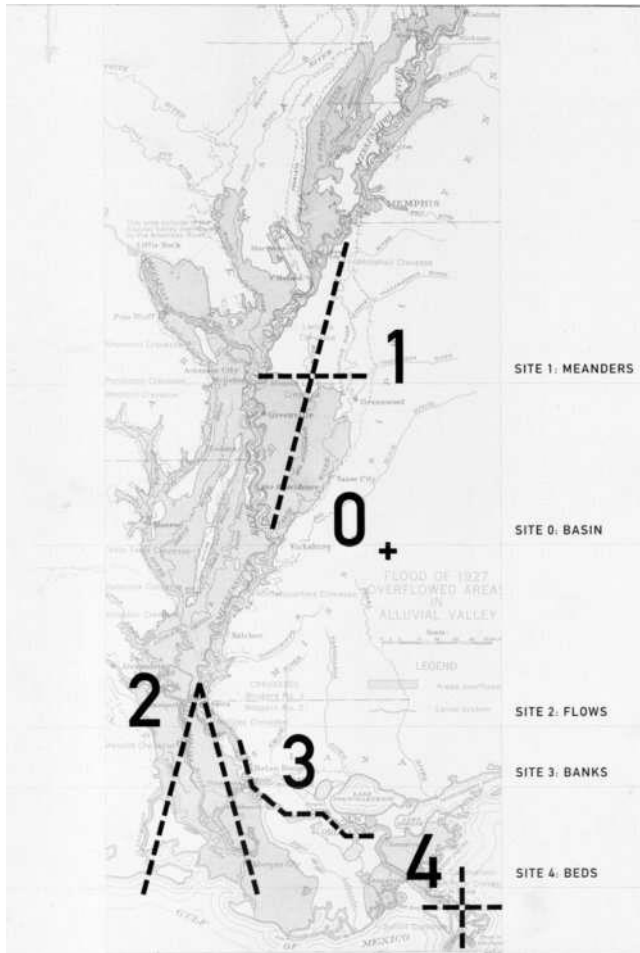
2.3 DYNAMIC INHABITATION OF A CHANGING LANDSCAPE | ANURADHA MATHUR & DILIP DA CUNHA, MISSISSIPPI FLOODS

The ambiguity of Mathur Da Cunha's work is based on the interdisciplinary nature of their research. The architects' mappings are territorial records of the acting entities of the landscape in question and contrast with the anthropocentric representation of geological conditions.

Mathur & Da Cunha's first published work is an analysis of the Mississippi River, which runs through North America from the United States border with Canada to the state of Louisiana. In their study, the river is presented as a living phenomenon, in contrast to material and ideological constructs that viewed the river as an object that is confined and categorized based on its behavior.

Historically, the Mississippi landscape has experienced a high number of floods in a short period of time. Mathur & Da Cunha approach the river landscape by traversing a path of analysis and mapping through five different landscapes with each individually holding a catalytic role in the mobility of Mississippi lands.

Their design process starts from Landscape 0, where the Mississippi River Basin Model is located, a multi-square-kilometre structure that serves as an outdoor laboratory, a simulation of the active landscape of the Mississippi River, designed to control and limit its dynamics.

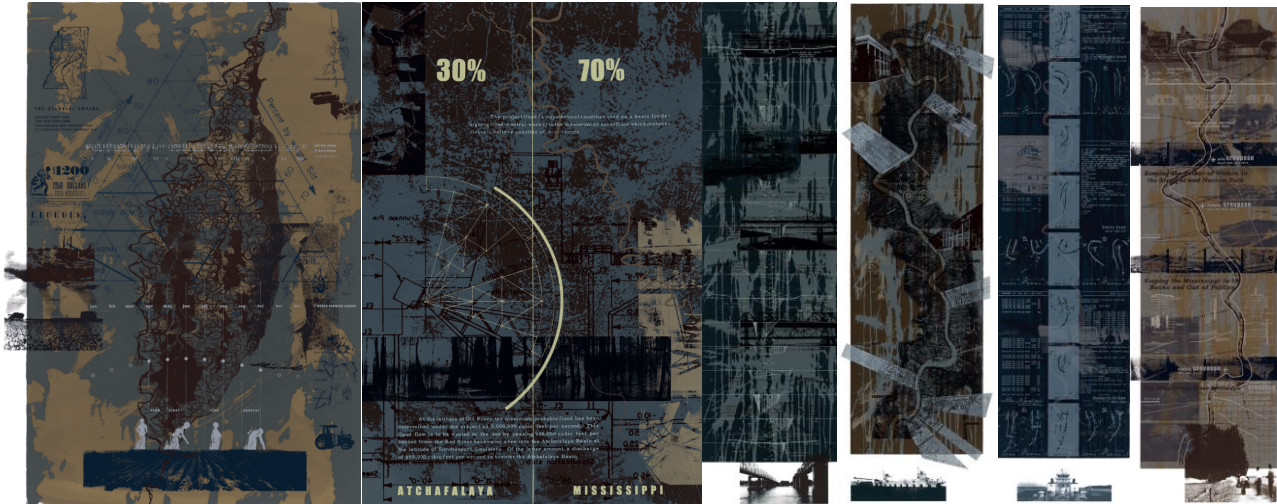


Landscape 1 is defined by the meanders of the river, where the factors that shaped its meandering form are located. The architects in this section focus on the Mississippi's autopoietic capacity, which is traced to the ground displacements resulting from the erosive force of water flow at its bends.

Landscape 2 incorporates all of the river flows that have been the subject of study for interventions attempted on Mississippi River lands. For Mathur Da Cunha, the control of flows based on socio-economic considerations is a reference point for the occurrence of cultural and territorial changes in the landscape.

As Landscape 3, the banks of the river are described where the construction of embankments is identified to protect residential areas from overflow, and at the same time to create waterways to serve commercial development.

Finally, Landscape 4, refers to the riverbeds, where sedimentation is now prevented due to the velocity of the water.



In *Mississippi Floods*, Mathur Da Cunha describes the changes that occurred, after the colonial period, in the ways of inhabiting the dynamic landscape of Mississippi. At the same time, the architects recognize practices of coexistence in the lifestyles of the region's indigenous inhabitants, cosmologies that are intertwined with the qualities of Latour's Terrestrial Attractor.

The study seeks to develop an universal debate, calling for the necessity of finding earthly habitation practices that are in danger of being erased by the narrative of deconsecration fostered by modernity.

3. CONCLUSION

Summarizing through the examples analyzed, it became evident that the design process can be released from its usual form and become more open to new meanings. The emergence of the biodiversity and interrelationships between the acting entities of a landscape, its ability to self-organize, to move and the multiplicity of biotic and abiotic forces, constituted the common denominator of the approaches studied. In contrast to the strict and robust demarcation, the architects' alternative mappings expressed fluid and caring design manipulations.

Deep ecology as an expression of conservative critique, refers to inert geological landscapes, a striking paradox for the unfavourable conditions of the time. Climate change, the finite limits of natural resources and the mass extinction of species require new considerations that test the limits of the notion of nature. The human-technological mediation of nature negates its romantic essence, putting the focus on rethinking the relationship between man and nature.

Felix Guattari's Ecosophical Praxis concerns an environment in a constant process of reinvention, as it crosses the spheres of the mental, the social and the environmental, laying the foundations of contemporary ecological thought. Capitalist economic logic entangles ecologies and technologies that are evolving at an ever-accelerating pace, confronting us with the inevitable scenario of the Anthropocene. The Earth as a site of economic exploitation, whose functionality is judged by the adequacy of human control, contradicts the theory of Gaia as developed by James Lovelock and Bruno Latour. In the theory of the two thinkers, the evolutionary processes of entities are characterized by overlapping violations of their boundaries, violations that alter space as a function of time. The confusion of the poles of the Local and the Global distorted the perspective of a common place of evolution, creating assumptions of escape from Earth. Observing the distancing of humans from the Earth, Latour proposes ways of re-imagining and re-appropriating its territories; systems of creation whose development is based on passive entity-environment relations.

Summing up, an attempt was made to redefine the relationship between ecology and architecture as it has been established so far. The relationships with material traces and the human histories of these transformations call for a deep engagement with different forms of life. Architecture, in contributing to the creation of environments, is embedded in landscapes-intermediate nature-civilization, in

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critical industrial landscapes. The architectural proposals analysed in the second section undertook buffering interventions, allowing the development of events, creating the conditions for autonomous and self-organizing landscapes.

«It is about an architecture in mid-stream, which undergoes constant changes and emerges from the accidental occurrence of events in complicated social, political, economic, ecological, technological, material and conceptual fields.» (Frichot, 2019).

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Coastal Cities Examined through Cinematic Lens: Athens-Copenhagen

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Extended abstract

In the conference paper, "Coastal Cities Examined through Cinematic Lens: Athens-Copenhagen," we delve into the multifaceted intersection of architecture in an urban environment, climate change, and sustainability through the lens of an artistic documentary film called 'Shores Apart'. The project explores the lives of old fishing communities in Greece and Denmark, offering a profound examination of the intricate relationship between the changing climate, cultural practices, and sustainable living. The urban structures that are shaped around the proximity to the shores and harbor scapes, are one of the core elements in the physical representation around the life that unfold. Our primary objective is to illuminate the divergent narratives on the shores and urban dwellings of these two coastal regions, drawing attention to the profound impact of climate and landscape variations. As climate change increasingly becomes a defining factor in the lives of coastal communities, our presentation underscores the significance of utilizing documentary filmmaking as a powerful tool for architectural investigation. Key themes to be addressed in our conference paper include the influence of climate as a differentiating factor between Greece and Denmark, each marked by contrasting maritime environments. The paper will delve into the cultural significance embedded in the oral storytelling of the old fishing communities, emphasizing the preservation of intangible cultural heritage through cinematic documentation. Additionally, we will explore the sustainability challenges posed by climate change to these communities, highlighting the urgent need for conservation efforts and sustainable practices to protect the urban structures.

Our project approach involves a cinematic exploration of the urban structures around the shores that have developed from activities on the water, starting with fishing and transportation. The cities have grown from this, but today we see that the cities are taking over and the fishing and other original trades are disappearing, making the proximity to the water mostly a mere spectator's delight. A general lack of knowledge and awareness of the natural environment has made many people in the cities feel disconnected from it.

Keywords: *shores, climate change, resilience, sea, sustainability, geonome, filming*

1. INTRODUCTION

This research examines the evolving relationship between Athens and Copenhagen and their coastal environments, historically rooted to a large extent in fishing and now dominated by tourism, recreation, and real estate. Both cities, originally developed due to their accessible ports and sustainable fishing communities, face new challenges as urban growth and climate change reshape their interactions with the sea.

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This study also introduces the concept of the "geome¹"—the geographical and geological foundations essential for sustainable urban development. By comparing the adaptive strategies of these two cities, such as flood defenses and green infrastructure, we explore how respecting the geome can enhance urban resilience. Additionally, we highlight the role of cinematic tools in capturing and conveying the human scale of interactions with the geome, providing a powerful means to advocate for sustainable urban practices. Through this lens, we aim to illustrate the importance of integrating natural landscapes into urban planning to ensure the ecological and social sustainability of coastal cities. Through comparative analysis and juxtaposing the urban experiences of our coastal nations, we can discern patterns, trends, and differences that may not be readily apparent when studying each country in isolation.



Figure 1. logo of the geome

2. THE URGENCY OF COASTAL URBAN RESILIENCE

It was more than 15 years ago, that McGranahan et al. (2007) pointed out that two-thirds of the world's cities with over five million people were located in coastal areas less than 10 meters above sea level, and 13 percent of the world's urban population lived within these low-lying coastal areas (McGranahan, Balk, & Anderson, 2007). The claim by McGranahan et al. is crucial for our presentation as it underscores the scale and urgency of the challenges faced by coastal cities worldwide. The challenges facing coastal cities are multifaceted. According to the Intergovernmental Panel on Climate Change (IPCC), global sea levels could rise by up to 1 meter by 2100, inundating low-lying areas, exacerbating coastal erosion, and leading to more frequent and severe flooding events (IPCC, 2019). This projection is particularly alarming for cities like Copenhagen, where many districts are at or near sea level.

By highlighting that a significant proportion of the world's urban population resides in low-lying coastal areas, it emphasizes the widespread vulnerability to climate change. This data point sets a foundational context for our exploration of Athens and Copenhagen, illustrating that the issues they face are part of a global pattern. The scientific basis for this claim lies in the inherent geographical and environmental dynamics of coastal regions, where natural processes and human activities converge, making them key areas for studying the impacts of climate change and developing resilient, sustainable urban practices.

¹ The term "geome," is coined by the authors of this research paper, Rasmus Iversen and Natalia Bazaïou. This concept emphasizes the intrinsic connection between natural landscapes and urban environments, highlighting the importance of integrating ecological and geological elements into city planning to enhance resilience and sustainability.

3. A COMPARATIVE STUDY OF ATHENS AND COPENHAGEN

Our research central argument posits that the historical relationship of Athens and Copenhagen with the sea has undergone a profound transformation. Through comparative analysis and juxtaposing the urban experiences of our coastal nations, we can discern patterns, trends, and differences that may not be readily apparent when studying each country in isolation. Climate plays a pivotal role in differentiating coastal regions, significantly impacting urban architecture and infrastructure. In Greece, the Mediterranean climate dominates, characterized by hot, dry summers with average temperatures ranging from 30°C to 35°C, and mild, wet winters with temperatures around 10°C to 15°C. This climate influences the urban architecture with features designed to mitigate heat and maximize comfort. In contrast, Denmark's coastal landscape is shaped by a temperate marine climate, with mild winters averaging around 0°C to 2°C and cool summers with temperatures around 17°C to 22°C. The annual rainfall in Denmark is approximately 700mm (27.5 inches), with consistent precipitation throughout the year (Climate Change Knowledge Portal, 2024). Urban infrastructure in Copenhagen reflects this climate, emphasizing insulation and moisture resistance. Historically, both cities relied heavily on the sea for fishing, which was a cornerstone of their local economies and cultural practices. Fishing communities in both cities were traditionally organized around small, family-owned boats and local fish markets, creating tight-knit communities that were integral to the local culture and economy. In Copenhagen, the GL. Strand area served as a bustling hub for fishermen, where boats would dock to unload their daily catch, which was then sold at the dock market. Similarly, in Athens, areas like Mikrolimano in Piraeus and the central fish market of Varvakeios were focal points for the city's fishing activities, with generations of families engaged in fishing, fish trading, and related maritime occupations. The original foundation of the coastal environment in both Athens and Copenhagen was based on the natural landscape and topography, which provided easily accessible ports and supported sustainable fishing activities. These areas, historically characterized by small, local nuclei of fishing communities, were integral to the socio-economic fabric of both cities.

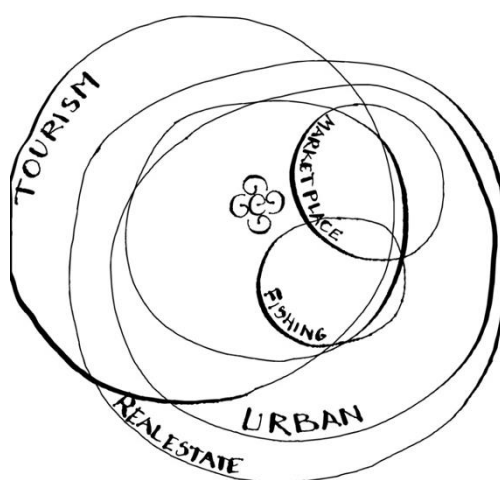


Figure 2. Changes in Urban Fabric 01

However, in contemporary times, these fishing nuclei are increasingly overwhelmed by the pressures of real estate markets and tourism. As urban growth accelerates, there is a tendency to overlook the natural environment and forget the fundamental reasons for the initial development of these coastal areas. This oversight leads to a critical tipping point where the natural environment collapses—a phenomenon highlighted by various environmental scientists and urban theorists who argue that sustainable development must account for the intrinsic value of natural landscapes (Rockström et al., 2009; Beatley, 2014).

To further investigate our scope, we introduce the concept of the "geome"—paraphrasing the term "genome"—to refer to the geographical and geological elements that form the fundamental basis of any dwelling. The geome represents the natural, foundational aspect of urban environments, akin to a city's ecological DNA. It is crucial to recognize and preserve the geome to ensure the sustainability and resilience of urban areas. When cities are built in opposition to their geome, they become less resilient to environmental changes and less capable of supporting long-term human habitation.

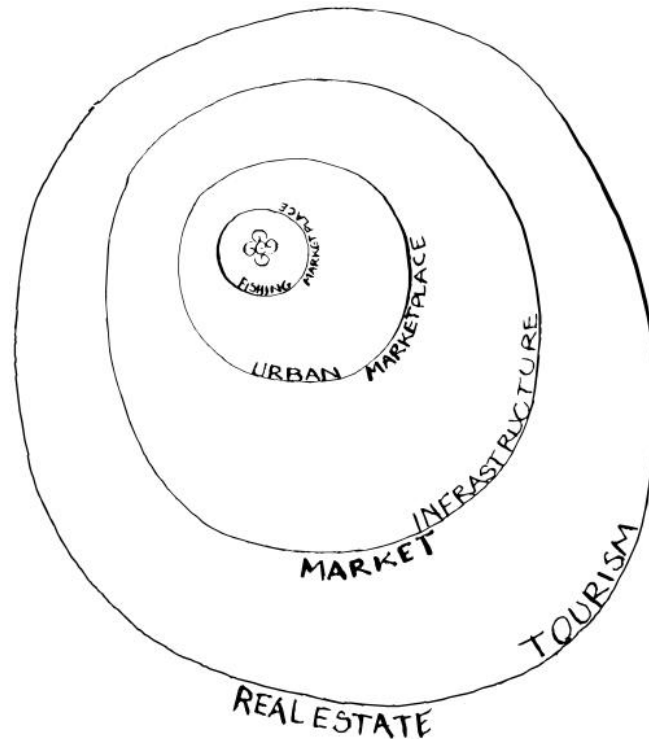


Figure 3. Changes in Urban Fabric 02

French anthropologist Marc Augé famously remarked that "the sea on the seashores is an analogy to oblivion that gives shape to memory." This observation points out the sea's dual role as both a force of erasure and a custodian of history. Similarly, the geome serves as the natural memory of a place, providing the environmental context and stability upon which urban development should be based. Ignoring the geome leads to a loss of this natural memory, resulting in urban environments that are disconnected from their ecological foundations and thus more vulnerable to environmental crises.

By acknowledging the geome and integrating it into urban planning and development, cities can restore and enhance their natural resilience. This approach ensures that growth respects the ecological and geological underpinnings of urban areas, fostering societies that are more adaptable and sustainable in the face of environmental challenges.

In contemporary times, however, the economic and social functions of coastal areas in both cities have shifted significantly towards tourism, recreation, and real estate development. This shift is evident in the proliferation of marinas, beachfront hotels, and luxury residential developments that now dominate these seascapes. This contemporary engagement with coastal areas has brought new challenges, particularly in the context of climate change.

In Copenhagen, rising sea levels and increasing flooding risks have necessitated the development of sophisticated infrastructure designed to protect urban environments from these threats. The Danish approach includes comprehensive strategies like the Cloudburst Management Plan, which integrates green infrastructure such as permeable pavements and rain gardens, alongside robust flood defenses

like the construction of the Lynetten sea wall and storm surge barriers around vulnerable districts like the harbor area (Copenhagen Municipality, 2012). These measures manage excess water, protect vulnerable areas, and enhance urban resilience. The implementation of these infrastructures has reshaped the relationship between Copenhagen's residents and the sea, transforming it from a source of economic sustenance to a focal point of climate resilience. The presence of flood defenses and green spaces has turned coastal areas into multifunctional zones where people can enjoy recreational activities while being aware of the protective measures in place.

Similarly, Athens faces the dual pressures of coastal development and climate change-induced risks. The city has responded with a combination of structural and non-structural measures aimed at mitigating flood risks and adapting to rising sea levels. Specific initiatives include the restoration of coastal vegetation and the installation of natural breakwaters along the Athenian Riviera to stabilize shorelines and enhance natural defenses against erosion and flooding (Hellenic Ministry of Environment and Energy, 2019). Additionally, Athens has upgraded its drainage systems and implemented the Faliro Bay Regeneration Project, which includes the construction of new flood defenses and the creation of public parks and pedestrian pathways (Spanogianni, E., & Theodora, Y. 2020). These projects intend to protect the city from flooding and also create new public spaces that host a closer and more sustainable relationship between people and the coastal environment. If these measurements are enough and successful cannot be part of this research.

Despite the shift towards tourism and recreation, both cities retain pockets of their historical fishing functionalities. In Copenhagen, the Nyhavn harbor area still houses a few fishing boats and seafood markets, maintaining a tangible connection to the city's maritime heritage. Similarly, in Athens, the Mikrolimano harbor in Piraeus remains a vibrant fishing port where traditional fishing activities continue alongside seafood restaurants and leisure facilities. These remaining fishing facilities preserve a small part of the cultural heritage of both cities, reminding us slightly of their historical relationship with the sea. However, they don't ensure that the evolution of urban coastal areas will continue including space for traditional practices alongside new economic and recreational uses. This evolving relationship emphasizes the importance of coastal areas as spaces where environmental protection, urban development, and public engagement must converge.

4. CINEMATIC TOOLS

Cinematic tools offer a direct and intuitive way of perceiving and sharing the human scale and interactions with the *geonome*. By employing visual storytelling techniques, we vividly capture the relationship between people and their natural environment, illustrating how the geonome shapes daily life and urban experiences. Through the narrative film, the dynamic interplay between urban development and natural landscapes can be explored in depth. For instance, aerial shots can reveal the topographical features that define a city's geonom, while ground-level footage can showcase the human activities and interactions that occur within these spaces.

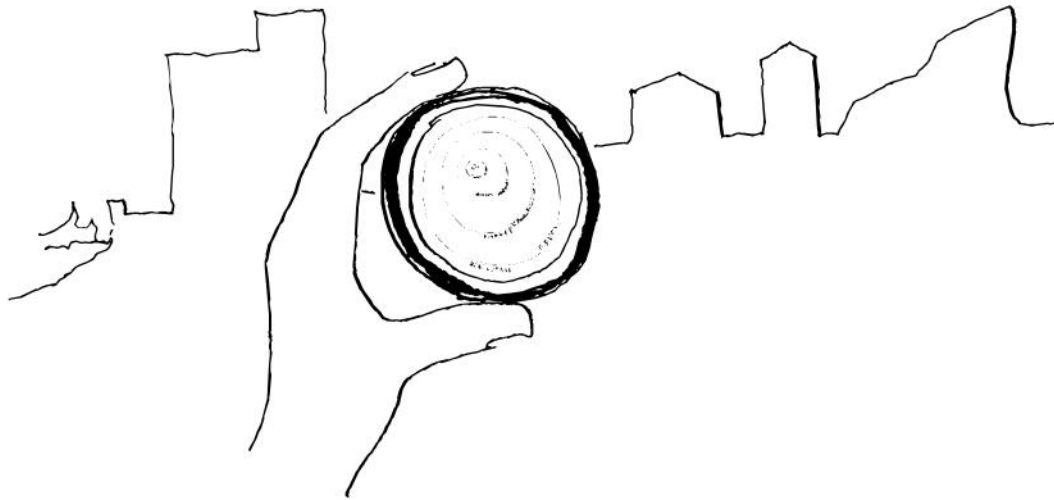


Figure 4. Urban Landscapes Through the Lens: Cinematic Perspectives on Coastal Cities

The immersive nature of film allows viewers to experience the geome on a visceral level, making the abstract concept of geographical and geological foundations more tangible. By highlighting how urban growth impacts natural environments and vice versa, cinematic tools can effectively communicate the importance of preserving and integrating the geome into urban planning. Moreover, films can document the adaptive strategies and infrastructural changes that cities like Athens and Copenhagen implement to cope with challenges such as sea level rise and flooding, thereby providing concrete examples of how respecting the geome can enhance urban resilience. Cinematic tools enrich architectural research and offer insights into the study of public space dynamics. Through cinematic techniques, it's easier to capture the multifaceted nature of public spaces. The concept of "urban cinematography," as pioneered by urban scholars like Richard Koeck, emphasizes the use of filmic techniques to document and analyze urban environments, including public spaces (Koeck, 2016). The concept of "cinematic urbanism" highlights how cinematic representations shape our perceptions of urban spaces and vice versa (Bruno, 2002). By employing methods such as time-lapse photography and aerial cinematography, it is easier to reveal the temporal and spatial dynamics of public spaces, showing patterns of use, movement, and interaction. The cinematic representation of public space has been explored in various films and documentaries. Through an interdisciplinary approach informed by Richard Koeck's concept of "urban cinematography," by urban theorists like Giuliana Bruno, the project endeavors to capture the temporal and spatial dimensions of urban phenomena. By adopting a cinematic lens, this research project aspires to stimulate scholarly discourse, engage diverse audiences, and foster a deeper understanding of the complexities inherent in contemporary urban life.

Conclusion

In conclusion, the historical and contemporary relationships of Athens and Copenhagen with the sea underscore the critical importance of integrating the geome—the geographical and geological foundations—into urban planning and development. As both cities transition from fishing-based economies to tourism and real estate-driven growth, the pressures on their natural environments intensify. The adaptive strategies employed to mitigate the effects of climate change, such as flood defenses and green infrastructure, demonstrate the need to respect and preserve the geome to ensure urban resilience. Cinematic tools play a crucial role in illustrating these dynamics, providing an intuitive and impactful means of perceiving and sharing how human interactions with the geome shape urban experiences. By acknowledging the geome and using it as a basis for sustainable

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development, cities can foster environments that are both resilient and reflective of their natural heritage, ensuring that growth does not come at the expense of ecological stability. Drawing inspiration from philosopher Gaston Bachelard's notion of the "poetics of space," (Bachelard, 1994)our cinematic exploration delves into the evolving relationship between coastal communities and their urban environment, wanting to invite viewers to reimagine their connection to the natural world, embracing the poetic essence of coastal living.



Figure 5. Key Concepts in Coastal Urbanism

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Blossoming solutions: A discrete choice experiment on nature-based solutions in European cities

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Extended abstract

As European cities face a multitude of climate change related issues, nature-based solutions are emerging as an answer to growing concerns about biodiversity loss, rising temperatures and poor air quality. Calls to action are being heard from all governance levels and leaders are recognizing the importance of integrating citizens and stakeholders in solution finding. Therefore, investigating the opinion of citizens, vital to participatory processes, and the trade-offs they are willing to make in order to green their cities have yet to be given the attention in research it deserves. The aim of the presented study, stemming from research within the UPSURGE project (Horizon 2020), was to understand urban citizens across Europe and to answer the question, why citizens value specific attributes of nature-based solutions, what differences are the most prominent and how urban planners can use this information in their development strategies.

To answer this complex question, a survey with an integrated discrete choice experiment was conducted in six countries (Greece, Hungary, Netherlands, Poland, Slovenia & United Kingdom). The survey was distributed via a panel and the obtained sample consisted of roughly 1,000 respondents per country. The hypothetical choices for respondents included attributes such different types of NBS and possible environmental improvements, but also possible communal fees which may arise from implementation and disruption to accessibility through removing sealed traffic areas to make space for NBS. This design is a reflection of the real world, in which space is sparse and trade-offs must be made when developments are planned in urban areas.

The results illustrate an initial comparison of the discrete choice experiment across all six countries and reflect the variety of exposure to climate change across the continent and different attitudes towards participation in the design process of nature-based solutions. For example, Greece and the United Kingdom show diverse preferences in the environmental function the nature-based solutions should fulfill. Participation was especially important in Poland and Slovenia. The Netherlands was the most sensitive to changes in accessibility. By delving into and understanding these results, participatory processes can be supported to help planners and politics define priorities, design participation opportunities for their citizens and decide on governance measures with long-term dedication to development plans. The study has made clear, that cultural differences and exposure to climate change mean that there is no transferable “one solution fits all” when it comes to nature-based solutions. The results of the discrete choice experiment can be integrated into a decision support tool for practitioners. With such a tool, planners and practitioners are supported in long-term sustainability strategies to make European cities places in which we have faced our issues jointly and overcome them together.

Keywords: *nature-based solutions; discrete choice experiment; European cities*

Cities and Climate Crisis; How Design Principles and Policy can Impact on Carbon Emissions

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Abstract

Climate crisis, environmental and biodiversity challenges and socio-economic difficulties are amongst the bigger issues of today's cities and regions. Landscape design plays a significant role on matters related to environmental sustainability, identity, health and wellbeing, economics, governance and politics. The current pressure for the development of urban and regional strategic approaches can only be appropriately addressed through systemic and behavioural change as well as a strong landscape focus in order to have holistic responses to urban transitions. Looking how policy impacts on design principles and environmental design, it unpacks the key characteristics required for systemic and behavioural change and discusses the key elements of a smooth transition to resilient and environmentally friendly cities.

This research touches upon the importance of carbon in landscape design and how cities can improve their environmental profile using a combination of a landscape holistic approach supported by policy and connected to current and potential carbon emissions. Findings indicate that a combination of both top down and bottom-up approaches is required, including strategic spatial visions for the cities influenced by policy/legislation and scientific characteristics such as carbon calculation. The lack of the necessary policy is often an obstacle on cities' sustainable development, not allowing for new approaches and innovative concepts to be integrated. Intangible concepts such as spatial quality and wellbeing and scientific calculations (e.g. carbon emissions and sequestration) are both significant for the cities and their wider areas impacting on the ways in which urban conurbations can become environmentally friendly.

Keywords: *landscape design; cities; policy; carbon; emissions; city transition; systemic change.*

1. INTRODUCTION

The climate crisis is becoming one of the most important challenges of our times, impacting on cities, regions, human settlements and biodiversity. The danger to human lives and the environment is acknowledged by the United Nations Intergovernmental Panel on Climate Change [1] that identifies several issues such as global sea level rise, melting of ice and snow, an overall warming of the climate system as well as an increase in air and ocean temperatures. Cities, urban conurbations, and landscapes need to be designed taking climate and environmental phenomena into account. As explained by Yu and Sun [2], environmental awareness is a crucial part of social development in urban areas. Cities have the ability to effectively deal with carbon metabolism, generated by the development of sustainable cities, as a result of the interest and active participation of their communities [3]. What is needed is for the carbon emissions of a city to be fully acknowledged and for policy and design strategies to be in place.

Policy and governance focusing on the climate crisis need to be reviewed and updated [4] as a measure to deal with carbon emissions in urban areas. This paper explores selected governance and policy models related to the landscape, as well as landscape design principles, aiming to identify necessary steps and key strategies. The fragmented way policy and science deal with the landscape

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[5], affects the way communities operate and therefore our broader sense of quality of life and wellbeing. Especially in a city context, the landscape is often considered as the green or open space that surrounds the conurbations when it, in fact, is the ‘‘vast infrastructure upon which we depend for everything’’ [6, 7]. Through an examination of a major project in Birmingham (UK), the City of Nature, as well as several policy and carbon guidelines from professional bodies such as the Landscape Institute (LI), this research hopes to support cities to improve their environmental profiles, by integrating holistic strategies on landscape design and carbon. Results demonstrate that developing technologies are important, but both systemic and behavioural change are required for cities to address their carbon footprint and emissions.

2. LITERATURE

The discussion on cities and policy is not recent. More than a decade ago, Stone et al. [8] were suggesting that Greenhouse Gas (GHG) emissions, heat management strategies etc needed to be included in city and regional climate action plans, however the importance on how spatial strategies affect the growth of carbon emissions has not been widely discussed. Several sources highlight different aspects of sustainable cities. Tang et al. [9] state that economic growth and carbon emission reduction are key for effective development of low carbon conurbations. Lamb et al. [10] conclude that cities are the major player in the 1.5°C target (Paris Agreement 2015) but acknowledge that there is a gap on policy around sustainable and climate needs. It is important to mention that land and land use have also been recognised very relevant in the context of climate crisis, and as Stone et al. explain both local and regional scales need to be addressed in relation to land and its uses, for example high/low carbon emissions, fluxes and more [8]. The importance of policy and legislation for the landscape has been highlighted by the Council of Europe, suggesting that the better understanding of policy in relation to the landscape the greater impact on its implementation [11]. In addition, focusing on spatial planning, Giannakourou [12] has stated that the ‘‘European Union (EU) in spatial planning has no binding force and cannot prescribe concrete legal or institutional requirements’’, however a swift in governance and policy is already being observed on urban and regional scale. Stremke et al. [13] discussing about the wider term of the landscape, suggest that the landscape impacts on both quality of life and human interactions. Although, when it comes to policy and the climate crisis, the goals usually point at GHG emissions and sinks [8], missing the key aspects of the wider spatial area, communities and the city activities and needs.

Policy action plans with regards to climate change are constantly being developed and there are calls for a wider spectrum of such policy measures, especially as current management frameworks do not cover the whole complexity on climate and temperature changes [8]. As a result, governments and local authorities need to develop strategies dealing with carbon emissions on the urban as well as the regional scale. Tang et al. [9] taking it a step further, suggest that cities’ planning systems need to incorporate environmental and carbon strategies. Highlighting similar gaps from a landscape perspective, Zhou et al., [14], mention that often social and cultural factors are not associated with landscape sustainability, but it is important to develop both the more scientific approach (ecology, ecosystem etc) and the broader community understanding. Discussing about the social character of the landscape, it has been suggested that a potential action plan should embed local administration processes and policies on its landscape proposal [15].

3. BIRMINGHAM CITY OF NATURE POLICY & PLAN

Several cities are looking into alternative governance methods and updated policies in relation to the climate crisis and the environment. However, the climate policies to date sometimes have a limited approach with regards to the climate crisis and especially when it comes to the landscape. Birmingham City Council declared Climate Emergency in 2019 and has been a Biophilic city for several years. With the climate and environmental emergency increasing, there is certainly a lot of interest in the city to improve its natural environment and address climate change. Birmingham city

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council is the largest local authority in Europe and therefore its aim is to lead by example, adopting innovative policy and organisational practices.

This paper uses Birmingham City Council's City of Nature programme as a case study to explore the governance and policy models when dealing with environmentally friendly cities, carbon emissions and city plans. The broader programme of the City of Nature was built on Birmingham's Future City Plan 2040 with a focus on sustainability, enhancement of green and blue spaces as well as maintenance. It connects into local, regional and national policies and strategies [16]. The first steps have been for the city of Birmingham to identify its future as a green and bold city able to address the challenges of a changing environment [17]. The city pledges to increase its green spaces becoming a city of a 1000 green spaces and trades [18] and connecting its communities with environmental principles and ways of living. Introducing the United Nations Sustainable Development Goals (SDGs), the plan connects the broader spatial vision with key indicators such as climate crisis, biodiversity, health and community engagement [16].

The significance of the city of Nature project has been the goal for systemic change within the city processes as well as a continuous evaluation of the decision-making procedures of the wider community. Embracing the concepts of sustainability, climate and environmental crisis, circular economy and citizen engagement, this innovative project has put the landscape of the city in the core of its spatial development while it also establishes new methodologies to achieve a truly green city. Following this approach, Birmingham was the first city in the UK to adopt an Urban Forest Master Plan in 2021, and with more than 1 million trees, has been awarded with the Tree Cities of the World status [19]. As mentioned in the formal 'Future City Plan' document, the delivery plan of the project has actively involved the whole council as well as third sector partners, through a City of Nature Alliance, in order to improve the way in which the city deals with the natural environment [19]. Part of the success of the project has been its wide partnership with educational institutions and third parties. Taking inspiration from the Naturally Birmingham and the Future Parks Accelerator (FPA) projects and following the city's Route to Zero Climate Emergency Plan, the City of Nature has been infused with several ideas that connect landscape with people. Working together with local and European landscape-led projects such as the EIT SATURN programme and being educated about new visioning approaches (West Midlands National Park Lab – WMNP Lab), has opened the pathway of a systemic change. In addition, the challenge of long-term visioning for the city has helped to understand the landscape and identify the needs of the city and its wider community. Through a series of workshops and methodologies run by the WMNP Lab, SATURN and other partners, the City of Nature partnership had the opportunity to work on its stakeholder engagement and capacity building methodologies, allowing for bolder and stronger policy alterations.

It is stated that to materialize the programme's ambition a 'collective change by the council and the city as a whole' is required [17] and therefore, the ethos and core aims of the City of Nature need to be acknowledged at all stages of decision making and across all parties of the council [16].

3.1 Policy and governance

One of the key parts when dealing with policy and spatial plans is to be aware of the strategies and regulations in place and also be fully prepared to embrace new methodologies and techniques. The City of Nature plan has been aligned with the 2021 Environmental Act, while it has followed several ideas from the Landscape Review 2019 – (Glover Review) such as connecting people with nature [19]. It has gained expertise from across the globe, looking at how cities respond to access to green space. As a way to respond to the open space inequality, the local authorities of Birmingham are the first in the UK to develop an Environmental Justice measurement tool, working on for fairness and citizen engagement with regards to environmental laws, policies and regulations.

The successful environmental strategy of a city is often secured by the commitment of its governance to the aim of the strategy as well as the wide spectrum of the decision-making process followed. Prior

to the City of Nature project, Birmingham was part of the Liveable Cities programme run in the UK from 2012-2017 examining the key elements of a sustainable city, where it was found that the effectiveness of a city strategy has to do with the level of interaction between its governance, planning and finance departments [19]. Learning from past experiences and being keen to leave a legacy of a green and low emission city with access to the landscape, the Alliance formed for the City of Nature project, has put specific emphasis on the project's governance itself. Continuous discussions, the creation of new bodies and the effort to have common agendas have been instrumental in Birmingham's success on a systemic and behavioural change. The creation of a strong vision for the future of the city, together with the close collaboration of local departments has been instrumental in this urban focused scale. A number of changes in the way in which the council was operating as well as the interaction with communities and third parties have been noticed as a result of the policy and decision-making processes re-evaluation. The plan created for the scope of the project, has been embedded in policy documents of the city of Birmingham. This has worked both ways; on the one hand, the goals set for the project are secured, on the other hand the innovative scheme of the City of Nature has contributed to the city's Carbon Net Zero climate ambitions [20]. Among the key findings is that a city scale vision needs to be shared between its decision makers, experts and communities and it requires behavioural change and a strong commitment to climate and environmental goals. A well-thought and strong net zero, place-based urban strategy has many growth and regeneration opportunities resulting to healthier, more sustainable and greener cities. Vision is key but cannot bring systemic change if it is not embedded in policy and legislation of a city. Especially when it comes to the impact of carbon emissions, policy needs to be in place to guarantee the commitment of governance and third-party processes.

3.2. Guidance on landscape-focused carbon policy

Especially in the UK several institutions have started providing guidance in relation to the climate crisis. With regards to the landscape, the Landscape Institute (LI) professional body of the landscape architecture profession together with the British Association of Landscape Industries (BALI) have recently published a report on carbon reduction in the sector. The report aimed to enhance knowledge on carbon emissions and support professionals to calculate and find solutions for the emissions in relation to spatial planning and the wider projects of the sector. It was mentioned that even though in the built environment standards on carbon action emerge, most of them have a limited relevance to landscape [21]. As a result, existing standards, such as BS EN 1597812, BS EN 17472:202213 and 'CEN TC/350 Sustainability of construction works' do not provide the necessary specifications for the landscape [21]. However, new regulations are being developed with the 'PAS 2080 2023 Carbon management in buildings and infrastructure', to have more relevance with the planning sector, but still quite limited from the landscape approach. Suggestions from the LI/BALI carbon report [21] encourage the creation of a 'dedicated sector-wide strategy for the landscape and carbon', so the calculation, understanding and spatial planning in relation to carbon emissions can be much more accurate and effective.

4. DESIGN PRINCIPLES

The principles of design are very significant among the design professions and usually the drivers behind the final masterplan of a city or an area. However, design principles are not a concern of the wider audience and when it comes to a city, they are often believed to be relevant to the aesthetic part of a plan. In addition, Dramstad and Fjellstad have examined how science and policy affect the landscape, questioning the way in which policies impact on landscape strategies and sustainable development [21]. Drawings can communicate ideas, and the principles of design have the ability to embed a certain character or ethos to the built project. Using the powerful mediums of design and drawing on a city scale development, the narratives and landscape ideas have much greater potential

to be effectively communicated to a wider audience, including decision makers, civil servants, third parties and the community of the area. Even though a swift on certain processes has started to be noticed, the management process of large infrastructure developments leaves landscape design at the fringe of this process. As much as design principles can be the pillars of a masterplan for the designer, they can also become a tool to improve the imagination of the wider audience and support the narrative. As a result, such principles are key to understand the somehow difficult concepts of carbon emissions, carbon sequestration, environmental approaches and sustainability on city scale. The Design Council has argued that design thinking is a necessary process when creating the vision of a scheme[22], and the outcome of this process, the design, provides a better understanding of the ideas proposed. The concept takes shape and is being expressed in a visual form through design [23] and this enhances the notion of this research, that the principles of design can impact on the way in which carbon emissions are addressed in cities. The principles created for a specific spatial proposal can communicate the ideas of sustainability and environmental ethos to professionals and local authorities, helping towards the issues of communication observed between governments, administrations and citizens [24].

Birmingham's 'Our Future City' proposal has highlighted that the design of an area must be bold, inspire and connect with the community who uses it most [17]. Acknowledging the significance of design and strong proposals, the 'Our Future City' proposal has stated the commitment of the council to work with and support stakeholders to deliver the visions proposed for central Birmingham. In addition, it is mentioned that the delivery of the vision can be secured through certain policies and planning applications [17] emphasizing the significance of policy within design and planning. Overall, the principles applied for a city scheme, have the power to impact on the extent to which the concepts of sustainable development and carbon will appear on the masterplan.

5. CONCLUSION

Following innovative schemes, the structure and processes in place, as well as recent guidance on landscape and carbon, this paper concludes that policy and legislation play a significant role in carbon emissions on a city scale. With a growing need to infuse climate resilience and sustainability into every design and provide solutions for the contemporary challenges of our cities (heat demands, sustainable transport, carbon emissions, embodied carbon on design and planning), councils need to step up and lead by example. New policies and legal requirements need to be put in place when dealing with carbon emissions on the urban scale, not only for the buildings, transport and energy sectors, but also for the landscape and open spaces. Using the principles of design can effectively explain and visualize how the proposed environmental concepts can be implemented in a city and therefore speed up the process and improve the overall outcome. The carbon emissions of a city come from a variety of different sources. This research suggests that if certain policy is in place and the decision makers are fully aware of the possibilities and the benefits of a holistic spatial approach, then it would be much more effective to deal with carbon emissions. The council's commitment has been proven key to any major development and together with the support of policy, the vision for sustainable cities can become reality.

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Mapping multispecies inhabitation of the Axios Delta complex: conflicts and conviviality in the climate change era

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Extended abstract

This study aims to investigate the conflicting or convivial relations between human and non-human systems in the discharge area of Axios River by using interpretative mapping. The Delta, which is formed by four different waterways (Axios, Aliakmon, Gallikos & Loudias), is examined under the lens of multispecies inhabitation. The delta complex has a critical role as a biodiversity reservoir which is challenged by the overall human pressures in the area. A variety of fauna and flora co-habits the territory, and is adjacent to the human settlements, the urban infrastructure, the production fields and facilities. The deltaic territory constitutes an important wetland on the national and European level, being in parallel a highly productive land for agriculture and aquaculture. Along with the increasing human pressure from all the relevant activities in the area, climate change forms an active threat to all the species and the local ecosystems. Even though river deltas provide favorable conditions for the inhabitation of various species, they appear to be more vulnerable to the effects of the gradual sea level rise. Erosion, inundation and saline intrusion are intensifying coastal fragility and further modifying the spatial characteristics of the deltaic coastal territories. Especially in the Mediterranean basin, this fact contributes to the loss of coastal biodiversity and to the modification of the coastal line, altering ecosystems and livelihoods.

Could this transitional phase be imprinted in maps? Through interpretative mapping, the aim here is to investigate how conflicts or balanced coexistence find their spatial expression. Which are the challenges that the delta is facing and how does climate change influence coastal inhabitation and protection? How is the tool of mapping helping on reading the appropriated territory and analyzing the existing or projected relations? Mapping the various spatial conditions of the deltaic territory illustrates that a different approach on coastal inhabitation is necessary under the changing climatic conditions. By transitioning towards a new balance, the hybrid character of this territory is challenged and adapted. Climate change adaptation and mitigation refers to the protection of both human and non-human inhabitants, placing the relation between man and nature in the center of the discussion. Mapping is therefore used as a tool to redefine a multispecies approach in coastal inhabitation. By drawing plans and cross-sections, the intention of this study is to test this methodology in analyzing but also in reinventing the identity of the Axios Delta complex in the climate change era.

Keywords: *climate change; multispecies inhabitation; Mediterranean; Axios river delta*

The bioclimatic metamorphoses of the resilient landscape of Lake Fucino

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Extended abstract

The experience of natural phenomena related to climate change involves changing modes and elements closely related to landscape and urban-architectural transmutations. Changes related to the climate sphere, are by definition, associated to anthropogenic practices of planetary exploitation effecting and altering the natural balance of the global ecosystem. The paper emphasizes the main role that landscape undertakes in the process of analysis, interpretation, and configuration of the new habitats of change, establishing a mutual and constant link. Consequently, the landscape that is a terrain of dynamic relationships, both visible and invisible, generates scenarios of climatic and environmental modifications involving multiple aspects: perceptual, economic, social and identity. The survey proposes an interpretive and reconstructive analysis of a unified vision of the Abruzzi landscape of lake Fucino, a protagonist over the centuries of massive physical, landscape and climatic metamorphoses. The landscape of the floodplain was influenced by the course of the seasons in which it irregularly underwent outgrowths and decreases, as it lacked a natural outflow. The regulation of water runoff relied on the presence of natural sinkholes that were unable to counteract the magnitude of the effects due to weather events responsible for the damage of flooding of rural land and urban centers around the perimeter of the lake. It should be emphasized that works for draining the lacustrine waters that occurred through the construction of an outfall, lasted for many centuries - initiated in 41 A.D. by the Roman emperor Claudius and completed, only, in 1875 by Prince Alexander Torlonia. The outfall allowed the resolution of the problem of management and regulation of the lake water regime and flow by allowing the outflow of the basin waters into the Liri River. This has however, caused a transformation of the habitat and climate and the loss of Mediterranean biodiversity. The analysis is based, on a two-pronged approach: iconographic reading of past representations and surveys of the landscape through a comparison before and after implementation of the engineered water works, and a prognosis of the current landscape in relation to climate crisis.

Keywords: *landscape, metamorphosis, climate, Abruzzo, lake Fucino*

The Role of Dilemma Games as a Mediation Tool between Citizens & Policy Makers for Urban Rooftop Utilization: A Cypriot Case Study

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Extended Abstract

This paper presents the role of a games-based activity as mediation tool between citizens and policy stakeholders in the field of sustainable urban planning and more specifically the reutilization of rooftops in the fight against climate change. The paper presents a case study methodology demonstrating the initial results of a pilot case based in Nicosia, Cyprus. The case study is part of a larger research project entitled 'GREAT' (Games Realizing effective and Affective Transformations). Great is a 3-year co-funded project under EU Horizon and UKRI. Research and Innovation in the 'GREAT' project aims to demonstrate that games have positive impact on social engagement and can create new forms of dialogue between citizens and policy stakeholders. By exploring the potential of games, it provides a platform for citizens to express their preferences and attitudes on policy issues.

The context of the 'GREAT' research is climate change and this paper displays a case study which focuses on the exploration of the reutilization of urban rooftops in the city of Nicosia, Cyprus. The case study is designed in collaboration with Urban Gorillas, NGO, Nicosia who are members of the European Creative Rooftop Network (ECRN), a network of organizations, across 9 European cities promoting the creative and optimal use of urban rooftops to tackle contemporary urban challenges, which is co-funded by the Creative Europe Programme. This partially undiscovered layer of urban space offers a diversity of opportunities. From the generation of new places to meet and the creation of cultural breeding grounds to innovative living labs exploring sustainability. As a result of the initiatives of the 'rooftop' project, the GREAT team of Frederick University and Urban Gorillas, NGO have combined expertise to utilize the GREAT methodology to engage with multiple stakeholders promoting a new form of dialogue using the positive impact of games, allowing each group to express their attitudes and facilitate dialogue to policy issues. The initiative aims to drive change in the way our buildings are designed and how the utilization of currently 'lost' spaces of the city can be reclaimed in the context of the climate emergency.

The game displayed in this paper is entitled 'Rooftop Revolution' and encompasses a role play perspective. The game presents participants with positives, challenges, incentives and fairness factors in relation to rooftop utilization. The game places the 'players,' citizens and stakeholders within situations that have real world implications, allowing them to explore how we can find balanced and fair policy solutions for all.

The paper ultimately displays an innovative methodology which can replicated in the same game format to suit multiple dilemmas to explore policy recommendations amongst target groups, thus yielding different results from traditional focus groups, workshops and consultations. Furthermore the 'GREAT' case study methodology has the potential to be applied to urban planners and stakeholders alike to address critical Urban challenges related to the climate emergency and beyond, as well as improving the connection between citizens opinions and the policy making process.

Keywords: *polycymaking; games; urban design; rooftop utilization; Cyprus*

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From UN Agenda 2030 to the organization of a mega sustainable event: the case study of Paris 2024 Olympics

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Extended abstract

In 2015, with the publication of the UN Agenda 2030, sport was recognized as instrumental for sustainable development. The Agenda consists of guidelines for the future and is in line with the recommendations of the 2020 Olympic Agenda. The International Olympic Committee (IOC) believes that sports and the Olympics can help develop the majority of the Agenda goals, such as ensuring a healthy life and promoting well-being for all, contributing to making cities inclusive, safe, and resilient, guaranteeing sustainable consumption and production patterns, promoting inclusive economic growth, or taking actions to combat climate change.

The next Olympics will be held in Paris in 2024 and will be the first organized according to the sustainability principles set up by the Agenda. This case is supposed to mark a turning point in the history of the Olympics. However, these objectives remain fairly vague in that they are not defined by concrete criteria.

This paper reports on the development of a method that starting from the analysis of the Agenda goals provides a series of requirements to discretise and evaluate quantitatively the long-term sustainability of the event. This study investigates, with particular focus on the urban and architectural aspects, the relations between the event and the host city, between people and context and between event and environment. Much importance is given to public infrastructures, the well-being of visitors and athletes and the needs of the host city. We study the Olympic venues, assessing how many of them already exist, are temporary, or have been built for the event, as well as which materials were used in the realization. We pay attention to the legacy of the event, which implies planning from the beginning the future of the city after the Games. In fact, the Olympics in Paris are part of a wider process of expansion of the city: the construction of a large infrastructure network, the Grand Paris Express, and the redevelopment of the suburban district of Seine Saint-Denis. Moreover, the majority of the venues are existing and it is very strong the relation with the heritage of the city.

With this method, we can easily analyse the results of studies and field research, like visits to the building site, and evaluate the impact of the event. This study is the beginning of a process that allows us to analyse and compare different Olympic editions within a single coherent framework.

Keywords: *event; sustainable development; Olympics; urban planning; Paris*

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Designing a smart tourism destination in Greece: the case of Piraeus

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Extended abstract

This paper reports on the development of a smart tourism destination in Greece. Smart tourism represents the convergence of ICT and tourism and denotes the transformation of tourism through technology. It indicates a new tourism braced by integrated efforts at a destination to collect and analyze data extracted from diverse sources in combination with the use of advanced information technologies to transform travel experiences to make them more enriched, efficient and sustainable. In this regards smart tourism is a social phenomenon arising from the incorporation of ICT with the tourism experience. Moreover, smart technology has been significantly changing the way visitors make diverse travels decisions, such as those pertaining to transportation, accommodation and activities available at a desired tourism destination.

Greece has established itself as one of the top international tourism destinations. However, the Greek tourism industry needs to invest in digital transformation in order on the one hand to respond to the international trends and on the other hand to upgrade the overall experience of the visitor. Every potential smart tourism destination needs to have a comprehensive strategy for digital development, with the provision of incentives and their immediate implementation, so that the destination can follow the pace of digital development of other destinations.

The paper presents the phases of designing Piraeus as a smart tourism destination. Piraeus is one of the largest cities in population in Greece with a great history and the largest port of the country. The development model is divided into two main levels: at the design level and at the level of implementation. During the planning phase, it must be determined who will participate in this project (stakeholders). Subsequently, the Municipality is called upon to outline the strategy and objectives of the project, with the creation of an integrated strategic plan and at the same time, it is important to seek collaborations with private bodies or research centers/universities and similar alliances in Greece or abroad. An additional critical factor in the planning phase is the search for financial resources to support the entire project. For this reason, it is necessary to utilize the available financial resources at national and international level, while resources can be leveraged by local society bodies or private initiative.

Once the vision and objectives of the project are finalized through the strategic plan, the stage of implementation follows. This stage includes the execution of all the steps planned in the previous stages. At the same time, a project monitoring mechanism is defined, which is responsible for the smooth supervision and completion of the project. A dominant role during the implementation stage is the development of the necessary infrastructure and applications that will support the project, while at the same time the monitoring mechanism will monitor the progress of the implementation of the proposed actions, evaluate their results and if deemed necessary, the plan's strategy will be redefined. Both during the planning stage and during the implementation stage, stakeholder participation will play a key role in achieving the goal of transforming Piraeus into an integrated "smart tourism destination".

Keywords: *smart tourism destination; ICT; strategic plan; Piraeus*

An Overview of Turkey's National Climate Change Program via Development Agency Initiatives

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Abstract

Climate change is the occurrence of long-term and significant changes in the Earth's overall climatic conditions, usually associated with an increase in greenhouse gases in the atmosphere and as a result of human activities. It is therefore also referred to as global warming. IPCC reports indicate that cities will be affected the most in climate change scenarios. Especially densely populated cities are more vulnerable to risks associated with climate change, such as extreme heat, excessive rainfall, flooding, and sea level rise. Sustainable urban planning and management make the role of cities important in combating climate change. For these reasons, various policies at the global level to combat climate change and the search for technological solutions are on the agenda of countries. National governments have a major role to play in pursuing various strategies such as encouraging societies to adapt to climate change, becoming a stakeholder in international agreements to build resilience to climate change, investing in projects, subsidizing projects. Turkey and the Mediterranean Basin countries are regions that have the potential to be severely affected by the impacts of climate change. To cope with these impacts, Turkey and other Mediterranean Basin countries should prioritize sustainability policies and strengthen their infrastructure to adapt to climate change. This study aims to examine the extent to which Turkey, a Mediterranean basin country in a changing world with changing climatic conditions, has implemented its national-level climate change mitigation and adaptation policies and strategic plans in regional resources and projects through development agencies at NUTS 2. With this aim, the policies of the Ministry of Environment, Urbanisation, and Climate Change on climate change will be examined, and the alignment with the projects that 29 development agencies support or programs with a focus on climate change at NUTS 2 will be examined. This study will reveal which regions of Turkey, a Mediterranean basin country, are strong and which regions are vulnerable in terms of climate change resilience studies at the national level on a NUTS 2 scale. The study is expected to offer a similar approach for other nations in the Mediterranean basin.

Keywords: *Urban Management, Climate Change Policies, Strategic Plans, Nuts 2, Turkey*

1. INTRODUCTION

Climate change, also referred to as global warming, is defined as the increasing trend of global temperatures, often manifested as shifts in temperature, precipitation and weather phenomena. These changes are primarily triggered by human activities, especially the release of greenhouse gasses. The burning of fossil fuels (coal, oil and natural gas), deforestation, industrial processes and some agricultural practices contribute significantly to these emissions. The importance of climate change lies in its widespread and profound impacts on natural and human systems. It poses risks to biodiversity, water resources, agriculture, human health and infrastructure. The Intergovernmental

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Panel on Climate Change (IPCC) has comprehensively documented these impacts, emphasizing the urgency of global action to mitigate and adapt to these changes. The impacts of climate change at the global level are highly diverse and spread over a wide spectrum. Some of the most notable impacts include temperature rise, sea level rise, increase in extreme weather events, biodiversity loss and water scarcity. Average global temperatures have increased in recent decades, leading to more frequent and intense heat waves. The melting of polar ice caps and the thermal expansion of seawater have caused sea levels to rise, threatening coastal communities by flooding and erosion. The frequency and severity of extreme weather events such as hurricanes, typhoons, floods and droughts have increased. The disruption of ecosystems and habitats caused by changes in climatic conditions results in species migration, population declines and extinctions. Furthermore, changes in rainfall patterns affect freshwater availability, exacerbating water scarcity in many regions. In the case of the Mediterranean Basin, these effects are more pronounced and region-specific. Temperature increases are particularly pronounced in the summer months, while the frequency of extreme heat waves has increased in the region. Sea level rise has led to serious erosion and flooding in the coastlines of the Mediterranean Sea. Furthermore, the region is experiencing more frequent and intense rainfall events and longer periods of drought due to climate change. This is resulting in biodiversity loss, which threatens sensitive ecosystems and endemic species in the Mediterranean Basin, destabilising ecosystems. There is also a pressing need to address the pressure on water resources in this region, with increasing water demand and decreasing water availability requiring serious changes in agricultural and water management policies. This puts severe pressure on water resources, negatively affecting agriculture, drinking water resources and hydropower generation. Furthermore, the rise in sea levels and coastal erosion present significant challenges to infrastructure, livelihoods and ecosystems in coastal areas. The agricultural sector is also experiencing difficulties due to changes in temperature and rainfall patterns, which are jeopardizing crop productivity and food security. In addition, the region is facing an increased frequency of natural disasters, with the rise in extreme weather events such as extreme rainfall, floods, severe storms and forest fires threatening living conditions and the sustainability of the region.

It is evident that governments and urban administrations play a pivotal role in the fight against climate change. Governments are at the vanguard of this fight through the formulation and implementation of policies and strategies. These strategies include participation in international agreements such as the Paris Agreement, the development and implementation of national policies and regulations promoting renewable energy, energy efficiency and sustainable land use. In addition, infrastructure investments such as improving water management systems and developing sustainable transport networks also have an important place. It is of the utmost importance that the general public be made aware of the causes and consequences of climate change, as well as the necessity for sustainable practices. Urban governments are also of critical importance in the mitigation of climate change, as cities are major contributors to greenhouse gas emissions and are particularly vulnerable to climate impacts. Sustainable urban planning encompasses a number of strategies, including the design of cities to reduce energy consumption and emissions, the incorporation of green spaces, and the promotion of public transport and non-motorised transport. Furthermore, resilience must be enhanced by implementing measures to safeguard urban areas against extreme weather events, improving drainage systems and constructing resilient infrastructure. It is evident that governments and urban administrations play a pivotal role in the fight against climate change. Governments are at the vanguard of this fight through the formulation and implementation of policies and strategies. These strategies include participation in international agreements such as the Paris Agreement, the development and implementation of national policies and regulations promoting renewable energy, energy efficiency and sustainable land use. In addition, infrastructure investments such as improving water management systems and developing sustainable transport networks also have an important place. It is of the utmost importance that the general public be made aware of the causes and

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consequences of climate change, as well as the necessity for sustainable practices. Urban governments are also of critical importance in the mitigation of climate change, as cities are major contributors to greenhouse gas emissions and are particularly vulnerable to climate impacts. Sustainable urban planning encompasses a number of strategies, including the design of cities to reduce energy consumption and emissions, the incorporation of green spaces, and the promotion of public transport and non-motorised transport. Furthermore, resilience must be enhanced by implementing measures to safeguard urban areas against extreme weather events, improving drainage systems and constructing resilient infrastructure.

The objective of this scientific study is to examine Turkey's climate change policies at the national level and to analyze the alignment of these policies with regional practices at the NUTS 2 level. In this context, the initiatives carried out by the Ministry of Environment, Urbanisation and Climate Change will be given particular attention. Additionally, the study aims to assess the effectiveness of development agencies in supporting climate change resilience projects. This analysis will thus enable an in-depth examination of the extent to which national policies overlap with local-level practices and the role of development agencies in this process.

2. LITERATURE REVIEW

The Paris Agreement, which was adopted in December 2015, represents a significant international agreement that is aimed at combating climate change and its negative impacts. This framework is based on the United Nations Framework Convention on Climate Change (UNFCCC) and represents a significant advancement in global climate policy. The Paris Agreement establishes a new international legal regime with the objective of limiting the global temperature increase to below 2 degrees Celsius above pre-industrial levels during this century and of continuing efforts to limit the temperature increase to 1.5 degrees Celsius [1]. The agreement includes provisions for regular reviews, transparency and reporting, which will require countries to submit their nationally determined contributions and increase their commitments over time [2]. Furthermore, the agreement emphasises the role of climate finance, capacity building and technology transfer in supporting adaptation and mitigation efforts [3]. The Paris Agreement differs from previous climate agreements such as the Kyoto Protocol in that it adopts a more inclusive and enforceable approach, whereby countries set their own targets [4]. The Agreement aims to gradually intensify the fight against climate change by introducing a 'ratchet mechanism' that aims to periodically review and increase national commitments [5]. Furthermore, it is the first international climate agreement to mention human rights, indigenous rights and gender equality, reflecting a holistic approach to climate policy [6]. Article 15 of the Agreement establishes an adaptation mechanism with the objective of facilitating the implementation of its provisions and promoting compliance. However, the details of this mechanism are still being developed [7]. The Paris Agreement represents a pivotal shift in the governance of international climate change, with a focus on inclusive, flexible and increasingly ambitious climate action. The success of the Paris Agreement will depend on the effective implementation of its provisions, the maintenance of strong international cooperation, and the continued scaling up of national commitments.

The Mediterranean Basin is one of the regions most vulnerable to climate change. Countries in this region have developed a range of policies with the objective of mitigating and adapting to the impacts of climate change. A substantial body of scientific research has been conducted to compare the climate change policies of the countries in the Mediterranean Basin. The national adaptation policies of France, Greece, Italy and Spain were analyzed, and it was observed that these countries address coastal threats and adaptation measures from different perspectives. It can be observed that coastal protection projects are characterised by limited private sector involvement and difficulties in determining the financial resources allocated to research initiatives [8]. The Mediterranean region is experiencing a significant and increasing risk from climate change, with implications for water,

ecosystems, food, health and safety. In order to reduce these risks, it is necessary to assess the potential adaptation options available [9] [10]. The countries of the Mediterranean Basin are susceptible to the adverse effects of climate change, including rising temperatures, droughts and wildfires, which present a significant risk, particularly in terms of public health. Those countries with lower incomes and older populations are more susceptible to the adverse effects of climate change [11]. The tourism sector in the Mediterranean has demonstrated considerable resilience and adaptive capacity in the face of climate change. Although climate change has not resulted in a significant decline in tourism demand, improved welfare and economic developments have offset this decline [12]. Vector-borne diseases (VBDs) in the Mediterranean region are directly related to climate change, and adaptation and preparedness policies are of significant importance in order to prevent the spread of these diseases. The level of preparedness varies among countries in the region [13]. Mediterranean Basin countries have developed a range of adaptation and mitigation strategies to address the impacts of climate change. The strategies employed by countries in the region vary according to their specific needs and circumstances. The efficacy of implemented policies is contingent upon international collaboration and the capacity of local governments.

Although Turkey has taken important steps on climate change, it has historically been a relatively late country in global climate policies. When the historical development and current status of Turkey's climate change policies are analysed; Turkey was late in climate policies by signing the United Nations Framework Convention on Climate Change (UNFCCC) in 1992 and the Kyoto Protocol in 2009. It has shown an increase of 110.4% in greenhouse gas emissions between 1990-2013 and, unlike developed countries, has not taken binding mitigation commitments [14]. In 2016, Turkey fell short in combating climate change at national and local scale despite the early implementation of the Paris Agreement and it was emphasized that political will is a key requirement for transition to a low carbon economy [15]. Turkey's climate change policies have not been sufficiently integrated with social policies and the social impacts of climate change as well as political and economic barriers have been ignored [16]. The transition to low-carbon urban development in Turkey has accelerated with the EU accession process, but current climate policies have been insufficient to reduce greenhouse gas emissions and climate change vulnerabilities in cities [17]. Turkey's climate change policies have been analyzed with a governance approach and the mismatch between the country's economic development priorities and climate change management reduces policy effectiveness. Climate change has serious impacts on Turkey's agricultural sector and current policies may be insufficient to cope with future climate change impacts. Turkey endeavours to adopt sustainable development principles in its energy consumption and climate change policies and the use of renewable energy resources and energy efficiency should be increased [18]. Turkey's climate change policies have historically developed with a lag and still face various challenges today. Political will and international co-operation are critical for transition to a low carbon economy and effective combat against climate change.

The establishment of development agencies at the NUTS 2 level in Turkey was driven by the objective of accelerating regional development, enhancing local capacities and reducing regional development disparities. This literature review addresses the functions, importance and impacts of these agencies. The establishment of a regional governance structure in Turkey's harmonisation process with the European Union (EU) necessitated the establishment of development agencies at NUTS 2 level. A study of the case of Istanbul indicates that these agencies have a tenuous foundation from both political and economic perspectives. However, they have the potential to address significant regional economic development gaps [19]. It is important to consider the differing levels of development within NUTS 2 regions when measuring regional development performance and the balanced distribution of financial support mechanisms. Studies employing the Pythagorean Fuzzy Analytical Hierarchy Process and a TODIM-based ranking model permit the evaluation of welfare indicators in these regions [20]. A study of the Izmir Development Agency's development board indicates that

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these boards have become dysfunctional platforms with low participation. It has been proposed that in order for development agencies to become more functional, their legal status and the structure of their organs should be re-evaluated [21]. The impact of development agencies on regional development has been evaluated in terms of geographical distribution and functionality. The establishment of development agencies in NUTS 2 regions is intended to reduce regional development disparities by mobilising local resources [22]. The effects of public investments and investment incentives on regional development have been examined. According to the fixed effects model, it has been determined that public investments have positive effects on regional development, with investments in transport and education exhibiting greater effects than other public investments [23]. The evaluations conducted on the activity reports of development agencies operating in 26 NUTS 2 regions in Turkey aim to ascertain whether these agencies are fulfilling their duties and responsibilities. The call for proposals mechanism of the agencies is considered an important component of their activities [24]. At the NUTS 2 level in Turkey, development agencies undertake a number of important functions, including the reduction of regional development disparities, the enhancement of local capacities and the acceleration of regional development. Nevertheless, the efficacy of these agencies is contingent upon a number of factors, including their legal status, the composition of their governing bodies, and the degree of local involvement.

The implementation of successful projects and initiatives in various fields in Turkey has played an important role in achieving local and national development goals. This paper analyses examples of these projects and initiatives and their success factors. A study of the success rate of projects in Turkey analysed 320 projects and found that 48% of projects were successfully completed, while 45% faced problems such as exceeding the budget, not being completed on time or not being fully completed. Among the success factors, the definition of requirements, planning of requirements and support from top management stand out [25]. The Sustainable Energy Action Plan (SEAP), implemented by a municipality in the Aegean Region of Turkey, encompasses initiatives designed to reduce carbon emissions. These projects include the implementation of zero-emission public transport, the conversion of energy-efficient buildings, and the development of smart traffic systems. It is evident that the role of top management and central government support is pivotal among the success factors [26]. A corporate foresight project conducted at Siemens Turkey included the redefinition of success factors for the better implementation of process-oriented elements and organisational changes, which was considered a success [27]. The success of urban regeneration projects in the Sulukule and Tepeüstü-Ayazma regions of Istanbul was evaluated using the analytical hierarchy process. The level of realisation of the objectives set by the actors at the beginning was used to measure the success level of the projects [28]. The green building certification process for existing buildings in Turkey was examined, and the success factors of the process were analysed by considering six LEED-certified projects. It can be argued that the commitment of owners and the support of top management are crucial factors in the success of such projects [29]. Urban regeneration projects in the Golden Horn region have been analysed in terms of the power dynamics of actors and the initiatives taken by top management, and have been successful even in cases where the participation of local communities and the private sector was limited [30]. The Information Society Strategy, Turkey's digital transformation project, has been subjected to critical analysis for its technical and methodological shortcomings, as well as for the ethical issues it has raised. Its high costs and ambitious socio-economic development goals have also attracted attention. A number of successful projects and initiatives in Turkey have achieved notable success in a variety of fields. Among the factors that have contributed to the success of these projects, it can be observed that accurate identification of needs, top management support, process-oriented approaches and the participation of local actors have played a significant role. These examples of success can also be instructive for future projects.

3. METHODOLOGY

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The methodology of this study employs a variety of data collection sources to investigate the impact of the renaming of the Ministry of Environment and Urbanisation as the Ministry of Environment, Urbanisation and Climate Change on the policies of development agencies at the NUTS 2 level in Turkey. The principal data sources to be employed in this context are as follows: Government reports will be utilized as a significant data source within the context of the research. The reports in question provide a comprehensive account of the government's policies, strategies and practices in relation to the environment, urbanisation and climate change. Furthermore, the reports of the Ministry of Development and other relevant ministries will be analysed in this context. At the NUTS 2 level, development agencies produce a plethora of reports and publications pertaining to local and regional development. The annual activity reports, strategy documents, project reports and evaluation documents of these agencies are of critical importance in the data collection process of the research. These publications provide detailed information on the measures taken by the agencies regarding climate change at the local level, the projects they implement and the impacts of these projects. Articles and theses published in academic journals are important data sources that will strengthen the scientific basis of the research. The findings of studies conducted by universities and research institutions in Turkey will be employed to analyse the alterations in the climate change policies of development agencies and the consequences of these alterations. In this context, the relevant literature will be analysed by searching national and international academic databases. The objective of this study is to compare and evaluate the climate change policies in Turkey with international standards. The integration of these disparate data sources will permit the Ministry of Environment, Urbanisation and Climate Change to conduct a comprehensive and in-depth analysis of the impact of the name change on the policies of development agencies at the NUTS 2 level.

The study employs a range of data collection techniques to examine the impact of the renaming of the Ministry of Environment and Urbanisation as the Ministry of Environment, Urbanisation and Climate Change on the policies of development agencies at NUTS 2 level. The selection of these methods enables the research to conduct a comprehensive and in-depth analysis. Document analysis represents one of the principal data collection methods employed in the research. This involves a systematic review and analysis of a range of written documents. The documents will be subjected to a detailed analysis in order to ascertain the extent to which the change in the name of the ministry has resulted in alterations to the policies and practices of development agencies.

Following the renaming of the Ministry of Environment and Urbanisation as the Ministry of Environment, Urbanisation and Climate Change, an assessment has been conducted of the changes in the policies of development agencies at NUTS 2 level. A framework for evaluation will be developed in order to ascertain the impact of these changes on the alignment between national policies and regional projects. This framework will facilitate a comprehensive and reliable analysis of the data, thereby ensuring the accuracy and reliability of the findings.

The document provides an overview of the main policy areas, major projects, budgets and details of development agencies in Turkey. The work of development agencies in various fields, including energy efficiency, renewable energy, sustainable urbanism, and the budgets allocated to these projects, demonstrates their contribution to local and national development goals.

Development Agency	Main Policy Areas	Important Projects	Project Budget and Details
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Istanbul Development Agency (ISTKA)	Green Economy, Smart Technologies, Education	Green Transformation Training Programmes	Cooperation with MoNE, curriculum development on ecology, waste separation, climate change in schools, no budget details given yet.
Izmir Development Agency (IZKA)	Spatial Planning, Disaster Management, Green Transformation	Wind Energy Meteorology and Environmental Conditioning Test Analysis Centre (RÜZMER), Industrial Symbiosis Project	RÜZMER: 384 million TL, Izmir Industrial Symbiosis Project: industrial waste reduction and improving supply chain relationships, Geothermal Resource Utilisation Project: no budget given.
South Marmara Development Agency	Renewable Energy, Green Hydrogen	Youth Energy Wind Energy Project, Renewable Youth Energy Project, HYSouthMarmara Project	Youth Energy: 350 thousand Euro, Renewable Youth Energy: 8 million Euro, HYSouthMarmara: 368 million Euro, South Marmara Hydrogen Coast Project: 20 million TL.
South Aegean Development Agency (GEKA)	Digitalisation, Efficiency, Disaster Resilience	Digitalisation in production, green transformation, disaster resilience projects	2023 Technical Assistance Programme: total budget 15 million TL, 100 thousand TL per activity.
Ankara Development Agency	Energy Efficiency, Water Management, Sustainable Agriculture	Climate Change Action Plan, Reduction of Electricity Distribution Losses	Climate Change Action Plan: no details given, Reducing Electricity Distribution Losses: increasing energy efficiency, reducing industrial emissions.

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Mevlana Development Agency	Sustainable Agriculture, Renewable Energy, Smart Agriculture	Smart Agriculture Programme, Rooftop SPP Dissemination Programme	Smart Agriculture Programme: 30 million TL, Rooftop SPP Dissemination Programme: 15 million TL, Environmental Symbiosis Project in Marble Sector: 55 million TL.
Cukurova Development Agency	Green Growth, Agricultural Water Management, Energy Efficiency	Climate Change Adaptation Projects, Analysis of Agricultural Irrigation Infrastructure	Seyhan Basin Climate Change Adaptation Projects: no details provided, Adana Agricultural Irrigation Infrastructure Analysis: no details provided.
Western Mediterranean Development Agency	Medicinal and Aromatic Plants, Alternative Tourism, Entrepreneurship	There are no direct projects related to Climate Change	Projects focused on Medicinal and Aromatic Plants, Alternative Tourism, Entrepreneurship, Climate change is not emphasised in the 2018-2024 Regional Plan.
Euphrates Development Agency	Circular Economy, Sustainable Agriculture, Energy Efficiency	Treatment Plant of Malatya 1st OIZ, Smart Energy Monitoring System	Treatment Plant of Malatya 1st OIZ: no details given, Smart Energy Monitoring System: no details given.
Silk Road Development Agency	Agricultural Resilience, Water and Soil Conservation	TRC1 Region Agriculture Climate Change Resilience Programme	TRC1 Region Agriculture Climate Change Resilience Programme: water resources and soil protection, soil quality improvement projects, no details given.

Figure 1. Projects and policies of development agencies in Turkey

These criteria allow for a comprehensive assessment of the effectiveness of development agencies' initiatives. In this way, the extent to which changes in the policies of development agencies at NUTS 2 level following the name change of the Ministry of Environment, Urbanisation and Climate Change and their impact on regional development can be better understood.

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4. RESULTS AND DISCUSSION

Turkey's approach to combating climate change has undergone a significant transformation with the renaming of the Ministry of Environment, Urbanization and Climate Change. This section will analyse Turkey's national climate change policies, key policies and strategic plans of the Ministry, and assess the implementation of these policies at the regional level. The Ministry has prepared a number of strategic plans and action plans, including the Climate Change Action Plan, the National Climate Strategy and Action Plan (2010-2023), and the Sustainable Development Goals. The aforementioned plans include targets to reduce carbon emissions, enhance energy efficiency, and adapt to climate change. It is evident that regional development agencies play a pivotal role in the implementation of national policies at the regional level, which has resulted in a notable shift in the policy priorities and strategies of the agencies. Agencies contribute to combating climate change at the local level by developing projects such as energy efficiency, the use of renewable energy resources, urban transformation and green building practices. Nevertheless, obstacles such as a lack of financial resources, a lack of capacity within local administrations and a low level of public awareness may hinder the effective implementation of policies. While successful projects and exemplary practices contribute to the effective implementation of national policies at the regional level, the shortcomings encountered in policy implementation necessitate the development of more effective strategies. In this regard, it is imperative to implement improvements in key areas such as the more efficient utilisation of resources, the enhancement of local capacity and the elevation of public awareness. The projects supported by development agencies are largely in alignment with national climate change policies and make a significant contribution to sustainable development and the mitigation of climate change at the local level. Nevertheless, further enhancements are required in the areas of inadequate resources, lack of capacity, and deficiencies in monitoring and evaluation processes. These recommendations will facilitate the enhancement of the efficacy and sustainability of the policies and projects of development agencies. The aforementioned analyses and assessments will assist in elucidating the nature of the alterations that have been implemented in the policies and strategies of development agencies at the NUTS 2 level in Turkey subsequent to the renaming of the Ministry of Environment, Urbanisation and Climate Change and the repercussions of these modifications on regional development.

5. CONCLUSION AND RECOMMENDATIONS

This analysis demonstrates the alterations in the policies and initiatives of development agencies at the NUTS 2 level subsequent to the renaming of the Ministry of Environment, Urbanisation and Climate Change. The projects of development agencies are generally aligned with national climate change policies and make a notable contribution to sustainable development and the mitigation of climate change at the local level. Nevertheless, there is a need for improvement in several areas, including the availability of resources, the capacity to implement projects, and the effectiveness of monitoring and evaluation processes.

In light of these observations, the following recommendations can be put forth: It is recommended that strategic planning and management processes be developed in order to ensure the effective use of financial and human resources. Training programmes and capacity-building activities should be implemented to enhance the capacity of local governments and development agencies. It is recommended that monitoring and evaluation processes of projects be strengthened in order to enhance the success and sustainability of projects. The implementation of these recommendations will facilitate the enhancement of the efficacy and sustainability of the policies and projects of development agencies.

This section will present a comparative analysis of climate change resilience in different NUTS 2 regions of Turkey. It will identify the regions that are most and least vulnerable to climate change adaptation. The impact of the renaming of the Ministry of Environment, Urbanisation and Climate

Change on the implementation of regional development policies will be evaluated. The Marmara Region is the most densely populated and industrialised region of Turkey, and climate change mitigation and adaptation projects are intensively implemented, particularly in Istanbul and its surrounding cities. The region's strengths include an abundance of economic resources, the prevalence of innovative technologies and sustainable urbanisation practices. However, it is also susceptible to pressures on infrastructure and natural resources due to high population density and rapid urbanisation. The Aegean Region is a region where the agricultural and tourism sectors are of significant importance, and development agencies focus on water management and energy efficiency projects. The region's strengths include the high potential for solar and wind energy and the prevalence of sustainable tourism projects. However, weaknesses include limited water resources and the increasing risk of water scarcity due to climate change. The Mediterranean region is particularly susceptible to the effects of climate change, with agriculture, tourism and water resources playing a pivotal role. The region's strengths include a high solar energy potential and tourism revenues. However, its weaknesses include high temperatures, drought risk and vulnerability to forest fires. Central Anatolia is a region where agriculture and animal husbandry are particularly intensive, and water management and sustainable agriculture projects are of great importance. The region's strengths include the adoption of innovative practices in agriculture and animal husbandry. However, limited water resources and the risk of soil erosion represent its weaknesses. The Black Sea region is characterised by high rainfall and extensive forested areas, and the implementation of water management and flood control projects is of significant importance. While the region is characterised by abundant water resources and forested areas, it is also susceptible to flood and landslide risk, as well as limited agricultural areas. The Eastern and Southeastern Anatolia Regions are among the least developed regions of Turkey and are highly vulnerable to the impacts of climate change. Development agencies have identified sustainable development and climate change adaptation projects as key priorities in these regions. While the potential of renewable energy resources is among their strengths, insufficient economic resources, infrastructure deficiencies and socio-economic difficulties are among their weaknesses.

Following the renaming of the Ministry of Environment, Urbanisation and Climate Change, the principal findings of the analysis of the alterations to the policies of development agencies at NUTS 2 level in Turkey will be presented, and the efficacy of development agencies in supporting climate change resilience will be evaluated. In light of the fundamental information obtained from national policies and regional practices, national climate change policies have established clear targets in areas such as energy efficiency, renewable energy use, sustainable urbanism and urban transformation. These targets are largely in alignment with the strategies and projects of development agencies at NUTS 2 level. The projects implemented by development agencies were designed and implemented in accordance with the strategies set by national policies, with the objective of contributing to national targets by taking into account local needs and conditions. The Marmara, Aegean and Mediterranean regions are notable for their resilience to climate change, due to factors such as their abundance of economic resources, use of innovative technologies and sustainable urbanisation practices. In contrast, the Eastern and Southeastern Anatolia regions are more vulnerable, due to a lack of economic resources, infrastructure deficiencies and socio-economic challenges. The implementation of development agencies' projects in areas such as energy efficiency, renewable energy projects and sustainable urbanisation practices has resulted in notable success in increasing environmental sustainability and combating climate change. The encouragement of local participation and the fostering of co-operation have enhanced the effectiveness and sustainability of the aforementioned projects. Nevertheless, the lack of adequate resources and the absence of capacity in certain regions have negatively affected the effectiveness of the projects. Furthermore, deficiencies in monitoring and evaluation processes have reduced the success and sustainability of the projects. While development agencies demonstrated efficacy in financing and managing projects, limitations in

financial and human resources in certain regions constrained the success of these initiatives. Agencies have encouraged the participation of local stakeholders in the projects and increased national and international cooperation in order to ensure that the projects are appropriate to local needs and sustainable. They have increased environmental and economic sustainability by using innovative technologies and sustainable practices. However, deficiencies in monitoring and evaluation processes have negatively affected the success of the projects. The findings of this study demonstrate that there have been significant alterations in the policies and projects of development agencies subsequent to the renaming of the Ministry of Environment, Urbanisation and Climate Change. It is evident that development agencies have achieved considerable success in combating and adapting to climate change at the regional level by developing projects in alignment with national climate change policies. Nevertheless, further enhancements are required in areas such as inadequate resources, lack of capacity, and deficiencies in monitoring and evaluation processes. In light of these findings, it is recommended that strategic planning and management processes be developed to ensure the effective use of financial and human resources. Training programmes and capacity-building activities should be organised to enhance the capacity of local governments and development agencies. Furthermore, monitoring and evaluation processes of projects should be strengthened to enhance the success and sustainability of projects. The implementation of these recommendations will facilitate the enhancement of the efficacy and sustainability of the policies and projects of development agencies. This section presents recommendations for enhancing the alignment between national policies and regional projects, as well as strengthening the role of development agencies, in line with the changes in the policies of development agencies at NUTS 2 level following the name change of the Ministry of Environment, Urbanisation and Climate Change. In order to facilitate the implementation of national climate change policies and strategies at the regional level, it is recommended that there should be closer coordination between development agencies and the Ministry. Furthermore, the establishment of joint working groups and advisory boards would be beneficial. This will ensure the more effective implementation of national policies at the local level and the alignment of regional projects with national strategies. It is recommended that regional development agencies conduct comprehensive analyses to identify local needs and priorities and develop projects in accordance with the findings. Consequently, the relevance of projects to local conditions will be enhanced, thereby ensuring more effective implementation of national policies at the regional level. It is recommended that monitoring and evaluation processes of projects be standardised and regularly applicable. This can be achieved by determining performance indicators and success criteria at both national and regional levels. This will enhance the efficacy and longevity of projects and guarantee the acquisition of the requisite data to gauge the efficacy of national policies. It is recommended that the financial and human resources capacities of development agencies be increased. In this context, additional budget allocations should be made, and agencies should be provided with training programmes. It is of the utmost importance that agencies address any deficiencies in their resources and capacities if they are to plan and implement projects in an effective manner. It is recommended that development agencies develop stronger cooperation with local administrations, civil society organisations, universities and the private sector. This will positively affect the success and sustainability of projects and accelerate regional development. It is recommended that support be provided to renewable energy projects, smart city applications and sustainable agricultural methods in order to promote the development of innovative technologies and sustainable practices. The encouragement of such projects will serve to enhance regional resilience. It is recommended that regular meetings, workshops and training programmes be organised to encourage knowledge and experience sharing among development agencies. Furthermore, successful projects and good practice examples should be shared with other regions. The recommendations set forth herein offer important steps to enhance the effectiveness and sustainability of development agencies' policies and projects in the wake of the renaming of the Ministry of Environment, Urbanization and Climate Change. It is of the utmost

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importance that there be greater coherence between national policies and regional projects, and that the role of development agencies be strengthened, if Turkey is to combat climate change and achieve its sustainable development goals.

This section will examine the implications of the changes in the policies of Turkey's development agencies at NUTS 2 level following the renaming of the Ministry of Environment, Urbanisation and Climate Change for other Mediterranean Basin countries. It will also consider how these findings can be applied in other countries in the region. The integration of Turkey's national policies and regional projects has been demonstrated to be an effective approach in combating climate change. The implementation of harmonised projects at the regional level, which are aligned with national objectives, enhances the strategic success of initiatives. This approach can be adopted by other Mediterranean countries, enabling them to develop effective solutions that are appropriate to local needs. The involvement of local stakeholders in development projects has been shown to enhance the success of such initiatives. This approach could be replicated in other Mediterranean countries, thereby facilitating the formation of a broader support base and enhancing the effectiveness of projects at the local level. The advancement of initiatives in the domains of energy efficiency, renewable energy, and smart urbanisation, through the utilisation of innovative technologies and sustainable practices, can serve as a valuable exemplar for other Mediterranean countries, offering potential avenues for replication. The strengthening of monitoring and evaluation processes has led to an increase in the effectiveness and sustainability of projects. The standardisation of these processes could similarly lead to an increase in the success of projects in other Mediterranean countries. The projects implemented by Turkey in different regions have been adapted to local needs and conditions, and it is recommended that other Mediterranean countries should also adapt their projects by taking into account local needs. Turkey's endeavours to integrate sustainable development goals and climate change policies can enhance environmental and economic sustainability by serving as a model for other Mediterranean countries. The endeavours to augment national and international collaboration have demonstrably enhanced the efficacy and longevity of the projects. These collaborations can be emulated by other Mediterranean countries. These lessons and recommendations can assist other Mediterranean Basin countries in developing more effective policies and projects to combat and adapt to climate change. Furthermore, the insights gained from

Turkey's experience present valuable opportunities to build more sustainable and resilient societies at the regional level.

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Aesthetics of streetscapes characterized by buildings with different heights and front setbacks, and distinct levels of order and visual stimulus

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Abstract

The objective of this paper is to evaluate the aesthetics of streetscapes characterized by buildings with different heights and front setbacks, and distinct levels of order and visual stimulus, by three groups of people with different levels and types of educational background. Although some studies have been made about the aesthetics of streetscapes, there is a need to deepen the existing knowledge, mainly, regarding aesthetic evaluations of these streetscapes by such groups of people.

Questionnaires available in the LimeSurvey software via the Internet, included nine streetscapes scenes in three sets and were answered by 250 people as follows: 62 architects, 169 non-architects college graduates and 19 non-college graduates. Non parametric statistical tests such as Kruskal-Wallis and Kendall W were used to analyze the data.

Results show, for example, that streetscape scene characterized by order and visual stimulus is clearly preferred, mainly due to similarity between buildings heights, colours and forms, and presence of clear visual stimulus. On the other hand, the scene characterized by disorder is visibly the least preferred by architects and by non-architects college graduates, mainly due to differences between buildings heights, colours and forms, and the absence of clear visual stimulus.

Keywords: *aesthetics of streetscapes; building height; building front setback; order and visual stimulus.*

1. INTRODUCTION

The importance of aesthetics of streetscapes has been mentioned by many authors and has been corroborated by many studies carried out in different cities and countries [1; 2; 3; 4; 5; 6]. The aesthetic evaluation is part of empirical aesthetics, which assumes that it is possible to evaluate, for example, a streetscape, to find generalizations and to understand the reasons for such evaluation based on a streetscape features [7], contrary to philosophical aesthetics which assumes that beauty is in the eyes of the beholder and, therefore, that aesthetic evaluations depend on each person's taste, are not subject to generalizations and cannot be objectively explained [7].

Although studies have shown that 'beauty is much more on the perceived object than in the eyes of the beholder' [e.g., 8], teaching of architecture and urbanism, regardless of the school and country, tends to favour the approach of philosophical aesthetics. This has generated architectural projects and urban interventions that disregard research results on urban aesthetics. This is the case of streetscapes characterized by tall buildings that tend to block or reduce pedestrians' views of the sky and to provoke less satisfactory aesthetic response by people in comparison to lower buildings that allow for a greater view of the celestial dome [9].

Moreover, disregarding the great importance of the ground floor in the relationship between the building and the street [10; 11], buildings set back, without a direct relationship with the street, as it is generally the case with buildings in modernist site layouts, tend to generate less pleasant urban experiences, due to lower visual stimulus, than buildings close to the front alignment of the lots [10; 12; 13]. Furthermore, studies involving empirical aesthetics have shown that buildings with order and

visual stimulus are preferred over those with disorder or with no visual stimulus like a blind wall or a wall with no openings [e.g., 8].

In addition, it is important to understand the aesthetic evaluations by people with different levels and types of educational background. In this respect, some apparently contradictory results still exist. Some of these results show that architects' aesthetic evaluations tend to be different from lay people's evaluations [14; 15]. For example, the best aesthetically evaluated houses by architects were the ones worst rated by other professionals and vice versa, in an evaluation of 40 houses [15]. Other results show that architects' aesthetic evaluations are clearly positive and tend to be similar to those of non-architects college graduates and non-college graduates when there is order and stimulus and that the differences tend to be visible in relation to a greater appreciation of the idea of order by architects and a greater appreciation of visual stimulation by non-architects [8]. Therefore, there is a need to produce new findings through studies in the area of empirical aesthetics to better substantiate existing results.

Hence, the objective of this paper is to evaluate the aesthetics of streetscapes characterized by buildings with different heights and front setbacks, and distinct levels of order and visual stimulus, by three groups of people with different levels and types of educational background, and to strengthen the importance of the results generated by studies involving empirical aesthetics and their consideration in architectural and urban design projects and so, for a pleasant aesthetic experience for users of public open spaces.

2. METHODOLOGY

Questionnaires available in the LimeSurvey software via the Internet were used for data collection, being answered by 250 people as follows: 62 architects, 169 non-architects college graduates and 19 non-college graduates. These respondents were invited by e-mail sent to the unions of employees, Deans and Departments of many federal educational institutions, including the Federal University of Rio Grande do Sul, and to educational institutions in charge of preparing for the university entrance examination, in the city of Porto Alegre.

Simple-choice questions about the aesthetic evaluations of each of the nine streetscapes scenes and multiple-choice about the order of preference for the appearance of the three scenes in each of the three sets and multiple-choice questions about the justifications for the preferred and least preferred scene in each of the three sets were used, such as: "Do you think the appearance of the scene A is: [] Very beautiful, [] Beautiful, [] Neither beautiful nor ugly, [] Ugly, [] Very ugly"; "Rank scenes from the most (1) to the least (3) preferred in appearance: [] Scene A, [] Scene B, [] Scene C"; "Nominate the main reasons that justify the most preferred scene's appearance: [] Adequate height of buildings, [] Adequate amount of visible sky, [] Others:"; "Nominate the main reasons that justify the least preferred scene's appearance: [] Inadequate height of buildings, [] Inadequate amount of visible sky, [] Others:"

Nine streetscapes scenes with little or no solar incidence, in order to avoid high contrasts and shadows on buildings, were included in the questionnaire in three sets as follows: set 1 – three streetscapes scenes characterized by buildings of different heights inside the blocks, with no direct relationship with the street (Figure 1); set 2 – three streetscapes scenes characterized by buildings of different heights on the block perimeter, with doors and windows facing the street (Figure 2); set 3 – three streetscapes characterized by order and low visual stimulus, by order and visual stimulus, and by disorder (Figure 3). Due to the difficulty of properly representing these characteristics in just one photo with both street sides, each of the nine streetscapes results from the combination of two edited color photographs taken from the two sides of streets in Porto Alegre. The color photographs are adequate to simulate a real setting in aesthetic evaluations [16]. Those in this study have different viewing angles in order to eliminate or greatly reduce different types of elements, including visual barriers, that interfere with the aesthetic evaluations of streetscapes, which were further removed or

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greatly reduced in the color photo editing process, such as: trees and other vegetation, distinct skies, light poles and wires, dustbins, and cars. These variations among the scenes' perspectives do not have a noteworthy effect on the aesthetic evaluations of streetscapes, since the determinants for such evaluations are the existing architectural elements [17], as also evidenced by the fact that such variations did not affect preferences for streetscapes' appearance in the pilot studies carried out to test the suitability of the questions and figures.



Figure 1. Streetscapes scenes set 1 – A1, B1 and C1 (A. F. Panzenhagen, 2016)



Figure 2. Streetscapes scenes set 2 – A2, B2 and C2 (A. F. Panzenhagen, 2016)



Figure 3. Streetscapes scenes set 3 – A3, B3 and C3 (A. F. Panzenhagen, 2016)

In order to facilitate understanding of the meaning of the numbers obtained, the aesthetic evaluations of the nine streetscapes scenes in sets 1, 2 and 3 were categorized according to the categories in Table 1.

Table 1. Categorization of aesthetic evaluations of streetscapes scenes in sets 1, 2 and 3

EVALUATION	main condition % of positive evaluations	secondary condition % of negative evaluations
very positive ++	more than 80%	up to 10%
positive +	more than 65% up to 80%	up to 20%
average 0	more than 50% up to 65%	up to 30%
negative -	more than 35% up to 50%	up to 40%
very negative --	up to 35%	any %

Note: The main condition indicates the categorization of evaluations once the secondary condition is met.

Non parametric statistical tests were used to analyze the data transferred from the LimeSurvey to PASW Statistics 18 software, such as: Kruskal-Wallis - analyzes the existence of a statistically significant difference (sig. ≤ 0.05) between the evaluations carried out for each of the three scenes in each set by the three groups of respondents; Kendall W - shows the existence of a statistically significant difference between the evaluations of the three scenes in each of the three sets by each group of respondents.

3. RESULTS

The statistical significant differences (Kruskal-Wallis test) found among the aesthetic evaluations of scene A1 (test statistic = 27.037, sig. = .000), B1 (test statistic = 28.384, sig. = .000) and C1 (test statistic = 13.127, sig. = .001) by the three groups evidences that these three scenes in set 1 (buildings inside city blocks with no direct relationship with the street; Figure 1) were better evaluated by those without a college degree and worst evaluated by architects (Table 2). All the three scenes in set 1 were evaluated very negatively by the architects, either very negatively (A1) or negatively (B1 and C1) by the non-architects college graduates. Even so, there are statistically significant differences (Kendall's W test) between these assessments of these three scenes by the architects (test statistic = 12.885, sig. = .002) and by the non-architects college graduates (test statistic = 14.463, sig. = .001). The scenes best rated by architects is the lower buildings scene (C1 - 5 storey) and by non-architects college graduates are the lower buildings scenes (B1 - 10 storey; C1 - 5 storey), with the taller buildings scene (A1 - 18 storey) been the worst rated by these two groups. All the three scenes in set 1 were averagely rated by those without a college education; although no statistically significant difference (Kendall's W test) was found, the scene with taller buildings (A1 - 18 storey), as in the two previous groups of respondents, was the worst evaluated (Table 2; Figure 1).

Table 2. Evaluation of appearance of streetscape scenes in sets 1 to 3

	Very Beautiful	Beautiful	N beautiful nor ugly	Ugly	Very ugly	Kendall mrv	K-W mrv
SET 1- buildings inside city blocks with no direct relationship with the street - A1 (18 storey); B1 (10 storey); C1 (5 storey)							
SET 1 - Architects (total number of respondents in each scene: A1= 62 ; B1=62; C1=62)							
A1 --	0	8(12.9)	19(30.6)	25(40.3)	10(16.1)	1.76	90.82
B1 --	0	9(14.5)	27(43.5)	19(30.6)	7(11.3)	2.02	90.40
C1 --	2(3.2)	12(19.4)	25(40.3)	16(25.8)	7(11.3)	2.23	103.15
SET 1 - Non-architects college graduates (total n° of respondents in each scene: A1= 169; B1=169; C1=169)							
A1 --	7(4.1)	48(28.4)	65(38.5)	38(22.5)	11(6.5)	1.83	132.63
B1 -	10(5.9)	52(30.8)	76(45.0)	23(13.6)	8(4.7)	2.09	132.50
C1 -	9(5.3)	55(32.5)	66(39.1)	31(18.3)	8(4.7)	2.08	129.30
SET 1 - Non college graduates (total number of respondents in each scene: A1=19; B1=19; C1= 19)							
A1 0	4(21.1)	8(42.1)	4(21.1)	3(15.8)	0	1.84	175.24
B1 0	4(21.1)	8(42.1)	7(36.8)	0	0	2.11	177.76
C1 0	6(31.6)	5(26.3)	5(26.3)	3(15.8)	0	2.05	164.66
SET 2 - buildings on the block perimeter with doors and windows facing the street - A2 (18 floors); B2 (12 floors); C2 (6 floors)							
SET 2 - Architects (total number of respondents in each scene: A2= 57 ; B2=56; C2=56)							
A2 --	0	10(17.5)	18(31.6)	19(33.3)	10(17.5)	1.60	140.18
B2 --	1(1.8)	13(23.2)	22(39.3)	16(28.6)	4(7.1)	1.98	143.89

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C2 -	3(5.4)	18(32.1)	23(41.1)	11(19.6)	1(1.8)	2.42	140.24
SET 2 - Non-architects college graduates (total n° of respondents in each scene: A2=166 ; B2=165; C2=163)							
A2 - -	1(0.6)	13(7.8)	34(20.5)	68 (41.0)	50(30.1)	1.66	111.42
B2 - -	1(0.6)	17(10.3)	47(28.5)	71(43.0)	29(17.6)	1.94	108.32
C2 - -	5(3.1)	27(16.6)	61(37.4)	54(33.1)	16(9.8)	2.40	106.88
SET 2 Non college graduates (total number of respondents in each scene: A2=17; B2= 17; C2= 16)							
A2 - -	0	3(17.6)	5(29.4)	7(41.2)	2(11.8)	1.53	143.18
B2 - -	0	4(23.5)	7(41.2)	6(35.3)	0	1.88	147.62
C2 0	2(12.5)	7(43.8)	3(18.8)	4(25.0)	0	2.59	153.47
SET 3 - order and low visual stimulus (A4); order and visual stimulus (B4); buildings characterizing disorderly street interfaces							
SET 3 - Architects (total number of respondents in each scene: A4= 49; B4=49; C4=49)							
A3 0	6(12.2)	23(46.9)	14(28.6)	6(12.2)	0	2.12	105.04
B3 +	13(26.5)	24(49.0)	10(20.4)	2(4.1)	0	2.60	94.38
C3 - -	0	5(10.2)	12(24.5)	20(40.8)	12(24.5)	1.28	79.56
SET 3 - Non-architects college graduates (total n° of respondents in each scene: A4=137 ; B4=136; C4=136)							
A3 0	13(9.5)	60(43.8)	34(24.8)	29(21.2)	1(0.7)	2.00	95.15
B3 +	41(30.1)	66(48.5)	20(14.7)	8(5.9)	1(0.7)	2.56	98.55
C3 - -	3(2.2)	19(14.0)	49(36.0)	50(36.8)	15(11.0)	1.44	101.30
SET 3 - Non college graduates (total number of respondents in each scene: A4=10; B4=10; C4= 10)							
A3 +	1(10.0)	6(60.0)	2(20.0)	1(10.0)	0	1.85	112.30
B3 +	4(40.0)	4(40.0)	2(20.0)	0	0	2.55	108.30
C3 -	0	4(40.0)	5(50.0)	1(10.0)	0	1.60	143.45

Note: ++ = very positive; + = positive; 0 = average; - = negative; -- = very negative; N beautiful nor ugly = neither beautiful nor ugly; mrv Kendall = mean rank values obtained through Kendall W Test (values should be compared for each of the three respondent groups; higher value indicates prettier looking scene); mrv K-W = mean rank values obtained through Kruskal-Wallis Test (values should be compared for each of the three scene types; higher value indicates prettier looking scene); values between brackets represent percentages in relation to the total number of respondents in each scene; the number of respondents may vary in relation to the evaluation of each scene, since some questions were not answered by everyone in each of the three groups.

Comparing preferences for the three scenes appearance in set 1 (Figure 1) between the three groups of respondents no statistical significant difference (Kruskal-Wallis test; Table 3) was found. Nonetheless, regarding the existence of statistical significant difference (Kendall's W test; Table 3) between preferences for these three scenes by architects and by non-architects college graduates it was found that:

- the scene with 5 storey buildings (C1) is the most preferred due to (% of 35 architects; % of 102 non-architects college graduates): adequate buildings height (77.1%; 45.1%); adequate amount of visible sky (62.9%; 70.6%).
- the scene with 18 storey buildings (A1) is the least preferred due to (% of 45 architects; % of 100 non-architects college graduates): inadequate buildings height (80%; 59%); inadequate amount of visible sky (31.1%; 61%).

These preferences are in line with the individual evaluations of scenes in set 1 by these two groups, showing that greater sky visibility indicates greater preference for a scene appearance.

Synthesizing, the relationship between different levels and types of educational background and aesthetic evaluations and preferences of scenes with different building heights inside city blocks with no direct relationship with the street (set 1; Figure 1) shows that:

- the aesthetic evaluations of streetscapes (A1, B1 and C1) have been affected, with best evaluations by non college graduates and worst by architects; nonetheless, none of the three groups did evaluate these urban features as positive.
- preferences for the appearance of streetscapes have not been affected.
- lower buildings (5 floors) generated the best aesthetic evaluations and is the most preferred streetscape regarding its appearance by the two groups with college education, due to adequate buildings height and adequate amount of visible sky.
- taller buildings (18 floors) provoked the worst ratings and is the least preferred streetscape regarding its appearance by the two groups with college education due to inadequate buildings height and inadequate amount of visible sky.

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Table 3. Preference for scene appearance– streetscape scenes in sets 1, 2 and 3

Preference for scene appearance – set 1									
Architects (59)			Non-architects college graduates (167)			Non college graduates (18)			K-W Test
Scene	mrsv K	mrsv K-W	Scene	mrsv K	mrsv K-W	Scene	mrsv K	mrsv K-W	test statistic - sig.
A1 (157)	2.60	138.43	A1 (398)	2.38	119.87	A1 (42)	2.17	108.21	no sig.
B1 (104)	1.75	113.33	B1 (314)	1.88	126.58	B1 (32)	1.78	114.67	no sig.
C1 (98)	1.64	118.02	C1 (290)	1.74	122.34	C1 (37)	2.06	145.67	no sig.
K - test statistic = 32.536, sig. = .000			K - test statistic = 38.515, sig. = .000			K - no sig.			
Preference for scene appearance – set 2									
Architects (49)			Non-architects college graduates (145)			Non college graduates (12)			K-W Test
Scene	mrsv K	mrsv K-W	Scene	mrsv K	mrsv K-W	Scene	mrsv K	mrsv K-W	test statistic - sig.
A2 (126)	2.56	102.71	A2 (378)	2.59	105.12	A2 (29)	2.42	95.62	no sig.
B2 (90)	1.88	99.94	B2 (276)	1.90	103.26	B2 (24)	2.00	112.17	no sig.
C2 (77)	1.56	107.47	C2 (219)	1.51	101.86	C2 (19)	1.58	107.17	no sig.
K - test statistic = 25.125, sig. = .000			K - test statistic = 85.945, sig. = .000			K - no sig.			
Preference for scene appearance – set 3									
Architects (49)			Non-architects college graduates (128)			Non college graduates (10)			K-W Test
Scene	mrsv K	mrsv K-W	Scene	mrsv K	mrsv K-W	Scene	mrsv K	mrsv K-W	test statistic - sig.
A3 (105)	2.14	91.91	A3 (276)	2.16	93.23	A3 (24)	2.40	114.05	no sig.
B3 (61)	1.24	88.03	B3 (176)	1.37	95.60	B3 (15)	1.50	112.00	no sig.
C3 (126)	2.61	101.42	C3 (318)	2.48	93.41	C3 (21)	2.10	74.70	no sig.
K - test statistic = 47.306, sig. = .000			K - test statistic = 83.453, sig. = .000			no sig.			

Note: mrsv K = mean rank values obtained through Kendall W Test; these values should be compared in the column, considering the lowest value as an indicator of the highest preference; mrsv K-W = mean rank values obtained through Kruskal-Wallis Test; these values should be compared in the line of each scene, considering the lowest value as an indicator of the highest preference; the values in parentheses represent the sum of the points received by each scene in each of the three groups of respondents, each of them assigning values from 1 (for the preferred scene) to 3 (for the least preferred scene); thus, the smaller the value in parenthesis, the greater the preference for the scene.

Concerning set 2 (buildings on the block perimeter with doors and windows facing the street; Figure 2), statistical significant differences (Kruskal-Wallis test) were found among the evaluations of scene A2 (test statistic = 10.172, sig. = .006), B2 (test statistic = 15.753, sig. = .000) and C2 (test statistic = 16.120, sig. = .000) by the three groups, evidencing that these three scenes were better evaluated by those without a college degree (very negatively - A2 and B2; averagely - C2) and worst evaluated by non-architects college graduates (very negatively) (Table 2). These three scenes in set 2 were evaluated either very negatively (A2 and B2) or negatively (C2) by the architects. Nonetheless, statistically significant differences (Kendall's W test) were found between the assessments of scenes in set 2 by the architects (test statistic = 37.839, sig. = .000), by the non-architects college graduates (test statistic = 84.762, sig. = .000) and by the non college graduates (test statistic = 14.333, sig. = .001): the lower buildings scene (C2 - 6 floors) was the best rated and the taller buildings scene (A2 - 18 floors) the worst rated by any of these three groups (Table 2; Figure 2). Comparing the evaluations of streetscapes with the same (A1 and A2) or similar (B1 and B2; C1 and C2) building height in set 1 with those in set 2, clearly, the architects best evaluated the streetscapes with buildings on the block perimeter with doors and windows facing the street (set 2; Figure 2) than those in set 1 (Figure 1). On the other hand, the opposite happened with non-architects college graduates and non college graduates, which rated best streetscapes with buildings inside city blocks with no direct relationship with the street.

Looking at preferences for each of the three scenes appearance in set 2 (Figure 2) by the three groups of respondents, no statistical significant difference (Kruskal-Wallis test; Table 3) was found. However, considering the existing statistical significant difference (Kendall's W test; Table 3) between preferences for these three scenes by each group, the scene with 6 storey buildings (C2) is the most preferred while the scene with 18 storey buildings (A2) is the least preferred by architects and by non-architects college graduates. As in the analysis of preferences for scenes appearance in set 1, the main reasons are basically related to sky visibility, as follows: scene C2 (% of 32 architects;

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% of 106 non-architects college graduates) - adequate buildings height (59.4%; 48.1%); adequate amount of visible sky (53.1%; 63.2%); scene A2 (% of 35 architects; % of 109 non-architects college graduates) - inadequate buildings height (68.6%; 65.1%); inadequate amount of visible sky (42.9%; 50.5%). These preferences are also in line with the individual evaluations of scenes in set 2 by these two groups, confirming that greater sky visibility indicates greater preference for a scene appearance. Summarizing, the relationship between different levels and types of educational background and aesthetic evaluations and preferences of scenes with different building heights on the city block perimeter with doors and windows facing the street (set 2; Figure 2) reveals that:

- the aesthetic evaluations of streetscapes (A2, B2 and C2) have been affected, with best evaluations by non college graduates and worst by non-architects college graduates, though none of the three groups did evaluate these urban features as positive.
- preferences for the appearance of streetscapes have not been affected.
- lower buildings (6 floors) generated the best aesthetic evaluations by any group and is the most preferred streetscape regarding its appearance by the two groups with college education, due to adequate buildings height and adequate amount of visible sky.
- taller buildings (18 floors) provoked the worst ratings by any group and is the least preferred streetscape regarding its appearance by the two groups with college education due to inadequate buildings height and inadequate amount of visible sky.

In relation to set 3 (buildings with order and low visual stimulus, buildings with order and visual stimulus and buildings characterizing disorderly street interfaces; Figure 3), statistical significant differences (Kruskal-Wallis test) was found only among the evaluations of scene C3 (test statistic = 13.425, sig. = .001), which was better evaluated by those without a college degree (negatively) and worst evaluated by the architects (very negatively) (Table 2). Nevertheless, statistically significant differences (Kendall's W test) were found between the assessments of scenes in set 3 by the architects (test statistic = 57.773, sig. = .000), by the non-architects college graduates (test statistic = 107.175, sig. = .000), and by the non college graduates (test statistic = 7.760, sig. = .021): the scene with buildings with order and visual stimulus (B3) was the best rated by any of the three groups, while the scene with buildings characterizing disorderly street interfaces (C3) was the worst rated by any of these three groups (Table 2; Figure 3). Among the nine streetscapes in sets 1, 2 and 3, streetscape scene B3 is the best evaluated, regardless of the respondent's level and type of college education, while streetscape scene C3 is the worst evaluated by architects and streetscape A2 is the worst evaluated by the other two groups.

On the other hand, no statistical significant difference (Kruskal-Wallis test; Table 3) was found between preferences for these scenes (A3, B3 and C3) appearance by the three groups of respondents. Nonetheless, the existing statistical significant differences (Kendall's W test; Table 3) between preferences for these three scenes appearance by architects and by non-architects college graduates reveals that the scene with buildings with order and visual stimulus (B3) is the most preferred, mainly due to (% of 38 architects; % of 91 non-architects college graduates): similarity between building heights (55.3%; 28.6%); similarity between the shapes of buildings (52.6%; 50.5%); presence of clear visual stimulus (44.7%; 60.4%); similarity between the colours of buildings (28.9%; 17.6%). On the other hand the scene with buildings characterizing disorderly street interfaces (C3) is the least preferred by these two groups of respondents, basically due to (% of 37 architects; % of 87 non-architects college graduates): difference between the shapes of buildings (78.4%; 60.9%); difference between building heights (67.6%; 36.8%); absence of clear visual stimulus (40.5%; 42.5%); difference between the colours of buildings (32.4%; 16.1%). Therefore, these results are similar to the individual evaluations of these three scenes and clearly reveal that the presence of order and visual stimulus tends to explain a greater preference while the existence of disorder and lack of clear visual stimulus tends to explain a lesser preference for the appearance of the scene, mainly for those with college education.

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Synthesizing, the relationship between different levels and types of educational background and aesthetic evaluations and preferences of scenes with buildings with different levels of order and visual stimulus (set 3; Figure 3) shows that:

- only the aesthetic evaluations of streetscape scene with buildings characterizing disorderly street interfaces (C3) have been affected, which was better evaluated by those without a college degree (negatively) and worst evaluated by the architects (very negatively).
- the scene with buildings with order and visual stimulus (B4) was the best rated by any of the three groups.
- the scene with buildings characterizing disorderly street interfaces (C3) was the worst rated by any of these three groups.
- preferences for the appearance of streetscapes have not been affected.
- the scene with buildings with order and visual stimulus (B3) clearly is the most preferred by those with college education, mainly due to similarity between the shapes of buildings, building heights and between the colours of buildings, and presence of clear visual stimulus.
- the scene with buildings characterizing disorderly street interfaces (C3) is the least preferred by those with college education, basically due to difference between the shapes of buildings, building heights, and between the colours of buildings, and absence of clear visual stimulus.

4. CONCLUSION

Results evidence the importance of building's height in affecting the aesthetics of streetscapes, particularly for those with college education, as evidenced by the best aesthetic responses for the streetscape scene with lower buildings (5 and 6 floors) and the worst for scene with taller buildings (18 floors), mainly due to differences in sky visibility, corroborating results from other studies [9]. Hence, these evidences do not corroborate the continuous proliferation of tall or very tall buildings in different urban areas in many cities around the world.

This paper also adds to the existing knowledge by reinforcing the fact that aesthetics of streetscapes is clearly influenced by distinct levels of order and visual stimulus. Contrary to the reality in many streets of different cities, the results of this research highlight the relevance of a streetscape characterized by the existence of order (similarity between buildings' heights, colours and forms) and clear visual stimulus for satisfactory aesthetic experiences, regardless of level and type of educational background of city users, corroborating results of previous studies [8].

On the other hand, this study add to the existing knowledge by emphasizing that streetscapes characterized by disorder (differences between buildings' heights, shapes and colours) tend provoke unsatisfactory aesthetic experiences, mainly by those with college education. These results are in line with those from other studies [8], reinforcing the fact that aesthetic quality is lost or drastically reduced when the streetscape is characterized by disorder.

Moreover, the results of this research also reinforce the fact, shown in previous studies about aesthetic evaluations and preferences [18; 19], that a formal education in architecture and urban design, which includes aesthetics, tends to generates stricter aesthetic evaluation criteria while the opposite tends to occur with lack of formal education, and so, what is well evaluated by the former would also tend to be so by the latter. The education in architecture and urban design may also explain the fact that architects, unlike those without such training, best evaluated the streetscapes with buildings on the block perimeter with doors and windows facing the street than the streetscapes with buildings inside city blocks with no direct relationship with the street. These evaluations by architects are in tune with the importance of the relationship between the ground floor and the street, as already emphasized [10; 11; 13]. This relationship tends to generate more pleasant urban experiences than buildings without a direct relationship with the street, as normally happens in modernist site layouts. In addition, the fact the streetscapes with buildings on the block perimeter present a more ordered set of buildings than the streetscapes with buildings inside city blocks helps to explain why the first scenes were better

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evaluated by architects, corroborating findings from other studies [8] about a greater appreciation of the idea of order by architects and a greater appreciation of visual stimulus by non-architects.

Yet, the fact that those with no college education tend to be less severe in aesthetic evaluations and presented some inconsistency in their responses, in addition to be characterized by small samples in several studies on urban aesthetics, at least in Brazil [18], including this one, and the fact that no striking and constant differences between the aesthetic responses by those with no college education and those with college education were found, suggest that new research on the subject might include only this last group.

Concluding, these research findings, based on people's perception, contribute to deepen the understanding of streetscapes aesthetics, specifically, by emphasizing the relevance of lower buildings, on the front limit of the lot or very close, and with order and visual stimulus. It is also emphasized the relevance of such findings being considered in the undergraduate and postgraduate courses in architecture and urbanism, in the practice of professionals in the field and in urban legislation, having in mind that the urban aesthetics is an important aspect of urban experience and so, of a city formal characteristics.

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Modernist site layout: An analysis of uses in open spaces

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Abstract

The purpose of this paper is to analyze, based on literature review, the uses of open spaces in housing estates with modernist site layout and the uses in the adjacent public open spaces. There are assertions in favour of modernist site layout, without evidence based on user attitudes and behaviour being presented. On the other hand, research results have shown that the uses in the open spaces of many housing estates with modernist site layout, as well as in the adjacent public open spaces, are not satisfactory for their users. However, these site layouts have been adopted even in the most recent housing estates designs in Brazil. Therefore, it is necessary to deepen the understanding about the implications of adopting modernist site layouts in such designs. This analysis highlights the inadequacy of uses in the open spaces in many housing estates with modernist site layouts, as well as in adjacent public open spaces, and reinforces the importance of considering research results in housing design.

Keywords: *modernist site layout; uses of open spaces; public open spaces; housing estates.*

1. INTRODUCTION

As mentioned in the Athens Charter (formulated in 1933 at the 4th CIAM - International Congresses of Modern Architecture) "... the house will never again be fused to the street by a sidewalk. It will rise in its own surroundings, in which it will enjoy sunshine, clear air, and silence." [1: 57], making clear the modernist idea of disconnecting the buildings from the streets. Years later, after the World War II, the "Unité d'Habitation" by Le Corbusier, built in Marseilles between 1947 and 1952 (Figure 1), incorporated the modernist ideas on a large scale, namely, a horizontal block 140 meters long, 56 meters high, and 19 floors (including the terrace), disconnected from the adjacent street due to setback, misalignment, and the empty space generated by the pilotis [2, 3]. Hence, the "Unité d'Habitation" clearly broke with traditional urbanism, generally characterized by buildings on the perimeter of the block, and became a reference for subsequent social housing projects in different countries [4].

Even so, the strong influence of modernist ideas was already present in Brazil, as revealed by the design of Várzea do Carmo Housing Estate (1938; Figure 4) by Atílio Correa Lima, built in São Paulo in 1942 [5], and the Prefeito Mendes de Moraes Housing Estate (1947), known as Pedregulho, by Affonso Eduardo Reidy, completed in 1952 in Rio de Janeiro [6]. Although these ideas have generated positive mentions in Brazil, for example, in relation to large open spaces [7, 8], the accessibility and collective use of open spaces in housing estates with modernist site layout [6, 9, 10], no evidence is presented for these mentions. On the other hand, results of research carried out in different housing estates [22; 25; 30] have shown the existence of problems related to the use of open spaces in the housing estates as well as in the adjacent public open spaces, such as the disregard of the visual and physical connections between the blocks and the streets as well as the definitions of use and access control to open spaces in the housing estates. In some cases, these problems provoked demolition, as happened with several blocks of the Puitt-Igoe Housing Estate, referred to by Charles

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Jencks as such: 'Modern Architecture died in St. Louis, Missouri, United States, on July 15, 1972' [11: 9].



Figure 1. “Unité d’Habitation” by Le Corbusier, Marseilles (Google Earth, 2014; Fabiano Scherer, 2000)

Yet, in many cities in Brazil, the practice of architecture and urban design, including recent projects of housing estates [12], continues to incorporate modernist ideas, as a likely reflection of the teaching in architecture and urban planning courses. Nonetheless, this tends to happen in many countries, as reflected in this interview with Nikos Salingaros [13: 161]:

- “Almantas Samalavičius (A. S.): The urban trends of the second half of the last century were strongly affected by the Athens Charter of 1933 drafted by Le Corbusier and his ideological allies ... the mentality of several generations of urban planners, designers and architects worldwide, and especially in Eastern Europe, remains somewhat under the spell of Corbusian doctrines that are not so easy to abandon. Do you see any shifts in the ideological background of present urban theories and urban practices?”

- “Nikos Salingaros (N. S.): I’m afraid that I see no hope for improvement as long as the present ideological/pseudo-religious system retains its hegemony of power and controls both city planning and architectural academia. Because Corbusianism is a religious movement, much like other fanatical cults, it will not change just because it is unreasonable... We have overwhelming evidence revealing the type of living urban structure that is responsible for a higher quality of life, and it is the opposite of the Corbusian model... Schools continue to teach the same modernist city destroying typologies to their students...”

Furthermore, respecting the urban legislation, many modernist site layouts in several Brazilian cities are walled and/or have apartment blocks with blind walls facing the street [14], as in the case of São Paulo [15] where the front walls in residential buildings can reach 4 meters in height.

Thus, the disregard of existing knowledge about the negative effects, for example, of lack of definition of use and access control to open spaces in housing estates, as well as physical and visual barriers to the uses of public open spaces, is evident. Therefore, there is a need to deepen the analysis of such problems in order to highlight and make known their relevance, mainly for architecture and urban design students and professionals and for those involved with urban legislation and housing policies. Furthermore, the need for this examination is reinforced by the fact that the extensive review carried out of the relevant literature on the topic does not include any specific publication on the use of open spaces adjacent to and in housing estates with modernist site layout. Hence, the objective of this paper is to analyze, based on literature review, the uses in open spaces in housing estates with

modernist site layout and in adjacent public open spaces, and highlight the importance of this information for housing design and for the quality of public open spaces.

2. USE IN THE OPEN SPACES OF HOUSING ESTATES WITH MODERNIST SITE LAYOUT.

Some authors mention that open spaces in housing estates with modernist site layout in Brazil are true squares [7] and that they allow the installation of communal facilities [7, 16], enabling different uses [6, 17], and stimulating social interaction among residents [8, 9, 10, 16]. However, these mentions are not accompanied by evidence based on user behaviours and attitudes and are in tune with the use of open spaces in many housing estates with modernist site layout. For example, the partial demolition of the Pruitt-Igoe Housing Estate, 20 years after its occupation in the mid-1950s, due to the existence of a series of problems with different causes, including those enhanced by the modernist site layout of 33 horizontal blocks with 11 floors, totalling 2,870 apartments, spread over a large open area of 23 hectares without access control. Its open spaces do not seem to have been characterized as true squares with communal facilities and diverse uses that would have stimulated social interaction among residents [18, 19], with a clear majority of former residents speaking negatively about open spaces during the 1960s [19].

Additionally, the statement that increase in height of buildings in modernist site layout allows the creation of larger semi-public open spaces with varied uses, including the semi-public use of pilotis [8] is not supported by research results and ignores the fact that such increase in height can occur even with buildings along the front limits of the block (with residential, commercial and service use on the ground floors) and that semi-public and/or semi-private open spaces can exist inside the block, as in the Karl-Marx-Hof housing estate, designed by Karl Ehn and built in Vienna between 1926 and 1930 (Figure 2).



Figure 2. Karl-Marx-Hof housing estate by Karl Ehn, Viena (Author, 2004)

Furthermore, in her master's dissertation, Antocheviz [20] highlights the possibility of having buildings with 10 floors on the block perimeter, maintaining the same number of apartments and built areas as an existing modernist site layout with five 18-story towers inside a block in Porto Alegre, Rio Grande do Sul, Brazil, in addition to revealing the preference of research participants for living in buildings on the block perimeter.

Site layouts with loose and isolated buildings on the block, with no direct connection between the facades and the street [6, 10], the possibility of having setbacks with gardens [17] and buildings surrounded by extensive open grassy spaces have also been mentioned as positive [21]. However, research, such as those carried out in the metropolitan region of Porto Alegre and in Santa Maria, in

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Rio Grande do Sul, Brazil [22, 23], reveal that many housing estates with modernist site layout lack garden/lawn spaces and communal facilities and/or facilities that are not vandalized.

In turn, unlike traditional apartment block site layout, in which buildings tend to have a front and back relationship with public roads, enabling the existence of front and back open areas [24, 25], in modernist site layout this relationship is eliminated and, consequently, the elimination of open spaces for uses that require a higher level of privacy, such as domestic activities, repairs, cultivation of vegetable gardens, the importance of which had already been highlighted [26].

Studies have also shown that open spaces in housing estates with modernist site layout tend to lack access control, a clear definition of use, an evident relationship with the buildings and to be perceived as residual spaces by residents [22, 27], who do not feel responsible for maintaining these spaces [28, 29]. Although, generally, these open spaces can be understood as for community, collective or semi-private use (for use by the estate's residents) in the original projects, studies tend to reveal that the spatial characteristics of modernist site layout make communal uses difficult and facilitate illegal occupations for private uses [27, 30, 31], with the consequent reduction in the amount of open spaces. Specifically, in the study carried out in the five housing complexes in the metropolitan region of Porto Alegre (for example, Sapucaia Housing Estate, Figure 3), communal open spaces, originally intended for semi-private use such as leisure, recreation, parking and circulation, but without clear definitions of use and spatial hierarchy and without access control, were occupied by irregular (illegal) constructions for uses such as garages, barbecue areas, deposits, commerce, services and new housing [30]. These irregular occupations generated significant increases in the constructed ground floor areas (or occupancy rates) of the estates, ranging from a 36.9% (439.7 m²) increase in Angico to a 131.7% (8919.7 m²) increase in Guajuviras, eliminating spaces intended for communal use, reducing the possibilities for social interaction among residents and recreation for younger children in suitable areas close to flats [30].



Figure 3. Sapucaia Housing Estate, Sapucaia/ RS (Author, 2000)

However, the spatial characteristics of modernist site layout that facilitate illegal occupations and alterations are generally ignored, as well as the fact that these tend to indicate that residents' needs were not met. It has not been uncommon to find manifestations in favour of modernist site layout (and the visions of modernist architects) in providing open spaces considered suitable for their users, without presenting evidence for such manifestations, as can be exemplified in the following texts relating to the Housing Estate Várzea do Carmo (Figure 4): "The analysis of the IAP project demonstrated that the success of such projects was directly related to the quality of public spaces..." [5: 13]; "This is a project marked by... rationality of site layout and, on the other hand, richness in public spaces. Unfortunately, only the four-story blocks were built." [7: 184]. Furthermore, existing problems in this housing estate were attributed to changes caused by residents and not to the original characteristics of its site layout.

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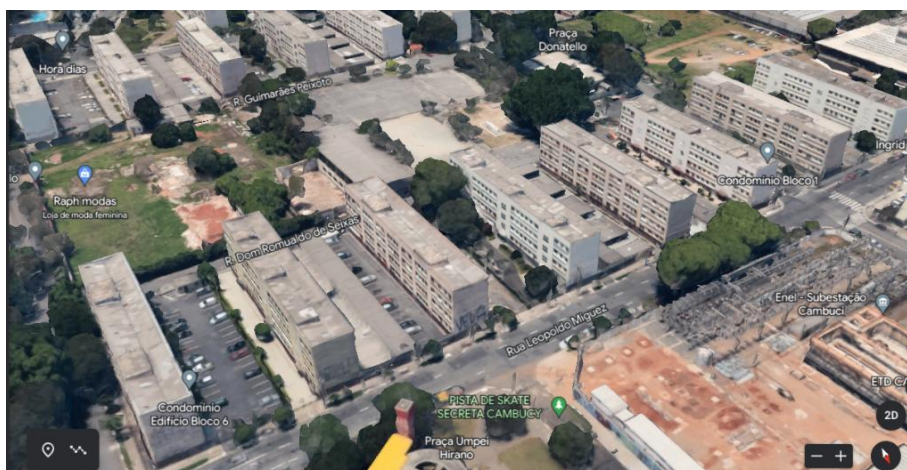


Figure 4. Housing Estate Várzea do Carmo (Google Earth, 2023)

The importance of site layouts providing open spaces suitable for use by residents is also evidenced by the existence of a relationship between these uses and the type of relationship between residents, there being better relationships between those who use communal open spaces. The inadequacy and/or insufficiency of spaces intended for socializing and recreation in modernist site layout, as exemplified by the existence of illegal constructions, tends to reduce social interaction between residents [30, 31] and provoke conflicts, for example, due to excessive noise, lack of privacy or material damage in places unsuitable for use [23, 31]. In turn, the fact that accesses to apartment blocks are generally far from public roads tends to cause spatial orientation problems and, therefore, make access to the blocks difficult, which is normally aggravated by illegal occupations of open spaces of the estates and the consequent proliferation of physical and visual barriers, and reduced legibility of the access paths to the blocks, as evidenced in a study carried out with four housing estates with apartment blocks in the metropolitan region of Porto Alegre [32].

3. USE IN PUBLIC OPEN SPACES ADJACENT TO HOUSING ESTATES WITH MODERNIST SITE LAYOUT.

Although generally disregarded in housing estates with modernist site layout, the importance of visual and physical connections for the intensity and type of street use has been highlighted [24]. The blocks with doors and windows facing the street, in predominantly residential buildings with apartments or shops and services on the ground floor, are the most used by residents and vacationers during the day in the coastal city of Capão da Canoa, Rio Grande do Sul, Brazil [33]. Positive correlations were found between the density of doors and windows (also on the upper floors) on streets in Rio de Janeiro and the amount of moving and stationary pedestrians, as well as between this density and the existence of buildings in continuous strip (or ribbon) and commerce and services [34], characteristics of architecture and urban design that tend to be present in traditional urban fabrics [35] and absent in modernist site layouts.

The fact that apartment blocks in housing estates with modernist site layout are normally physically and visually disconnected from adjacent public open spaces [25, 36] tends to reduce the uses in these spaces [37]. Many condominiums with apartment buildings (or houses) arranged in the interior of a city block are also walled, which tends to further reduce the intensity and types of uses on adjacent streets, basically limited to the passage of people, as per evidenced in a study carried out with two walled condominiums in Porto Alegre [38]. In this study, the behavioural maps reveal that the streets most used by adults and children (circulation, socialization/leisure and work activities) are those with greater physical and visual permeability, while the least used street is the one that does not have any physical and visual connection.

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Considering the behavioural observations carried out in 15 blocks in Porto Alegre, characterized by the predominance of traditional buildings or walls of gated condominiums on both sides and by combinations of these interfaces with the existence of a square on one side of the block, the three blocks with gated condominium walls on both sides are those with the lowest rates of daytime use (six days a week and two weekends), rates that are very low and significantly lower than those in blocks with traditional buildings (with doors and windows facing the street) on one side of the block and the square on the other [39]. The importance of visual and physical connections for the uses of public open spaces is also corroborated in this research by the increases in daytime uses in these blocks as the rates of visual and physical connection increase [39].

Negative correlations were also found between the existence of walls and the presence of people on streets in Rio de Janeiro, both in movement and in stationary activities [34]. Furthermore, public open spaces, when adjacent to buildings with garage doors and/or blind walls, tend to have their uses reduced, as evidenced by the decrease in pedestrian movement rates in blocks with a predominance of residential buildings with these characteristics in Capão da Canoa [33].

The uses on the ground floor of buildings, added to the visual and physical permeability, can also affect the uses in adjacent public open spaces, and enhance the presence of people and the rapprochement between residents and users of the surrounding area, and thus, favour social interaction and urban vitality [40, 41]. In a study carried out in Porto Alegre, positive correlations were found between the quantities of commercial and service uses on the ground floor of buildings and the quantities of moving and stationary daytime and nighttime activities on the blocks, with the block having the highest number of optional stationary activities being the one with the greatest diversity of commercial use and services (such as restaurants, bars, cafes, stores and small markets) [42]. Likewise, positive correlations were revealed between the existence of buildings with shops or services on the ground floor and pedestrian movement on streets in Rio de Janeiro [34]. The city blocks with a predominance of these uses on the ground floor also have the highest rates of pedestrian movement during the morning, afternoon and night in Capão da Canoa [33].

Modernist site layout, in addition to making it difficult and/or preventing such uses on the ground floor, reduce or make it impossible for the ground floor interfaces to have storefronts that act as pedestrian attractors and for their uses to extend to the sidewalks, such as tables in restaurants, bars and cafes [36, 43]. The lack of commercial activities and services on the ground floors can be exemplified in the Killingworth Housing Estate, where the apartment blocks are far from the streets (Figure 5), as well as in the Pruitt-Igoe Housing Estate, where pilotis and significant distances of blocks from public roads predominate. Moreover, Gehl [36] already highlighted the positive effect of the continuity of ground floors in Vancouver, Canada, on urban dynamics. Corroborating this, in research carried out in Rio de Janeiro, positive correlations were found between the existence of continuous buildings and shops or services on the ground floor, and the movement of pedestrians, contrary to the negative correlations found for isolated buildings [34].

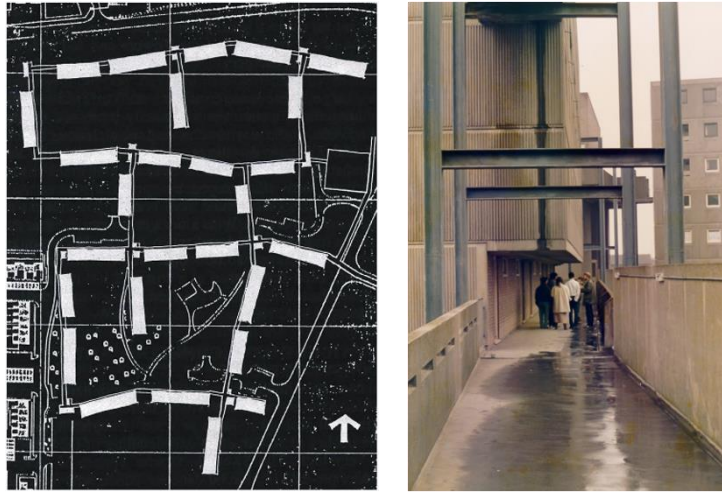


Figure 5. Killingworth Housing Estate (North Tyneside Borough Council, 1987; Author, 1987)

4. CONCLUSION

The reflection carried out fills an existing gap in the literature on the subject by synthesizing in a single paper, based on evidence generated by research carried out in different cities and countries, problems heightened by modernist site layout related to uses in the open spaces of housing estates, as well as well as in adjacent public open spaces [30].

The lack of definition of use and control of access to community open spaces in the housing estates stands out, which allows the occupation of these spaces in several estates in Brazil by illegal constructions for private purposes, and the consequent reduction of open areas and worsening of problems related to their uses, including spatial orientation and social interaction in these spaces.

Problems related to uses in adjacent public open spaces tend to be related to the lack of relationship between these spaces and the apartment blocks (far apart, visually and physically disconnected, and without uses on the ground floor), reproducing the disregard/denial of the importance of street by the modern movement [44] and so, of urban design characteristics that enhance these problems, as already highlighted: “The drop in the presence of pedestrians and microeconomic activities appears consistently associated with architectures that present discontinuity of facades, distancing, wider lots and walls.” [34: 277-278].

The contribution of this paper is also in the presentation of evidence that contradicts favourable mentions of uses in the open spaces of housing estates with modernist site layout, as well as in adjacent public open spaces. In addition to emphasizing the importance of considering this evidence in housing projects, which has been largely disregarded, the analysis carried out brings clear support to the teaching and practice of architecture and urban design by reinforcing that the physical-spatial characteristics of modernist site layout tend to explain the problems of use in the open spaces of the estates and surrounding areas, contradicting the fact that these characteristics have often been valued, and that existing problems are due to the “... distorted modernist paradigm of housing estates.” [6: 248].

This paper also adds to existing knowledge by addressing aspects of social housing design based on research results that deal with the relationships between people and the built environment, since these results have been disregarded in many publications on the subject such as those in Brazil, as well as in many housing projects.

The evidence presented also allows us to propose and justify site layouts with buildings in a continuous strip on the perimeters of the city blocks, physically and visually permeable, with shops/services and/or housing on the ground floors, and with access control to semi-private residential areas, enhancing more suitable use of community and public open spaces, as well as generating job

and income opportunities for the residents themselves. In this in this regard, keeping the same built area and number of apartments, a site layout with continuous blocks with 10 floors on the perimeter of a city block was preferred for living by research participants [20] to the detriment of a modernist site layout with five towers with 18 floors inside the same city block in Porto Alegre. Additionally, site layouts with continuous buildings along the front limits of lots, with doors and windows facing public streets, have been adopted in contemporary urban design, such as in the Västra Hamnen Neighborhood, Malmo, Sweden [45], and in Vancouver, Canada [36].

In conclusion, this paper adds to existing knowledge by emphasizing the importance of considering research results, especially those related to users' attitudes and behaviours, for the design of housing that enhance appropriate uses in its open spaces and surroundings. These results also highlight the importance of the uses of urban spaces for the qualification of cities, considering the fact that people are attracted to spaces where there are people [46], and can contribute to the teaching and practice of architecture, urban design and planning, and to housing policies and urban legislation.

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Coexistence on the Mediterranean coastal territories: between protection and usability

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Abstract

The Mediterranean coast, seen as a multilayered porous boundary between land and sea, forms a fragile territory where different landscapes and ecosystems meet and interact: coastal areas of great ecological value neighbor with human settlements, archaeological sites, tourist facilities, agricultural fields, and production units. This coexistence is usually accompanied by conflicted relationships as the protection of an area collides with its usability. Both in marine and terrestrial contexts, intensive human appropriation of the territory becomes a threat to the local habitats. In parallel, climate change is accelerating the territorial transformations of this transitional area, further influencing its inhabitation patterns. Coasts are the areas most vulnerable to environmental impacts and most exposed to increasingly frequent and intense extreme events. While it seems opportune to reconcile environmental protection with the public interest, climate change relates to the need to protect natural areas of great ecological value or areas with cultural significance by introducing new urgent management forms. How do these new forms of coastal management reflect on the way we perceive the relationship between man and nature? What is changing in the definition and use of protected areas and their relation to their surroundings? Are the current conservation efforts corresponding to both the emerging societal and environmental needs?

Starting with these questions, this paper focuses on the Mediterranean coastal territories by exploring the notion of coexistence in two case studies: the Gaiola Underwater Park (IT) and the Axios River Delta (GR). Comparing the two case studies mentioned above, the contribution sheds light on the Mediterranean coast as a context characterized by contrasts and conflicting interests. The case of the Marine Protected Area of Gaiola in Naples specifically explores the intricate coexistence between environmental conservation and the public's actual enjoyment of the coastal resources, thereby exploring the theme of conflicts. More precisely, that of Gaiola is a tangled and delicate story of a marine protected area, of a particular form of management, of the many actors involved, but mainly of a community that feels increasingly excluded. In the case of Axios River Delta, the area is protected under three different protection protocols (Ramsar 1975, Natura 2000 & National Park), and yet it is a highly productive area, with rice culture and mussel aquaculture being the dominant production and of national importance. How do conservation and coexistence relate in these cases and where is their balance? By discussing these two case studies, the contribution reflects on the socio-ecological transition along the Mediterranean coasts. As fragile hybrids, the coasts host the collective interests associated with the public's access to and utilization of the coastal resources along with the ecological importance of marine and terrestrial ecosystems.

Keywords: *coast; ecology; conviviality; Mediterranean; public interest*

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1. INTRODUCTION

As we live in an era where the emergencies of the new climate regime [1] along the coastal territories are gradually intensified, the scarcity of resources and the conflicts over their exploitation are growing bigger in parallel to the loss of biodiversity and the appearance of more intense climate risks. Urban planning and design need to contribute by investigating the new territorial ecologies of coexistence, sustainably and equitably. In particular, the Mediterranean - a sea between lands - is configured as a laboratory to deepen the challenges that characterize contemporaneity. Its coasts, similar to other coastal regions across the world, frame a common basin and are now considered vulnerability hotspots. The transitional zone between water and land, the coastal zone, is a vital interface [2] on the frontline of the climate battle. The importance of coastal adaptation to climate change is evident as “it is estimated that approximately one-third of the Mediterranean population is concentrated in its coastal regions, whereas more than half of the population resides in the coastal hydrological basins” [2].

The altering climatic conditions are putting the coastal areas in a more vulnerable frame and the coastal line is being compromised. Considering the “coastal areas as terminal parts – the extremities – of larger environmental regions” [3] is critical in envisioning their transitional character towards a sustainable future. “Evidence from other regions suggests that protection and restoration of coastal ecosystems is vital for building resilience in the face of climate change” [4]. The coasts, as porous land-sea interfaces, constitute spatial expressions of a land-sea gradient. These liminal places are fragile territories in which different ecosystems and urban systems meet and sometimes collide, and whose coexistence is often accompanied by conflicting relationships between the protection of a specific coastal territory and its usability as productive land or as a common public good. Instead of considering coastal protection as a static condition (a state which according to its mutable character cannot exist), it can be considered as an opportunity to adapt to its inherent dynamism.

Under this view, this contribution is structured as follows. After the introduction, it describes the overall framework within which the coast theme is placed, about its transition between the land and the sea condition that recalls the themes of broad-spectrum conviviality and coexistence. Secondly, the article delves into the coastal territories around Naples and Thessaloniki, describing the cases of the Gaiola Underwater Park and the Axios River Delta respectively. The cases, investigated with different methodologies (the first with direct and participant observation, the second with fieldwork and mapping), explore the notion of conviviality along the Mediterranean coasts, highlighting possible conflicts under the topic of coexistence. The main issues that have emerged will then be discussed, proposing a view that opens up new perspectives in response to the socio-spatial injustice and the protection of coastal ecosystems. Finally, the concluding reflections of the work will be discussed, emphasizing the need to adopt a multilayered approach in equilibrium with the various forms of life.

2. COEXISTENCE IN TRANSITION

Within the field of urban planning, the theme of socio-ecological transition has taken on an ever-increasing role over the years. If the transition is a process of mutation of a territorial system from point A (in a crisis situation) to point B (towards a new equilibrium), it seems more appropriate than ever to reflect on the spatial repercussions of this process [5]. Pellizzoni [6] underlines how the ecological transition, understood as a response to the environmental crises that cities face, calls for a radical mutation beyond socioeconomic configurations or mere modernization processes. It is rather a change in life models, cultural references, and ways of land use but, above all, a fair distribution of the costs that this process implies on the different social groups, the territories involved and the relationship of human-not human conviviality. Recently, scientists such as urbanists, sociologists, and biologists, who start from different points of view, have expanded their field of study by looking into the spatial relationships between different species and their environments. From the architect's

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and urbanist's point of view, how is a multispecies coexistence conceived, and what type of public spaces it produces? Further and most importantly, how are the conflicting relationships and bordering conditions formed into boundaries of different landscapes and habitats in the design process? Within the discussion on coastal inhabitation and coexistence in the Mediterranean territories, tourism is an important aspect to consider, as it has been among the strongest drivers of change through time. Coastal tourism in the Mediterranean is complex because of the diverse range of sizes and types of tourist facilities and developments, as well as its significance as an economic sector. Even though it is a topic on its own, the time and intensity of human touristic activity along the coast seem to have a notable impact on the spatial relations of different landscapes and the balance of different species living together. The effects are mostly negative, but are they reversible? Which other parameters exist when thinking about coexistence?

The protection of the multilayered coastal system, under the pressure of a changing climate, relates more to the effort of inventing and establishing new balances, rather than imposing measures to maintain the existing balance. Unexpected extreme events, increasingly intense and frequent, are threats that create hostile conditions for all inhabitants, altering the balance of the coastal ecosystem. Seeing them as actors who participate in the establishment of new balances on the dynamic land-sea border is adding another perspective to the design process. According to Morf, «it is widely acknowledged that effective problem solving across the land-sea boundary, and the sustainable management of coastal and marine social-ecological systems, requires terrestrial and marine spatial planning to be linked» [7]. Ingold (p. 173) argues that «...what is needed is a completely new way of thinking about organisms and about their relations with their environments; in short, a new ecology» [8]. Spatial planning and design play a crucial role in this process and «it is important to highlight that most of the literature shows that no universal solution exists, and that robust planning and implementation is a prerequisite for any successful intervention» [9] (p. 562). Hence, the essential reimagining of how people live along the coast is crucial and is intertwined with the conversation about humans' connection to the natural world and to the territorial palimpsest [10] of signs and traces that over time accumulate on it. What is the added value that a multilayered approach provides for the modern reinterpretation of inhabiting the coast?

3. THE GAIOLA: A MARINE PROTECTED AREA, FROM WHOM?

On 7 August 2002, the Marine Protected Area of the Gaiola Underwater Park (Area Marina Protetta del Parco Sommerso della Gaiola) was established, a vast territory of approximately 42 hectares which extends from the Borgo Marechiaro to the Bay of Trentaremi, west coast of Naples. The Park is divided into two parts (fig. 1): a complete reserve (zone A) and a general one (zone B)¹. For each of the two areas, the decree provides for some restrictive limitations to safeguard the characteristics of the marine environment and submerged archaeological finds.

In 2005, the memorandum of understanding was signed between the CSI (Interdisciplinary Study Centre) Gaiola onlus association and the managing authority of the A.M.P.² for the study and enhancement of the coastal heritage of the Underwater Park, in collaboration with university and research centers. In 2010, the Center for Research and Dissemination of the Gaiola MPA was opened for studying naturalistic-archaeological resources, hosting numerous operational, educational, and research activities. In 2019, the management of the Gaiola submerged park was entrusted, by private negotiation, to the CSI association Gaiola Onlus for nine years.

¹ In zone A, bathing, scuba diving, mooring, fishing and navigation (except rescue vessels, those with a draft of less than 2.50 meters or those authorized by the managing body) are prohibited. In zone B, however, bathing, diving and some types of navigation are permitted.

² The Special Superintendency for Archaeological and Environmental Heritage of Naples and Caserta.

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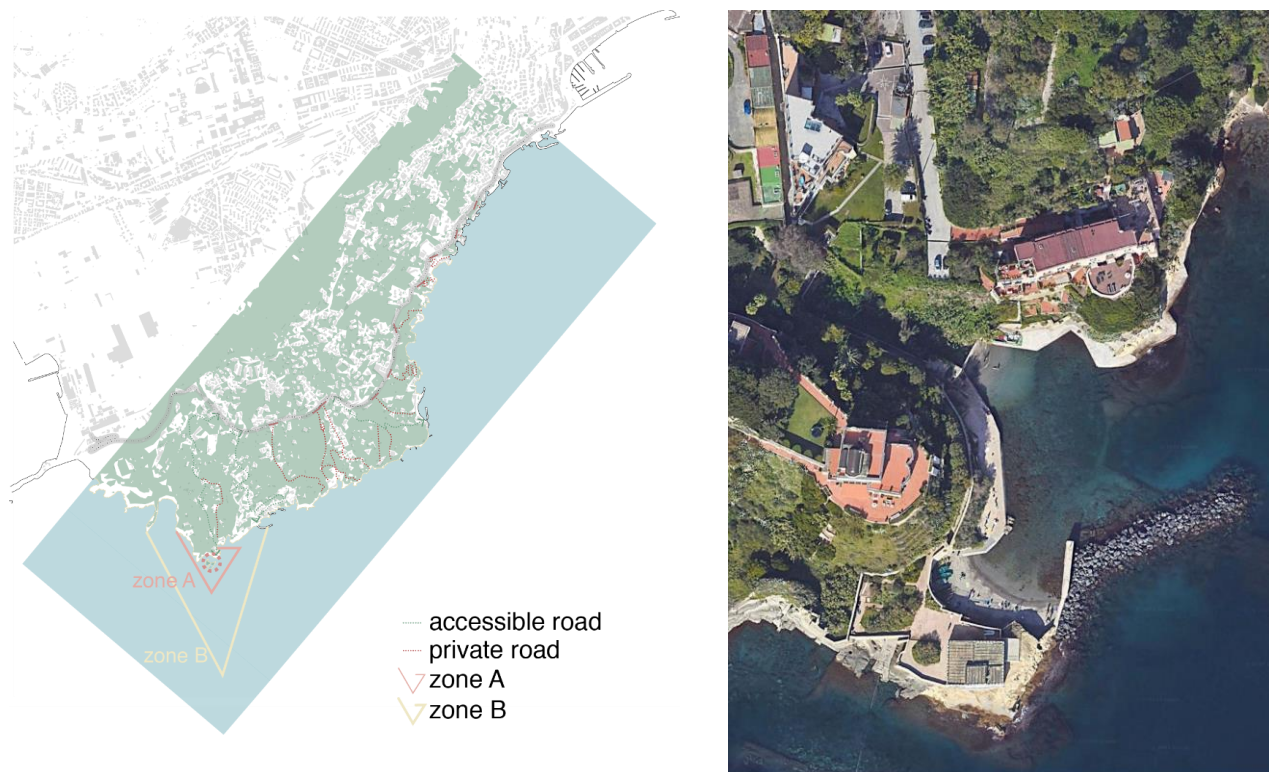


Figure 1. On the left, the highly inaccessible context in which the area is located and the two zones into which it is divided. Elaborated by K. Pica. On the right a satellite image from Google earth.

At a national level, the management of this protected marine area is unique [11]. These areas are usually managed by public institutions while, in the specific case of Gaiola, we are witnessing an assignment to a private entity without any competitive procedure or tender. The CSI aims to create a center for the dissemination of sustainable development through the promotion of research activities, training initiatives with schools and educational laboratories, carrying out control, beach cleaning and monitoring activities [12]. In addition it offers different types of guided tours. Through the work of the non-profit organization, the area has faced some problems that had characterized it for years, linked to exasperated overcrowding, wild parking, securing access to the sea, poaching and the accumulation of solid waste on beaches¹ [13].

In 2020, on the occasion of the opening of the Park following the closure imposed by the measures to contain the COVID-19 contagion, a technical safety protocol was developed, and an agreement stipulated, on an experimental basis, for the use of the Park and the public bathing area present in it. The agreement provides for contingent and differentiated access depending on the seasons and periods of the year². In 2021 the agreement was renewed, adapting it to conditions of ordinary use, considering being able to resolve “the atavistic problems of public safety, decorum, environmental impact and liveability of the area”. Furthermore, a two-year agreement was stipulated regarding zone B - located in an area that the Municipality considers “a free beach equipped in the City's bathing system” - to facilitate its usability. The direct assignment to the non-profit organization and the choice

¹ The area has been zero waste for some years and does not allow the introduction of disposable empties and objects.

² During high season, access takes place via online booking via the Park's institutional website, involving two shifts (morning/afternoon) of a maximum of 100 people each.

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to extend the quota measures even at the end of the pandemic and the management model have sparked a reaction from citizens, aimed at questioning various legislative violations (fig. 2).



Figure 2. “This marine protected area is a free stolen beach”. On 22 April 2023, activists of Mare Libero committee put up banners near the access to the Gaiola beach. “Free Gaiola” and “The Sea Does Not Reach Naples” are messages placed right at the point where two guards had the task of verifying the necessary reservation for those who wanted to reach the area. Photo by Mario Avoletto

In May 2023, has been renewed the institutional agreement (signed in June 2021), aimed at guaranteeing the eco-sustainable use of the public bathing area present in zone B of the park, whose beach, according to the Municipality, “constitutes a site of great importance for citizens, considering its bathing and amenities”. The renewal of the agreement, without any public tender or transparent process, prevented the activation of participatory mechanisms¹ and alternative management models from being presented by other subjects [14]. This affair led the Euplea collective, with the support of the Coordinamento Nazionale Mare Libero and the Mare Libero, Gratuito e Pulito Napoli Committee, to present an appeal to the Campania Regional Administrative Court. The appeal is aimed at the annulment of the Resolution² of the Port System Authority, with which the collaboration agreement for the public use of the area approved bathing facilities present in zone B.

From the study of the current legal regime in force in the Park, according to the proponents of the appeal, numerous critical issues emerge in the management model, deriving from the direct

¹ Concerning the theme of participation, the Park, unlike other marine protected areas, does not provide for the presence of the Reserve Commission, i.e. the body - indicated by national legislation - made up of environmentalist associations and some local entities, aimed at comparing and support in the management of the marine protected area. The commission has the task of expressing opinions and formulating proposals, rebalancing the interests at stake. This lack has made, and still makes, dialogue with citizens difficult.

² no. 125/2023 issued on 05/31/2023.

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assignment procedures, from a poor involvement of active citizens and from a system of protection of the environment still based on a static vision of nature. Specifically, about the attribution of the management of the Park to the CSI Gaiola, it was underlined how this choice was in contrast with the regulations, also of a Euro-community nature, which instead impose that the selection - even in the field of the third sector - takes place through procedures that allow all interested parties to propose themselves. However, as regards the issue of limiting access to Cala San Basilio, the appeal criticizes the choice to sacrifice citizens' rights by placing obstacles in the way of using the beach and the limited number used with online booking damages the public nature of the property.

The Gaiola is a context of contrasts characterized by the presence of a protected marine area, an important archaeological heritage and marine biological system, vulnerable geological and meteorological-marine conditions, human pressure, and an active citizenship that is mobile for the reappropriation of the asset. What causes a problem in the city-sea relationship seems to be the issue of accessibility (too much/too little), conviviality (man/nature) and coexistence (conservation/use). The accessibility of this area makes coexistence between different interests, and between human and non-human, very difficult: if its limitation is linked to the need to protect and preserve it, it is perceived as an impediment to public enjoyment of the sea. So who should Gaiola be protected from? From the citizens who, by claiming their right of access to the sea and the beach, risk "impoverishing its peculiarities"; or from the CSI Gaiola onlus that, by using certain management methods on the marine protected area, is increasingly excluding citizens from a public space of collective importance? Is there an equilibrium and where does this line of balance lie?

4. AXIOS RIVER DELTA

The Cross chapter 4 of the IPCC 2022 assessment points out the Mediterranean region as "a hotspot for highly interconnected climate risks" [15], while the low-lying areas are identified as being the most vulnerable (p. 2235). Particularly susceptible to sea level rise are river deltas, which provide ideal habitat for a variety of species [16]. The delta of the Axios River is located in the north of Greece, adjacent to Thessaloniki, the second biggest urban agglomeration of the country. It is the biggest wetland in the country, with in total 4 main waterways forming the deltaic territory: Gallikos, Axios, Loudias, Aliakmon (from east to west). The greatest extent of the area lies in less than 2m above mean sea level, constituting a fluvially-dominated delta, in the inner Thermaikos Gulf [15]. Due to its location along one of Europe's primary bird migration routes, the area is well-known for its seasonal avifauna. The region's position and geomorphology make it a significant destination for bird nesting and resting, in addition to being home to significant populations of fish, mammals, and reptiles. This complex deltaic area is made up of many ecosystems, including riparian, agricultural, coastal, and inland, providing a home to a diverse and significant associated flora and fauna while «all these habitats and species are targets of the Europe-wide conservation efforts» [17]. In fact, the region is protected by multiple protocols; it is a National Park, a Ramsar Site 1975, and a component of the Natura 2000 network. The perimeters of the various protection regimes include vast areas with natural habitats, fields for agriculture, mussel aquaculture, and infrastructure. It is important to observe how these potentially incompatible land uses interact, particularly when enclosed by regulations to conserve habitat. How is the relationship developing between the coexistence of multiple species and what is the role of protection protocols?

Nevertheless, the current landscape, a significant wetland on many levels (national, European, global), is the result of several human appropriations. The image of the delta has been changing radically during the past century, mainly due to anthropogenic interventions such as drainage of the floodplains, sand quarrying, canalization, land reclamation, and construction of levees and weirs.



Figure 4. The Intermingle of agricultural fields, natural and man-made areas: this aerial image shows the Axios – Loudias – Aliakmonas Delta National Park (ALAD) in Greece, acquired by one of the Copernicus Sentinel-2 satellites on 31 August 2022. Source: <https://www.copernicus.eu/sk/node/12185> (accessed on 27/12/2023)



Figure 5. The appropriation of Axios Delta, Greece, is expressed as a fragile balance between human activities and the natural landscape. Photo by Eleni Samara © 2023

«Major changes took place in the twentieth century resulting in heavy losses of the original size and wilderness of this complex wetland area» [17]. As a result of the multiple land modifications, in the course of the 20th century, 70% of the original wetland was destroyed [18]. Even though a vast part of this «area has been reclaimed, drained by an extensive channel network» [16], it still holds an essential role as a biodiversity reservoir critically challenged by the overall human pressures. «The complex wetland system formed by the Axios, Aliakmon, Gallikos, and Loudias rivers, and their streams and irrigation channels, provides many services; prominent among these are water supply, rice, and mussel production» [17].

A variety of land uses and landscape characteristics compose the whole area. Perennial and intermittent marshes and swamps are covering the wetter parts, while intensive agriculture (mainly rice) is dominant on the majority of the fields. In parallel, the Axios complex delta has 12 different habitat types of Annex I of the EU Habitats Directive and multiple efforts have been made lately on «changing the way that people understand, value, and use the natural resources of the protected area» [17]. Besides human pressure, Sea Level Rise (SLR) and droughts are recognized as the main climate change related threats that will influence the hydrology of the area, its species and habitat types [17]. «Low-lying coastal urban centers, populated deltas, and coastal protected areas are key societal hotspots of coastal vulnerability in terms of relative sea level change» [18]. Poulos et al. in their study [16] declare that «in the event of a sea-level rise, significant parts of the deltaic coasts investigated will be inundated and the shoreline will retreat».

Coastal retreat is an inevitable effect of SLR in the area, as shown in the study of Elias et al. [18]. The examination of the relative SLR in 50 years in Chalastra for example (a village of an altitude of approximately 5m), revealed a max rate of 90cm and a min rate of 44cm. This rise results in a significant loss of land. «The substantial loss of deltaic land will also cause damage to the agricultural economy of the area, which may be worsened further by the process of salinization of the groundwater and, especially, of the phreatic horizon» [16]. Even though the future sea level projections include a level of uncertainty, they are important in creating local scenarios and dealing with minor or major alterations. Mediterranean delta ecosystems are undergoing substantial changes, requiring species to adapt, migrate, or face extinction due to the faster pace of the changes compared to adaptation. Changing climatic conditions are altering ecosystems and livelihoods, as they are transforming the productive territories. The rice production in the area equals about 80% of total rice production of Greece [19] while the mussel production reaches 80-90% of the domestic production. Both domains are highly influencing the neighboring ecosystems and will be influenced by climate change. A new productive landscape that embraces alternating crops will emerge as a need to the local societies. It remains a challenge for architects and urbanists to imagine the relation and coexistence between natural and productive areas within this frame of a transitional landscape.

5. CONCLUSION

Coastal inhabitation is seen as a fragile, multilayered inhabitation, where adopting the notion of conviviality is essential. To guarantee the long-term survival of coastal ecosystems, human activities should be in equilibrium with the needs of all coexisting species. Embracing coexistence in coastal inhabitation practices enhances the endeavor to preserve resilient ecosystems that can adjust to changing climatic conditions. Encouraging a balanced coexistence among these neighboring habitats means protecting these ecosystems and the ties that bind them. Benefits and turbulence occur simultaneously when multispecies landscapes come together and form [20] (p. 294). In this interaction, the practice of urbanism negotiates the relationships between the various components and has the advanced position to direct new systemic balances. In summary, by acknowledging and respecting the complex web of life in these settings, we can foster a sustainable coexistence of

different species and spaces. It necessitates that we consider ourselves to be “inhabitants not just of a human lifetime or generation, but also of deep time” (Macfarlane 2016)» [20] (p. 295).

The two cases bring into tension different declensions and aspects of coexistence. The case of Gaiola explores the intricate coexistence between environmental conservation and the public's actual enjoyment of the coastal resources, making clear the multitude of interests that can permeate around coastal territories, showing how sometimes, despite declaring the same goals, a meeting point seems far away. It also highlights how the current governance model creates difficulties in ensuring efficient management of marine protected areas, capable of reconciling the environmental protection needs with the public interests. From the case, it emerges that a regulatory realignment is necessary that is compared with environmental protection and safeguarding, with the objectives undertaken at European and international levels, as well as with the collective interests connected to the use of a public good. It would seem rather useful to strengthen participation, which in the case of Gaiola has been completely lacking, involving citizens in initiatives for the conservation of coastal resources, and promoting uses compatible with the need to protect areas at risk of impoverishment. In the case of Axios River Delta, the exploration of coexistence focuses on the relationship between the protection of the local habitats and productive landscape. The idea of nature protection has found certain expressions that enhance the man-nature dichotomies, while a new approach is necessary [21]. And this is where the notion of conviviality emerges as an alternative. The case study of Axios River Delta is an example of how conflicted uses overlap on a sensitive territory. The coexistence between the multiple ecologies of the area and the intense human activities is fragile and most of the times the regulatory protection boundaries are inadequate in bringing balance .

To enrich the efforts of safeguarding coastal ecosystems, spatial planning, and design at all scales must restore the relationship between humans and the natural world under a multilayered inhabitation strategy for the coastal landscape. The perception of nature in design and planning is transitioning along with the socio-ecological transition, giving new meanings to the notion of protection. This contribution presents itself as an opportunity for discussion on new ways of living together, through the recognition of bonds of interdependence between humans and non-humans, possible alliances, and renewed inhabitation proximity. From this perspective, the public accessibility of the protected landscape can act as a pillar for an innovative design scenario that respects or even enhances the coastal identity. The urban planning project in the socio-ecological transition will have to reconstruct conditions for living together in diversity, capable of reconciling the variety of forms of life and the need to share rules of coexistence.

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Redefining death: The new urban nature of burial grounds

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Abstract

Burial grounds are an integral part of every social formation and social ritual. They reflect the peculiarity of cities over time and narrate the evolution of society's attitudes towards death, since they in turn constitute 'cities' of limited size. Over the centuries from scattered burial grounds to modern organized cemeteries, burial grounds constitute vital urban cells of multiple properties. These are important free urban spaces, open to the public of the city that go beyond religious rituals and can be treated as monumental 'gaps' in which its past is inscribed. From the medieval spaces that were social and crowded spaces, a displacement of the cemeteries from the core of the city is established, with the result that they function as 'organized spaces' on its borders, leaving behind the monumental burials as 'urban fragments'. Therefore, the purpose of the paper is to explore philosophical and cultural views on death from the Middle Ages to the modern era and the influence they have had on the design of modern burial grounds. The paper will focus on the emergent urban dynamics of cemeteries, studying issues of urban integration and spatial composition in the context of a climate of gentrification and a lack of open public spaces. The above problem can be understood in the light of 'Landscape Urbanism'. According to 'Landscape Urbanism', the landscape is defined as the prism through which the modern city is interpreted and at the same time the mean through which it is shaped. It is essentially an attempt to decode the urban situation in landscape terms and manage it as an ecosystem, which is studied and planned on the basis of a spatio-temporal ecology. Through the contemporary production processes of the space, the vanguard of landscape architecture design expresses the view of a 'new urban nature' which can be identified in the modern burial grounds. In addition, both incineration and conventional burial have some adverse environmental effects, with the result that some cities are already implementing innovative design strategies aimed at urban resilience. Therefore, the re-personification of the spatial issue of death projects the future form of specific spaces through their change, shrinking and even disappearance. In general, innovative design approaches to burial sites are emerging through modern technology and architecture under the gaze of the continuous ecological needs of the space. Beyond the theoretical part, the presentation focuses on two personal design research projects that examine the above issues. The first project focuses on the ways in which the question of burial is reintegrated into the urban fabric and the daily life of the inhabitants, while the second on the process by which the dead body ceases to cause disgust and returns to the city in a 'new form', identifying public space with memory

Keywords: *burial sites, urban voids, death, integration, landscape*

1. Introduction

The nature of death is a fact of human existence and can regulate life itself and the behavior of man towards others, since it is not something that comes to an end but is always potentially present. Thus, life turns into a perpetual conflict with the 'hereafter'. Thinking and living the experience of death takes place through the loss of the other, which marks the foreshadowing of our own death. Death was never accepted without fear and awe, as it remained in human consciousness an undefined and inconceivable event. The dead body also contributes to this logic, occupying an intermediate position

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between 'here' and 'there', as it is considered vulnerable due to its perishability. Therefore, the purpose of the presentation is to investigate philosophical and cultural views on death, from the Middle Ages to the modern era. The issue of death is glossed over in the modern context, as it is inconsistent with current issues of happiness and image. In addition, the influence of the above considerations on the design of contemporary burial grounds and their looming urban dynamics through questions of urban integration and regional composition will be examined. Therefore, the re-personification of the spatial issue of death highlights the emerging urban dynamics of specific spaces through their change, shrinking and even disappearance. More generally, innovative design approaches to burial sites are emerging through modern technology and architecture under the gaze of the continuous ecological needs of the space.

2. Methodology

2.1 Death as a matter of theoretical thought

2.1.1 Death and mourning as the beginning of civilization

As Bronislaw Malinowski states, "*The question of death has been a central concern for various religious beliefs of human civilization. Both the places and the practices of the burial acquired a key and symbolic character, as they were the focus of urban formations and habitation until today*" (Walter, 1993:273). Historically, the cemetery is for most peoples the place to deposit the body, while burial traditions date back thousands of years and reflect social structures, habits and popular preferences. As Lewis Mumford records, "*The dead was the first to have a fixed abode, a place, where the living could often visit their ancestors*" (Mumford 1961). The above reference substantiates the claim that the first cities were the 'cities of the dead', i.e. that the core of every spatial organization was the Necropolis. Based on various archaeological findings, the burials within the urban environment and specifically within houses are able to support eventual considerations of the burial as centers of urban concentrations. "In primitive peoples there is no 'natural death', every death is social, public, collective, it is always the result of an opposing will that must be absorbed by the group, which takes place through celebrations and ceremonies related to mourning" (Makrynioti, 2008 :115). Thus one can talk about a symbolic and spatial continuity but also a gradual domestication of man with the issue of death with mourning and burial as the main mediator.

2.1.2 The tamed death

The studies of Phillipe Aries constitute the most important sources for the study of the attitude of Western civilization towards this specific issue. The specific studies cover a wide period of time from the Middle Ages to the modern era and aim to give meaning to human mortality. By reference to the study of Aries, one can identify critical stages in the meaning-making of human mortality. The first is described as the stage of 'tamed death' or otherwise 'common death' and is chronologically placed during the early Middle Ages. In this particular period, death is projected in the form of punishment to people. Through this terrifying image the church of the time sought to instill fear in order to manipulate the popular and middle class. The above raises the conclusion that in no other era is so much importance attached to the idea of death as an event before which all are equal, defying the unequal order of birth, wealth and power. In general, Medieval burial grounds were social and crowded places, where commerce and other activities flourished. Essentially, Medieval cemeteries were urban spaces that transcended religious ritual and included a multitude of commercial functions.

2.1.3 The romantic death

"At the beginning of the 16th century, a new model appeared, that of the 'beautiful' and 'ethicoplastic' death. This standard prevails until the 18th century and refers to a just and dignified death" (Aries, 1999:41). Therefore, the Medieval model where life is dominated by the agony of salvation at the last

moment succeeds the model of the 'beautiful' and 'romantic death', in which the coming of the end is surrounded by a new romantic view. Also, the burial grounds begin to consist of a multitude of representative monuments and acquire an autonomous and supervisory position within the city after a long period of discreet coexistence with the society of the living. In the same period of time, in European cities such as France and Italy mainly, the trend of visitable 'garden cemeteries' emerged, which are characterized as essential spaces for the city's monumental stock.

2.1.4 The beginning of concealment

At the end of the 18th century, a period that coincides with the end of the 'beautiful' and 'romantic death', an important change takes place which is a turning point in Western thought and in the urban culture of Europe. The spread of anatomy reached its peak during the 19th century and was not only due to scientific purposes but also to the effort to investigate things that were not clearly defined until then. Regarding burial grounds in the 19th century, the cemetery is considered a place of philosophical contemplation as it indicates that death is not a catastrophic event, but part of a perpetual cycle of reproduction. This results in it being directly connected to nature, while at the same time attempting to give a sense of historical continuity. The cemetery is not only a memorial site, as in the 18th century, but becomes an organized place of visitation and pilgrimage and therefore an element of preserving the city.

2.1.5 Forbidden - clinicalized death and the modern condition

From the Middle Ages to the middle of the 19th century, perceptions of death show slow but steady changes. However, in the period of industrialized Europe of the 20th century, a new perception towards the issue of death is recognized, that of the 'invisible' or 'forbidden'. "Moving into the 20th century, rapid advances in personal comforts, personal hygiene and the idea of antisepsis made people more sensitive and therefore contact with the dead body more abhorrent. This results in people banishing death from everyday life and focusing on a new uncontaminated world in which hygiene, medicine and morality are based" (Aries, 1999:411). So the banishment of death from everyday life, in which the uncontaminated world of hygiene and medicine is based, brings to the surface a new 'macabre', the 'macabre' of science. This development takes place in the early 1960s. Affluent societies marginalize death and, at the same time, promote a model of life without suffering. Furthermore, they favor the spread of an extreme cult of physical health, forgetting that it is something precarious, fragile and not permanent. Illness is presented as an exception, a misfortune, a derivative of non-observance of hygiene rules, but never as inherent to human fragility. In modern Western societies, the question of death is revived and returns to the public discourse through the politicization of biological life. Power takes the form of social and political intervention against the body of the population, there is a generalized tendency to naturalize the conditions of death, which now takes the form of state violence through visible and invisible death practices. At the same time, the burial grounds lose their dynamics and are trapped in the continuous and unstoppable construction of the cities. They thus turn into 'terrain vagues' within the urban fabric since they cannot defend themselves against the nature that has now been tamed by technical progress.

2.1.6 Forbidden - clinicalized death and the modern condition

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in which the uncontaminated world of hygiene and medicine is based, brings to the surface a new 'macabre', the 'macabre' of science. This development takes place in the early 1960s. Affluent societies marginalize death and, at the same time, promote a model of life without suffering. Furthermore, they favor the spread of an extreme cult of physical health, forgetting that it is something precarious, fragile and not permanent. Illness is presented as an exception, a misfortune, a derivative of non-observance of hygiene rules, but never as inherent to human fragility. In modern Western societies, the question of death is revived and returns to the public discourse through the politicization of biological life. Power takes the form of social and political intervention against the body of the population, there is a generalized tendency to naturalize the conditions of death, which now takes the form of state violence through visible and invisible death practices. At the same time, the burial grounds lose their dynamics and are trapped in the continuous and unstoppable construction of the cities. They thus turn into 'terrain vagues' within the urban fabric since they cannot defend themselves against the nature that has now been tamed by technical progress.

2.2 Contemporary cemeteries as multidimensional urban spaces

Cemeteries function as spaces of coexistence of the real and the imaginary. In addition to their functional dimension, as spaces suitable for disposing of the dead, they are also public spaces where the bereaved come face to face with their loss. Therefore, in this proposal, an attempt is made to investigate the design of burial grounds as a special category of urban space. In particular, the presentation focuses on the spatial evolution of the topography of burial sites as urban monumental complexes and their emergence as points of reference in the fabric of the city and their relationship with the environment. Death is always marked and covered under the veil of architecture, whether it is a simple stone slab in the ground, or an organized burial ground. Based on the above position, the modern urban dynamic of the burial grounds is highlighted through the growing needs of the space. The mutations recorded in burial sites over time, from the late Middle Ages to modern times, are mainly based on historical, social and cultural spatial changes. An important contribution to the investigation of the spatial evolution of the topography of cemeteries is Maria Koumarianou's study on the Fantasy of Death. The above study records the spatial dependencies and mutations of the cemeteries in relation to the urban fabric of the city. The above mutations go hand in hand with historical changes in the question of response to death, as mentioned above based on the work of Phillipe Aries. It is a sequence of spatial determinations of the cemetery in relation to the urban environment. Four phases of change are briefly recorded, namely the 'closure' of the burial grounds in the urban environment, their 'visual isolation' from the city, their subsequent 'displacement' to the outskirts of the cities and finally their 'disguise'.

As has been recorded, during the Middle Ages the burial ground was an open public space, a reference point for the city, without defined boundaries within the urban fabric. This is how the first phase of 'closure' and the coexistence of the cemetery area with the city of the living can be distinguished. However, from the end of the 19th century, a morphological and not so topographical change took place, through the construction of walls, which led to their 'visual isolation'. The cemetery space maintains its central position, but is visually isolated from the space of the living, that is, from the space that surrounds it. The above practice of 'visual isolation' is directly linked to the period of 'personification' and ultimately 'romantic beautification' of death. This significant change in perceptions of the human response to death resulted in cemeteries gradually being displaced from the inner city. The intense building development of cities led to the incorporation of historical cemeteries into the urban fabric as 'urban fragments of memory', while in a second phase it displaced them outside their boundaries, thus turning them into ambiguous places. The gradual 'isolation' of burial sites on the outskirts of cities leads to their 'disguising', in the sense that the cemetery loses its specific spatial qualities and turns into either green spaces or undefined spatial units, a kind of 'topographical implication' in general space without a necessary urban function. The above practice raised issues

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concerning the museological management of historical cemeteries, where they are places of memory and remain visible in the spatial reserve of the city without traces of particular disguise. In contrast, many of the cemeteries on the outskirts of cities function as unorganized 'urban voids'. The specific burial grounds do not have a clear function due to their location, i.e. they are places without specific meaning. Despite their ostracized position in the urban fabric due to the ecstasy of the city, they have a special spatial and symbolic value as they gather elements and qualities of 'transition'. For example, "Ignasi de Sola-Morales speaks of 'terrains vagues' referring to the empty places in the urban space that lack both meaning and use. The fact that they have been 'frozen' at some point in their history, automatically makes them places that are waiting to 'wake up' in order to narrate what they have lived through.

They are areas that are not used or have been abandoned for a long time, but whose deterioration and marginalization are so evident that they are classified as residual places" (Doron, 2008:204,205). More generally, the evolution of the topography of burial sites is a symbolic practice defined as the transition from 'being' and 'appearing' to 'not appearing'. Thus, cemeteries can be studied as multidimensional spaces in the changing urban periphery since their conditions of urban integration and their topographical particularities are constantly changing. Through these transformations emerges the need and desire of the people to restore the specific spaces into everyday and familiar spaces.

2.2.1 The urban dynamic of burial grounds

From the analysis recorded so far, it appears that the symbolic and spatial role of the burial grounds yield multifaceted approaches to their emerging urban dynamics in the contemporary condition. According to the architect Katrina Spade as recorded in her work *Urban Death*, the rationalization of the burial is deemed necessary in relation to the positive effect it can have on the environment and also on climate change. Her research is based on the issue of renewing people's relationship with the question of death and not on the location of cemeteries on the periphery of cities (Eveleth 2014). Therefore, through the rapid growth of the population, in the context of a climate of urbanization, and through the lack of open public spaces, the questioning of the character and role of modern cemeteries emerges. Spade's problematic can be understood in the light of '*Landscape Urbanism*'. "According to '*landscape urbanism*' the landscape is defined as the prism through which the contemporary city is interpreted and at the same time the medium through which it is shaped. It is essentially an attempt to decode the urban situation in terms of landscape and manage it as an ecosystem, which is studied and planned on the basis of a spatiotemporal ecology" (Corner, 2006:29). Through contemporary processes of space production, the vanguard of landscape architecture design expresses the view of a '*new urban nature*' (Giro 2005) which can be identified in contemporary burial grounds.

According to David Schreiner, it is necessary for city dwellers to think about conventional burials because it can become a luxury only available to the rich as urban congestion can reduce the space available for cemeteries. Cities and burial grounds are forced to adapt their relationship with each other along with emerging innovations in the handling of dead bodies so that everyone has access to a dignified burial. Therefore, the re-personification of the spatial issue of death highlights the emerging urban dynamics of specific spaces through their change, shrinking and even disappearance. The above condition is mainly detected in countries where cremation is not supported since residents pay for a burial place in cemeteries as if it were real property. So instead of growing, cemeteries simply expand. In addition, both incineration and conventional burial have some adverse environmental impacts, with the result that some cities are already implementing innovative landfill management strategies aimed at urban resilience (Schreiner 2014). More generally, innovative design approaches to burial sites are emerging through modern technology and architecture under the gaze of the continuous ecological needs of the space.

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For example, in 2004 the architectural team Naja & de Ostos designed a fantasy scenario that investigates issues of extreme burial conditions. Their proposal refers to the design of a cemetery space, which hovers over the city of Baghdad and was shaped as a clash between the 'aggressive West' and 'stereotypes of the East' (Jackowski 2007). The cemetery in question is clearly influenced by Takis Zeneto's *Electronic Urbanism and Utopia* and features a flying city with multiple levels and locations for various civic functions suspended by a system of cables. The '*hanging cemetery of Baghdad*' is a utopian challenge and not an actual cemetery with a specific spatial articulation as it projects multiple spiritual symbolisms. The example of student Steve Baumann's *New London Necropolis*, which deals with the interdependence between the natural and the artificial, follows a similar logic. He proposes a hybrid necropolis which, beyond the burial ground, includes the city's power station and a market in the form of a garden through a romantic, functional and rationalist logic (Baumann 2011). A different approach to changing the shape of burial spaces is the vertical cemeteries that respond to the continuous urbanization of the space. Notable implemented examples are the *Yarkon Cemetery* on the outskirts of Tel Aviv in Israel and the *Memorial Necrópole Ecumênica in Santos*, Brazil. An innovative example of a vertical cemetery is the *Moksha Tower* in Mumbai, India designed by architects Yalin Fu and Ishuan Lin. It is a burial skyscraper that serves the needs of different religions with the aim of freeing up space for the creation of green oases in the city. The tower above has been designed with bioclimatic criteria such as its green facade.

Also, a proposal that caused multiple discussions on the emerging issues of urban burial is the proposal of architect Chan Joong Kim named *The Last House*. Its design is rendered as a floating vertical organic tower that through modern technology and ecology produces clean energy for the city of Seoul. A similar approach that responds to urban sprawl is the undergrounding of burial grounds. The proposal by architects López Balan, Elsa Mendoza Andrés and Moisés Adrián Hernández García called '*Tower for the dead*' aims to address the increased construction of Mexico City by designing an underground burial site. It is designed with curved walls and ramps while natural light diffuses into the space through a large opening (Schreiner 2014). Another example that responds to urban overpopulation and the loss of green land is the *Inverse Void* by architects Alison Huo, Ben Chang and Shengjie Qiu. '*Inverse Void*' composes an existential journey through a ramp into an underground space leaving the agricultural space untouched on the surface. In the logic of changing the location of the burial grounds, one also comes across some examples that go beyond the above locations. The innovative '*Light after life*' proposal treats human bodies as temporary forms but also as sources of biomass in a continuous energy cycle. Therefore, a park-like riverway consisting of burial properties that can be reused through aerobic biotransformation is proposed. The decomposition of the bodies produces biogas which takes the form of light on the river public road. A similar approach is recommended by '*Constellation Park*' from the DeathLab 8 team. This particular ecological proposal uses biomass management in an identical way by composing a hanging cemetery park with multiple levels under the Manhattan Bridge (Distasio 2016). The above examples respond to the change of position and form of cemeteries in an attempt to find new spatial solutions. Also responding to the search for new spatial solutions are proposals for floating and underwater cemeteries such as Fabián Leiva's '*Floating cemetery*', David Mutschlechner's '*Circle*', Coen van Bergeijk's '*Sunken Bodies*' and Espacio Cero's '*Columbarium in a pond*'.

In terms of Schreiner's view of shrinking future cemeteries there are numerous examples designed with urban resilience and ecology in mind. The international ideas competition entitled *Studies in Death* organized by the Lien Foundation and Designboom highlighted hundreds of contemporary approaches to conventional burials. The above approaches are related to the ecological management of human remains and new mortality enclosures as the competition committee called them. A number of proposals have emerged such as biodegradable capsules and special cast molds which help transform dead bodies through natural processes. In the same problematic, the *Dying* competition from the organization NON ARCHITECTURE COMPETITIONS highlighted interesting proposals

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for the dematerialization of burial grounds within a wider framework of ecological management. Notable proposals are 'We are the nature' by Jakub Kozaczenco, Apolonia Slesarow and Konrad Zaborski and 'The story of atoms' by Manuel Alejandro Suárez Hernández and Haruka Tonegawa. The above proposals are aimed at the development of green spaces in the urban fabric of the city through the composting of dead bodies. Nevertheless, the scenario of the disappearance of burial grounds from the urban periphery is related to utopian digital solutions. Through the above competition, ideas were submitted for digital cemeteries through applications and even proposals for space cemeteries outside the earth. From the above examples, the effort to find new handling strategies for cemeteries under the gaze of new possibilities of destigmatizing mourning in modern societies can be understood. In this context, the emerging urban dynamics of the cemetery may shift to scientific fields that go beyond their functional dimension.

3. Conclusions

In conclusion, at the root of every culture, from primitive social structures to modern reality, is the constant effort to give meaning to human mortality. Starting from the claim that the core of every spatial organization was the Necropolis, the beginning of civilization itself can be distinguished in the issue of death and mourning. In the first section of the presentation, an attempt was made to take a historical, cultural, social and political view of the issue of death from the Middle Ages to the modern era. Through this historical path, death is transformed from a visible social event to an invisible individual event, from a content of narratives to a taboo subject, from a community test to a personal drama unfolding in the modern hospital, to end up as a matter of managing the biological existence. The above changes towards the issue of death are reflected in the spatial evolution of burial grounds from the Middle Ages to the present day. Furthermore, the symbolic organization that governs the above spaces makes them the 'negative' of the city of the living, i.e. an 'other city'. Through the continuous evolution of the urban environment, the spatial dependence of the cemetery on the city and therefore its modern role is constantly changing. The need to redefine the character of the cemetery as part of the spatial stock of the city and not as an 'urban void' brings to the fore its emerging urban dynamics. Through modern technology and ecology, new possibilities for the management of dead bodies and the dematerialization of future burial sites can be discerned in accordance with the needs of the exasperated urban space. Despite the wide contrasts, the specific spaces are an integral part of the continuous and changing urban condition, since through their design they are able to function as multidimensional urban cells and as spatial carriers of meanings that raise multifaceted readings of the city and the place.

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City and coastal interface: investigating planning as a research framework in the urban context of Patras

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Abstract

Contemporary cities confront critical challenges stemming from climate change, public health issues and transportation, a network of interconnected problems with significant implications for urban life. Coastal cities in particular, confront heightened risks due to rising sea levels, a global phenomenon affecting numerous coastal areas and posing risks to infrastructure, communities, and ecosystems. Areas previously considered secure are now vulnerable to transformations. Proactive measures are imperative to address this crisis, including the implementation of strategic urban plans, the promotion of sustainable urban design, and the development of resilient infrastructure.

In examining the considerations outlined above in both a real-world context and the practical realm of architectural design, our focus turns to the case study of the city of Patras. Chosen as a design project within our architectural school, Patras presents a compelling case study due to its intricate relationship with the coastal front. This front characterized by its port promenades in the city center, heavy traffic along the coastline, and ultimately, disconnection of the city life from the coastal front. Efforts have been made to liberate the coastal front from the confines of the port facilities, attempting to restore this significant space to the city. However, before any solution is implemented and the coastal front is reclaimed by the city, Patras faces anew the threat of losing its coastal land due to the climate crisis and rising sea levels. The rise in sea level poses both a threat and an opportunity to investigate the problematic relation of the city with water because of the port facilities, but certainly endangers residential communities, public space, transportation networks and unique ecosystems. Part of the investigation is based on the relocation and replacement of the city's coastal transportation network onto the water. The climate crisis presents both a threat and an opportunity for the long-term revitalization of cities.

Through this exploration, our aim is not only to understand the theoretical concepts but also to apply them tangibly and in context -specific manner, unraveling the complexities of architectural design, urban planning, sustainable design, and resilient infrastructure in response to the distinct challenges faced by the city. The studio seeks to develop strategies for addressing the phenomenon, leading to design proposals and investigating innovative architectural solutions that go beyond mere visual upgrades. The focus is on a comprehensive design exploration to enhance the overall urban experience. The role of architecture is explored as a field of design research for improving urban conditions. By viewing architecture as a catalyst for positive change, the project aims to investigate specific spatial problems and propose sustainable and resilient design solutions. An interdisciplinary approach and the integration of architectural research aim to pave the way for a more resilient and sustainable urban future.

Keywords: *urban design; coastal cities; resilience; sustainability; transportation network*

1. INTRODUCTION

Modern cities are facing critical issues regarding energy, inequality, public health, economy and transportation. These problems are interconnected and largely exacerbated by the climate crisis, resulting in serious implications for urban life. Coastal cities face additional risks due to rising sea levels. This is a global phenomenon affecting many coastal areas, endangering infrastructure,

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communities, and ecosystems. Areas once considered safe are now vulnerable to change. Addressing this crisis requires preventive measures such as strategic urban planning, sustainable urban design, and the development of resilient infrastructure.

Future climate predictions indicate rising temperatures in the Mediterranean with reduced rainfall and an increase in sea levels. These phenomena are expected to intensify in the future, enhancing the risk of severe droughts, soil erosion, and increasing demand for water and energy.

'As the temperature of the waters in the oceans rises and the seas become less dense, they expand and will spread, occupying more surface area on the planet causing inundation of low-lying areas. Increased temperature will accelerate the rate of sea level rise. Since the end of the last Ice Age, 18000 years ago, sea level has risen by over 120 m.' [1]

During the 20th century, the average annual increase in sea level doubled compared to the past 3000 years. Predictions for the global average sea level rise for the next 30 to 50 years are consistently increasing, particularly in recent years due to the unstable nature of average temperature rise. While sea levels are expected to elevate almost everywhere, the extent of coastline retreat depends on various factors such as geographic location, soil geomorphology, ocean currents, wave heights in the area, and the structure (materials and form) of the coastline. Even within the same area, the degree of water intrusion into the land and its impact on citizens' lives vary. The intrusion of salty seawater affects the aquifer horizon and river estuaries with significant consequences for drinking water and food production.

2. CITY OF PATRAS: A MODEL AREA FOR ARCHITECTURAL STUDY

We examine the above issues within a real-life context, focusing on the city of Patras and applying principles of architectural design. Patras is a coastal city in western Peloponnese, that faces challenges in its interaction with the seafront. This relationship is complex, characterized by the distinctive port promenades in the city center, heavy traffic along the coastline, and ultimately, the distancing and detachment from its coastal waterfront.

After the liberation from the Turks, the city developed mainly around its port, becoming renowned for its commercial activity and the raisins that supported Greece's economy for decades. In 1828, following the order of Governor Kapodistrias, Stamatis Voulgaris designed the city's expansion towards the sea, which was the center of the region's trade. The main principle of the urban plan was not only to support the old upper town but also to extend the city towards the sea and the port, where the economic, social, and cultural life of the new Patras would be organized. Since then and up to the present day, the city has expanded with the port facilities at its center, extending along the coastline to the north and south. However, despite the sea's significance for the city, Patras has not managed to inhabit its waterfront. The city's challenging relationship with the water has deep roots. *'In 1830, during the implementation of Voulgaris's plan, at the request of the residents, the coastal zone, which Voulgaris had intended for a park, was parceled out and later the railway line passed through it. In this way, Patras lost even this opening - breathing space towards the sea.'* [2] Due to the constantly expanding port and traffic infrastructures, the city never managed to relate to its waterfront. On the contrary, over the years, the city's relationship with its waterfront has become increasingly problematic. The recent relocation of the commercial port to the southern edge has freed up the coastal front and opened up new prospects for changes in the city's structure and public life. In 2018, the port facilities were transferred from the Greek State to the Municipality for management and exploitation. The already established situation requires drastic decisions and interventions for the reconstruction and improvement of the city's relationship with the water. With the release of the waterfront from the port facilities, efforts are being made to find solutions that will utilize this significant urban space. A significant step in this direction was the architectural competition announced by the Municipality of Patras in 2019 for the *'Redevelopment of the Coastal Front of Patras'* as an important project for the quality of life and the image of the city's public space. A key objective of the competition was *'the*

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radical reorganization of the coastal front, the connection of the central part of the city with the water element, the aesthetic and functional upgrade of the coastal zone.' [3] Although the announcement sets the organizational principles of the plan as *'the functional and environmental upgrade of the area, the integration of developments into a unified spirit and style, the application of environmental protection techniques,'*[4] it does not account for future risks related to the threats of climate change, which in any case will alter the coastline once again. Any effort to integrate the coastal zone into the city's life must not ignore the anticipated changes in the natural environment. The problem appears to be twofold. On the one hand, the water element threatens to alter the coastline with the loss of coastal land and the city's infrastructures, and on the other, the necessary traffic network does not allow access to the sea. The looming threat of the climate crisis presents us with a unique opportunity to change and revitalize our city both in the short and long term within a rapidly changing environment.

3. ARCHITECTURAL STUDIO: CITY & WATER

These topics constitute the focus of study and research in Architectural Design 8 courses during the fourth year of the study program at the Department of Architecture, University of Patras. The initial idea is based on both the protection of the coastline and the relocation and replacement of the city's coastal traffic network with water-based transport. After preliminary research, we aim not only to understand the theoretical principles and issues but also to formulate architectural proposals adapted to the problem's framework, highlighting the complexities of architectural design, urban planning, sustainable design, and resilient infrastructure. The workshop aims to develop strategies to address the phenomenon, leading to design proposals and examining innovative architectural solutions that go beyond simple aesthetic upgrades. The studio includes a generalized design research to enhance the overall urban experience, examining the role of architecture as a field of research for improving urban conditions. Viewing architecture as a catalyst for positive change, the project aims to investigate specific spatial problems and propose sustainable and resilient design solutions. This multifaceted approach, which integrates architectural research into urban planning, aims at a resilient and sustainable urban future.

3.1 Design Process, From Concept to Creation

In the initial phase of formulating and developing design proposals, group research is conducted along two main axes of information and analysis. The first axis focuses on the location, the program, the unique characteristics of the site, and the climate systems. This includes an in-depth study of the site's geography, context and environmental conditions. The second axis examines flood mitigation techniques, natural resource management technologies such as water, wind, and tidal energy systems, as well as advanced construction technologies and materials that are not commonly available and influence the proposed architectural project.

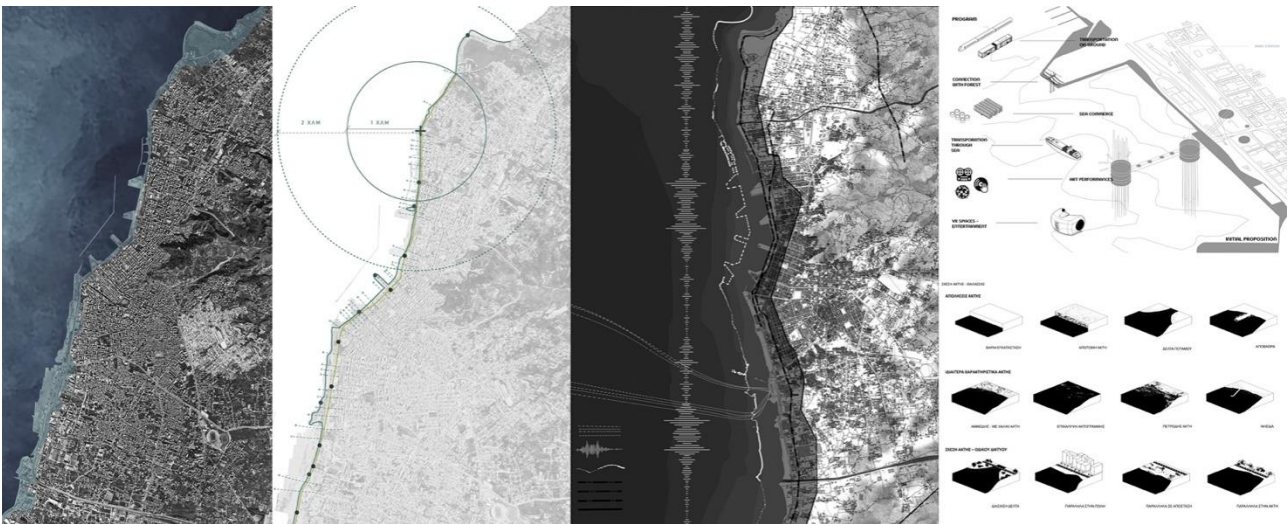


Figure 1. Analysis of the Coastal Front

A detailed reading of the urban landscape provides a comprehensive understanding of various phenomena, allowing us to perceive both traces of the past and potential future scenarios. As a method of design research, we thoroughly analyze and outline every aspect of the city's waterfront, including piers, small ports, and beaches, along with the adjacent neighborhoods that either currently extend or could potentially extend towards the waterfront. All these locations serve as reference points which, with their diversity and interconnections, shape the whole city. They are like pieces of a collage of urban structure that encompass all necessary functions and programs. Each intervention site is treated as part of an evolving urban whole that can enhance the city's potential over time. The coexistence of different functions and characters in nearby and easily accessible areas leads to a sustainable city. The transportation network is responsible for connecting these areas. Traditionally, the central transportation network holds special significance in the city as it links different neighborhoods with centers of cultural, educational, social, institutional, and commercial activity. It facilitates social interaction, plays a crucial role in the quality of the urban experience, and imparts identity to the urban environment. For the goals of our proposals, we consider that a good public water transport network along the waterfront can contribute to reducing car usage, which has caused congestion in the city center.

3.2 City and Infrastructure

As Elizabeth Mossop states, *'Infrastructure increasing lyprovides the public spaces of our cities, and the infrastructure of movement is an essential presence in the developed world.'* [5] And referring to transportation networks, *'it is the connection of elements to one another that is the foundation of urban and suburban life. Are required to perform multiple functions: they must fulfill the requirements of public space and must be connected to other functioning urban systems of public transit, pedestrian movement, water management, economic development, public facilities, and ecological systems. Thesedemandsarethereforepropellingnewdesignapproaches'* [6]

In our case, central role in this matter is played by waterborne transportation as a sustainable option for reducing traffic congestion. By providing an alternative to traditional road traffic, water transport reduces the burden on coastal roads, which often act as barriers to water access. This mode of transportation not only alleviates congestion but also promotes economic and social activity along the waterfront by improving accessibility.

Additionally, waterborne transportation encourages a more dynamic and integrated coastal boundary. This is complemented by flood protection projects that safeguard the shoreline while enhancing its

usability. To further support sustainable mobility, we propose energy-efficient infrastructure that leverages natural resources and phenomena. This includes harnessing renewable energy sources such as solar, wind, and tidal power to create a more resilient and efficient transportation network. This approach not only enhances mobility but also contributes to a more vibrant and sustainable urban environment, where natural and built elements work in harmony to support the city's growth and resilience.

3.3 Overview of Design Projects

The experience of being near the water and the experience of moving on the water is central to the design. Implementing such a daily experience relies on a network of coastal hubs that extend along the city's waterfront. These network hubs integrate public water transport with urban infrastructure. After collectively studying the entire waterfront, each group of students selects a specific site for intervention. Each proposal articulates an urban scenario accompanied by functional programs, which are designed to enhance the character of each area, meet its needs, and ensure its smooth integration and participation in the overall functioning of the city.



Figure 2. Map from the course website showing intervention points on the city's waterfront

Regarding the management of the new coastline, there are various approaches to addressing future sea level rise and ensuring coastal resilience. One strategy involves preemptively transforming land to accommodate anticipated sea level rise, effectively bringing the water onto the land up to the expected future shoreline. This proactive approach allows for a gradual adaptation to changing conditions. Another strategy focuses on preservation and protection through technical works along the coastal front. These measures might include constructing seawalls, revetments, and other forms of coastal defense to shield the land from rising waters. Additionally, there are proposals for extending the city towards the water, integrating urban development with the coastal environment. These approaches aim to balance ecological sustainability with urban expansion, ensuring that coastal areas remain resilient, functional, and seamlessly integrated into the broader urban fabric. Here, we present six selected representative cases that exemplify these strategies and their implementation. Each case highlights different methods and techniques for managing the coastline while promoting ecological and urban harmony.

The first proposal [7] selects a location north of the city center, on the banks of the Melichos stream, in a sparsely built residential area. Until 2004, this vacant space housed a refugee camp. The memory of the violent eviction of the refugees in 2004 still lingers in the area, making it a significant landmark for the city. After this tragic event, the land remained undeveloped. The proposal symbolically and literally chooses to establish a transportation station on this site, bringing water into the area. Historically, this location was a marsh during the Ottoman period, which was drained after liberation. The topographical slope of the land allows for the influx of water to create a safe maritime station that will serve a large portion of the city's residents, enhancing its significance as a historical site. The proposal takes into account and implements the anticipated encroachment of water into the land area,

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ensuring its resilience to future changes. The proposed structure, housing the suggested programs and the station, is a lightweight construction that allows the landscaped surroundings to dominate, creating an open public space - a park. The existing clusters of trees are preserved on small created and protected islands. These specific trees are resilient to the salty marine environment.



Figure 3. Aspects and sections of the proposal by student Alexopoulou, I.

Another proposal [8] brings water into the urban fabric, by creating a canal at the southern boundary of the city center. This area is characterized by a dense urban fabric separated from the sea by a zone of commercial buildings and a park. Nowadays, these commercial buildings host supra-local public functions such as shopping centers and cinemas. The canal aims to bring the aquatic element closer to the residents of this densely populated area while simultaneously enhancing the public character of the park, which currently acts as a barrier between the city and the sea, serving a protective function. The canal transforms the park space and the public buildings into island, providing autonomy to the city's functions. This creates a unique urban landscape where the network of floating transportation will serve both the residents of the area and park visitors. This integration of water transport will operate at both the neighborhood and city levels, blending urban development with the creation of a more sustainable and functional city. The entire architectural proposal is developed spatially within the existing topographical differences of the section. By utilizing the natural variations in elevation, the design ensures a seamless and harmonious integration of the canal into the urban environment, making the aquatic element a central and accessible feature of the city's daily life.

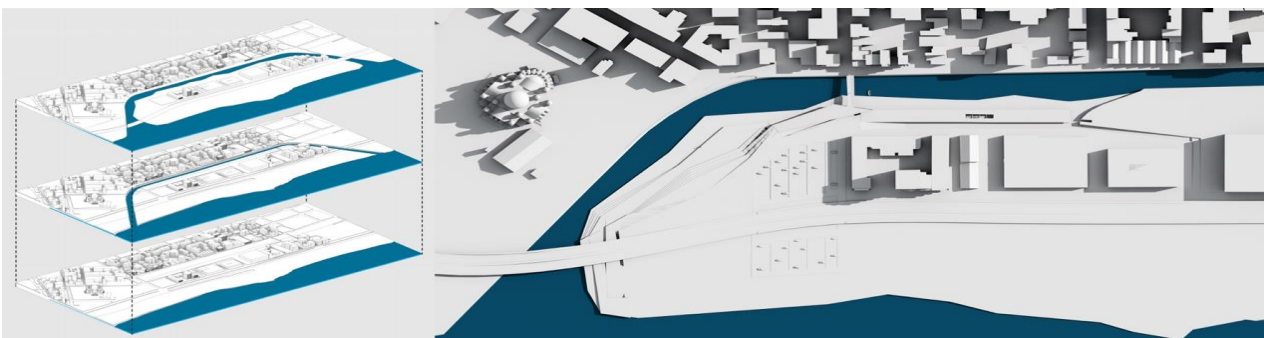


Figure 4. Topographic plan for canal excavation, by students Garefalaki, I. and Natsi, A

In the next case, front shielding measures are designed to preserve the existing shoreline. This proposal [9] suggests a new dynamic in the urban coastal area by placing the station at the former customs area. On the existing pier is located the former Port Authority building, an emblematic building of the city, representing public modernist architecture in Greece. Given projections of rising sea levels, this building is at risk of being underwater within the next 50 years. To preserve the

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building, a coastal protection system is being designed specifically for this location. The proposal includes the construction of embankments in the form of artificial hills that will house water desalination facilities, providing the city with vital water resources. This creates a new urban landscape by combining public space with an essential production unit that meets the city's water needs. The already existing artificial boundary of the area evolves into a small ecosystem, an autonomous green space or park that independently satisfies its own water requirements. This transformation redefines our relationship with water and creates a sustainable, functional space that addresses present and future needs while preserving the existing coastline and emphasizing its importance. In this way, the proposal not only protects and preserves a significant historical building but also enhances the urban environment by integrating practical water management solutions with public space.

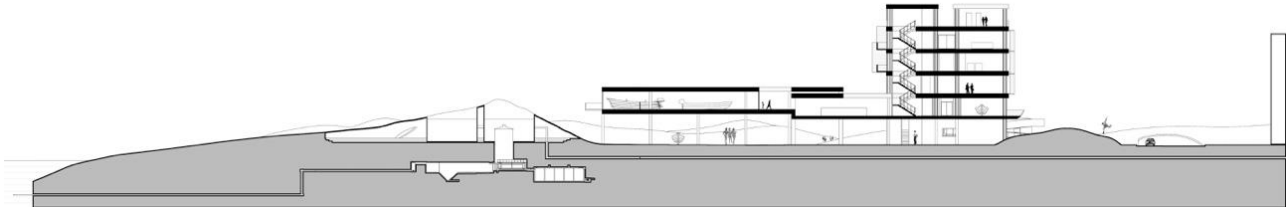


Figure 5.Topographic section, by student Moustaka, F.

In close proximity to the previous project, another case [10] aims to protect and enhance the city's fish market, which is the third largest in Greece. The fishing trade here serves needs beyond the borders of Patras. The fish market is located on the edge of the old port in a significant and vital part of the city, with the iconic lighthouse of Patras situated across from the church of Agios Andreas, the city's patron saint. The proposal involves creating low protective dykes at the land-sea boundary and expanding the fish market's activities with light constructions. These constructions will revive the once important outdoor market and enhance the circulation of fishing commodities. Additionally, a fishing shelter is planned for both professional and amateur fishermen. Furthermore, the creation of a water airport, previously proposed by the Municipal authorities for this area is included in the plan. All the new constructions mimic the industrial character of the area and are developed in the form of piers over the water, creating a protected environment for the land. This approach not only safeguards the fish market and its activities but also enriches the urban landscape, integrating the market more closely with the waterfront. By enhancing the functionality and resilience of the fish market area, the proposal supports both the local economy and the cultural heritage of Patras, ensuring that this vital part of the city remains active and vibrant for future generations.



Figure 6.Section of pier, by student Nikolakopoulou, M.

In another approach focusing on energy [11], the proposal harnesses the power of water with a floating structure capable of adapting to sea level changes while generating electricity from water currents. The proposal includes tidal hydroelectric turbines that channel the generated energy into the

station's parking lot for car charging. The proposal aims to minimize car usage in the city center and promote clean energy production, creating an energy self-sufficient system. The architectural intervention includes the design of a marine platform and an energy infrastructure that utilizes the region's climatic conditions, such as prevailing winds and coastal currents. Beyond the operation of the floating transportation station, the platform features a promenade, a café, waiting area and mooring infrastructure for small boats at the hydroelectric pillars. The platform's wavy form references water wave formations, embodying the concepts of fluidity, variability, and continuous change. Located on the northern edge of the city, it encourages visitors and residents to move to the city center by watercraft while simultaneously offering the opportunity for free car charging using environmentally friendly energy sources. The entire structure is anchored on land without being affected by the rising sea levels.

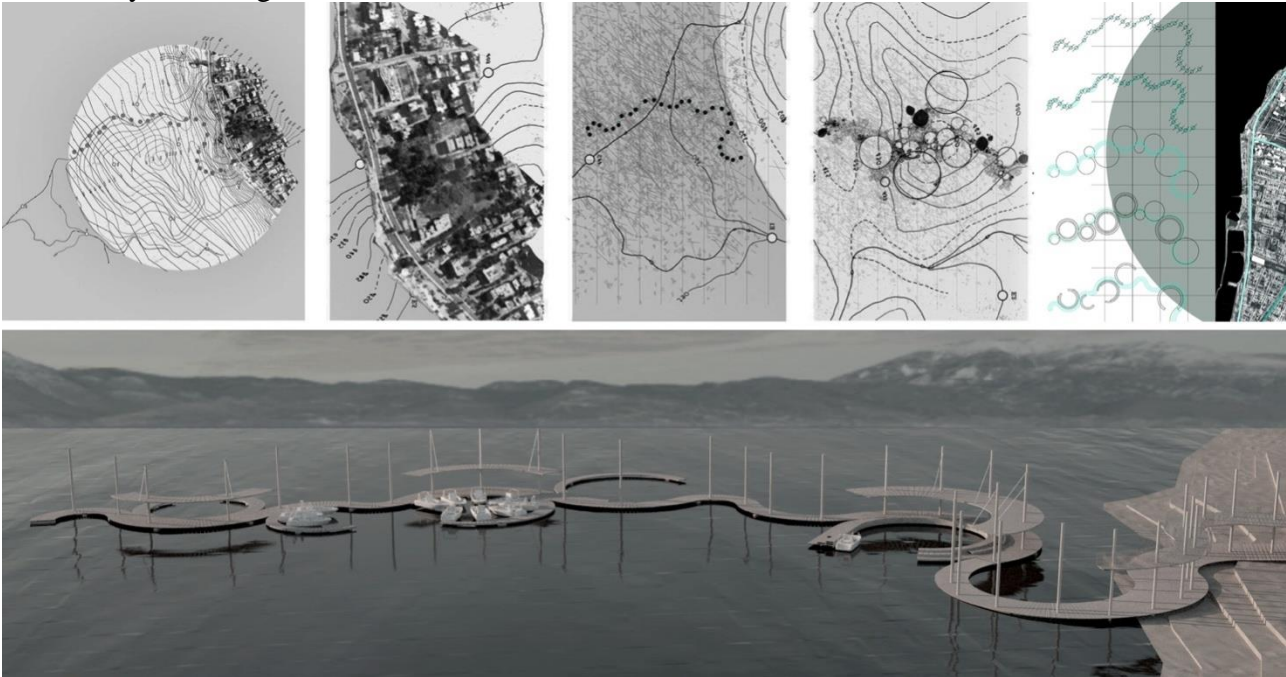


Figure 7. Research diagrams and 3D visualization, by student Patsioti, D.

In another proposal [12], a sea-based traffic hub is designed, to integrate various models of transportation, including a cable car that connects the hub to the hill at the diametrically opposite point from the sea border of the city. Centrally located along the city front, this construction opens new possibilities for traffic circulation, facilitating movements in two perpendicular directions. The hub serves as infrastructure where floating structures can be developed to accommodate city activities and future expansion needs. The concept draws inspiration from Constant Nieuwenhuys' New Babylon proposals, Archigram's Walking City, and the architectural developments in the Netherlands involving urban extensions onto the water. This proposal envisions a new dimension of the city on water, creating a sustainable urban space that connects people with the environment while enhancing the city's cohesion and social life. By extending the city onto the water, it aims to inhabit the aquatic surface while maintaining a close relationship with the existing structures on land. The design includes facilities for docking and transportation, recreational areas, and social spaces, all integrated into the floating hub. This setup not only provides practical transportation solutions but also creates a vibrant urban environment that promotes interaction and community engagement. The hub's floating nature ensures adaptability to changing sea levels, making it a resilient addition to the city's infrastructure. Overall, this proposal offers a visionary approach to urban development, merging

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innovative transportation solutions with sustainable design principles. It transforms the city's relationship with its waterfront, making it an active and integral part of urban life.

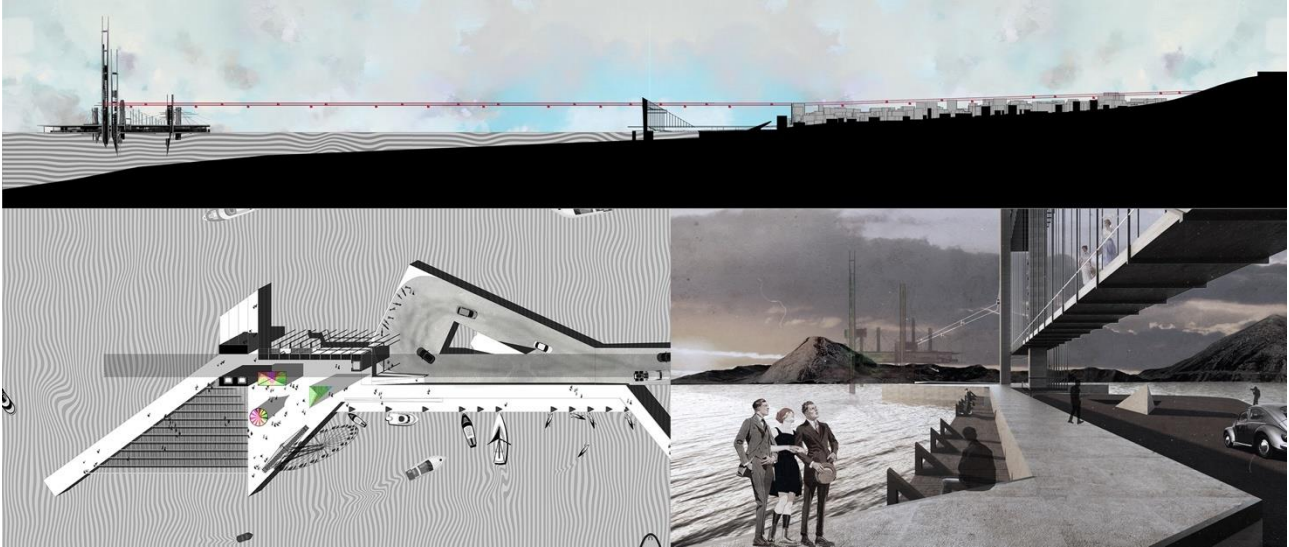


Figure 8. Sectional and Perspective Drawings, by students Ziros, N. and Kaloudis, S.

4. EPILOGUE -FINAL THOUGHTS

Each proposal develops a strategy for the city and implements an architectural concept that meets the needs of today and tomorrow, while maintaining a strong connection with the environment. In each area, a new boundary with the water is carefully designed, utilizing both building and land installations to bridge the city's relationship with the sea. Just as urban configurations and development rely on detailed planning to create cohesive and wholes, our approach recognizes the close relationship between architectural scale and urban planning. The integration of architectural research into urban planning contributes to the creation of integrated environments that meet the needs of residents. This approach is a way of thinking and a methodology considers the complexity of urban development and prioritizes the quality of life for residents. Through this process of analysis, planning and design, we come to the conclusion that there is no one specific way for protecting the coastal front and integrating it into city life. Instead, a multitude of approaches can be combined, tailored to local characteristics and needs, even at a small scale. This diversity and variety of approaches results in a rich and varied coastal landscape that corresponds to the complexity of urban structure. It's important to recognize that the seafront is not uniform or homogeneous but rather responds to both natural and anthropogenic influences, leading to diverse characteristics at each point and area. By embracing this diversity and harnessing the potential of various strategies, we can create resilient and vibrant coastal environments that enhance the overall urban experience.

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Public Space and Publicness: Between Center and Periphery

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Extended abstract

This paper investigates public space through the concept of *publicness*, an approach that emphasizes what creates an inclusive, democratic, and socially driven public space in everyday life. It particularly examines how the small-scale design of the physical environment might affect the interaction among people towards the shaping of a more community-based spirit. It asks, is it possible for the architectural design or the physical environment to foster a civic identity? What structures and which elements within places can inspire a civic self among people? Using both theory and practice, the paper expands the idea through which architecture might influence the shift from an individualistic to collective society. Through fieldworks within central and peripheral regions of Southern Europe it records existing tendencies that mark the possibility of (and ways reinforcing) such transition.

Theoretically the paper discusses the relevance of: the artistic approach of installation/intervention within public space (Diller Scofidio+Renfro, Krzysztof Wodiczko); working through a civic vocabulary, a visual language as a set of verbs that respond to particular actions within public space (Zenovia Toloudi), emphasizing the social imaginary by linking the future, through the past (Cornelius Castoriadis); favoring rituals rather than events (Byung-Chul Han); working towards tangible futuristic ideas (The Japanese Metabolists); and the politics of cooperation (Richard Sennett) among other ideas. The fieldworks, which include architectural, photographic, and drawing studies in Italy, Spain, and Greece, and the proposals for public space from the architectural design studios constitute the examples which illustrate this vision linking public structures to public activities.

The examples of *publicness* include structures that host public moments (structure and activity); identifying public moments that happen (no structure, but there is activity); public structures that stay unused (structure, but no activity). These structures/ activities) may be found within traditional public spaces, such as street, plaza/square, park; office space (individual versus collective), private houses (open and inviting spaces). Some examples from the recent pandemic era (known for extreme lack of public interactions) explore the idea of “public space” within one’s private home (private car as well, such as the van-life). Such examples, all together create a spectrum of *publicness* through which public space can be reimaged. In this, the following three conditions exist: The creation of multiple centers for important actors (a process of de-centering to ensure an inclusive space for the marginalized and neglected); b) Structures that relate to (slow) time, towards a non-productive everyday life establishing rituals that emphasize empathy, courage, and interpersonal connectivity; and c) complex structures within a broken world, architecture structures that are neither complicated, nor simplistic to help rediscover a sort of public identity and to cultivate (within all) a more public-centric personality.

Keywords: *public space; publicness; art and architecture; civic self; everyday life*

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SUSTAINABLE URBAN PLANNING & DEVELOPMENT

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Heritage Conservation and the Triple Bottom Line: Findings from two recent North American Studies

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Extended abstract

Heritage advocates argue that the retention and reuse of the historic built environment is, in and of itself, a major contributor to sustainable development and an effective tool for resilience. While there has been some research on the role of heritage conservation and each of the three pillars of sustainable development – environmental, economic, and social – there are few examples of single studies or articles that demonstrate heritage conservation’s contribution to all three. This paper will consider two recent studies in North America that in one instance quantified the value of heritage resources at risk from sea level rise and the other monetizing the “triple bottom line” value of four commercial districts with a concentration of heritage buildings.

St Augustine, Florida, founded in 1565, is the oldest continuously occupied European settlement in the United States. It is home to 14,500 people, a small college, and a major tourism industry based on its collection of Spanish colonial architecture. It is also a waterfront community on Florida’s Atlantic coast and subject to regular weather events that seem to be getting stronger and more frequent with climate change. Much of the city lies in identified flood zones. As part of its climate mitigation efforts, the city commissioned an analysis that included: 1) quantification of the value of heritage properties located in flood zones; 2) how weather events impact the city’s tourism industry; 3) the value of its heritage resources using the travel cost method of valuation.

Calgary, Alberta is a city of 1.3 million in Western Canada. Founded in 1875 it is now the center of Canada’s largest petroleum producing area. But the economy has diversified with major economic sectors including aerospace, financial services, agribusiness, transportation, and technology. It also has four commercial districts with a concentration of heritage buildings. The city is committed to a comprehensive sustainable development strategy. City staff suspected but needed evidence that the commercial districts had quantifiable monetary value not only economically, but also socially and environmentally. A Calgary architectural practice and a US-based heritage research firm were commissioned to undertake the analysis. The social value was estimated using, in part, a willingness to pay study. Environmental values were estimated considering landfill costs avoided, embodied carbon, embodied energy, and other metrics. The economic portion of the analysis identified both a heritage premium (an additional value increment recognized by the marketplace) and a heritage halo effect – enhanced value of non-heritage buildings resulting from their proximity to historic structures.

Keywords: *triple bottom line, heritage impact, resilience, heritage halo, heritage premium*

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Focusing on the generic city to transform Athens' urban landscapes

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Extended abstract

Transforming and regenerating urban landscapes involves a wide range of disciplines and addresses several pressing issues: climate adaptation, stormwater management, mobility infrastructure, social inequalities, gentrification and the housing crisis. Many of these aspects are evident in the current urban situation of Athens, Greece. Since 2010, Athens has been recovering from, but continues to cope with, a series of crises including the economic crisis, pandemic, migration and climate change. At the Technical University of Munich, Chair of Sustainable Urbanism, we led a three-year research and teaching programme entitled Athens' Inner-Urban Landscapes, which addressed the multidimensional urban transformation of the city and the issues mentioned above. We worked with the National Technical School of Athens and an interdisciplinary group of experts from academia, local authorities and practitioners to gain valuable insights into the city's current urban issues.

With the aim of bringing together different fields into a condensed set of knowledge and action for the future of the city, the research project was built on three main pillars: Research - on the theme of urban transformation and regeneration; Teaching - in the form of interdisciplinary seminars, design studios and workshops; and Outcomes - in the form of a book, a symposium and others that will ensure creating a strong network and disseminating the project. The research project has succeeded in proposing a series of ideas, plans and actions for the metropolitan area, identifying current and future urban challenges, governance and climate adaptation issues. It is the generic city that, in order to improve the quality of daily life of its citizens, is in need of urban transformation on several levels, from the upgrading of its building stock to the defragmentation of its urban landscapes. Considering the natural elements of the city, such as green corridors, streams, topography, we must develop new climate-adaptation strategies that improve the quality of life in these areas, leading to a common agenda among stakeholders to improve the urban context we live in. Inner urban landscapes are therefore defined as landscapes of (urban) regeneration. They play a crucial role in climate adaptation in the city, but also provide social cohesion as spaces for public interaction.

The presentation will highlight the process of developing the project, from conception and structure, to identifying themes and taking action. It will also show examples of the teaching procedure, along with research findings which focus on these themes. Finally, it will explain the benefits of synergies and active collaboration between administration, academia and practice, contributing to the collective discussion on a sustainable future for the city.

Keywords: *Urban Transformation, Generic City, Urban Landscapes, Defragmentation, Taking Action*

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Examining railway incidents in Thessaly: how to assure safety in the urban environment

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Abstract

The devastating railway incident on February 28, 2023, in the area of Tempi (Thessaly region) caused intense discussions regarding the safety of the railway networks and particularly where they intersect with urban areas. In Thessaly region, there are three main railway lines: the primary national route Athens to Thessaloniki and two regional routes, one connecting Palaiofarsalos to Kalambaka and the other linking Larissa to Volos. These railway lines traverse through the cities of Larissa, Trikala, Karditsa and Volos. While Larissa and Trikala have the railway lines passing through their urban cores, in the cases of Karditsa and Volos, they run along the outskirts. The paper aims to statistically analyze railway accidents, comparing them against national statistics, and subsequently benchmarking the data against other countries, particularly those in Europe. As the jurisdiction of the regional department of the Technical Chamber of Greece only encompasses the three regional units of Larissa, Trikala, and Karditsa, the study will not incorporate data from the Magnesia regional unit. Raw data from 1995 until 2023 are collected, detailing accidents occurring in the railway networks in these three regional units. The analysis results reveal a notable upward trend in railway accidents occurrence across the three regional units in Thessaly. A comparative analysis between regional and national data illustrates a decline in national accident rates post-2018, contrary to the escalating trend observed regionally. This fact reinforces the conclusion that, on regional scale, the challenge is the railway passages through urban areas. Comparing the national data with the data from other countries, Greece exhibits a higher accident rate compared to EU27 level. In essence, these findings underscore the urgent imperative to address safety concerns within railway networks. Our study aims to delve deeper into potential solutions to mitigate risks and ensure the safety and well-being of the residents.

Keywords: *railway; accidents; Thessaly; urban environment; safety.*

1. INTRODUCTION

Railway systems serve as vital lines of transportation in cities, efficiently connecting people and goods across vast urban landscapes. However, the integration of railways within densely populated urban areas poses significant safety challenges. Railway safety and the prevention of accidents are paramount concerns for urban planners, policymakers, and citizens.

Railway accidents in cities can vary in nature and severity, involving collisions between trains, derailments, or accidents involving pedestrians and vehicles at railroad crossings. Identified common causes of railway accidents in urban areas include human error, track and equipment failures, collisions, trespassing, security threats, weather conditions, and other causes. Human errors by train operators, signal maintainers, or other personnel can lead to accidents. Defective tracks, broken rails, or issues with switches and crossings can cause derailments or other accidents. Other causes leading

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to accidents are malfunctions in train components such as brakes, engines, or signalling systems. Accidents can occur when trains collide with each other or with vehicles at railroad crossings. People trespassing on railway tracks or attempting to cross them illegally can be struck by trains, resulting in accidents and fatalities. Moreover, problems with infrastructure such as bridges, tunnels, or overhead wires can lead to accidents if not properly maintained. In some cases, adverse weather conditions like heavy rain, snow, or fog can affect visibility and track conditions, increasing the risk of accidents. Security issues such as acts of vandalism, terrorism, or sabotage can pose serious risks to railway safety in urban areas.

This paper aims at investigating railway accidents within the regional units of Larissa, Trikala, and Karditsa, in Greece. Specifically, the paper performs a statistical analysis of the railway accidents in order to stress out the need for measures in the region. The accidents were categorized based on their date and location of occurrence, the underlying cause, and the number of casualties. In order to investigate the trend of the railway accidents in the area compared to the national data, a comparative analysis was conducted illustrating a decline in national accident rates post-2018, contrary to the escalating trend observed regionally. Finally, the national data was compared to the data from other countries (both EU and non-EU). The study aims to delve deeper into potential solutions to mitigate risks and ensure the safety and well-being of the residents.

2. RAILWAY ACCIDENTS CAUSES: A LITERATURE REVIEW

Rail transport is recognized globally as a secure and environmentally friendly mode of travel. Although safety standards can fluctuate, even in highly developed regions like the European Union, the railway is considered as the safer mode of travel compared to other transport modes, except for commercial aviation. EU data [1] show that railway accidents resulting in fatalities in 2019 in EU-27 account for 0.09 deaths per billion train Km, compared to 0.24 deaths per billion Km by bus/coach. The related number of deaths in airlines is 0.08 per billion Km.

Based on the International Railway Safety Council [2] the common risks identified in railway are: (a) train collisions; (b) derailments; (c) level / grade crossings and trespass; (d) railway staff risks; (e) stations; (f) suicides; and (g) dangerous goods. Collisions between trains or between trains and infrastructure is one of the common risks identified in railway industry. Although collision between passenger trains travelling at high speed in opposite directions are rare, they can result in severe consequences (recent examples in Germany, Spain, and Greece). The causes of such accidents include drivers running signals, incorrect routing, speeding, train separation, poor wheel-rail adhesion, and both technical and human errors in the signalling system.

Another risk is derailments which is common, but the consequences are not extremely severe [2]. Derailment causes include technical issues such as poor track geometry, damaged or defective switches and crossings, and wear and fatigue in the wheel-rail interface. Vehicle suspension faults and operator errors, including incorrect setting of points, excessive speed, and poor driving behaviour, also contribute to derailments.

Globally, the predominant occurrences of rail-related injuries and fatalities (excluding suicides) are concentrated at railway level crossings. The study of Larue et al. [3] showed that in the United States 31% of such incidents were recorded in 2015; in the European Union the figure stood at 26% between 2012 and 2014; Australia reported 31% between 2002 and 2012; India documented 43.5% between 2009 and 2015; and South Korea witnessed a staggering 95% from 1998 to 2002. Despite a decline in the number of collisions, the latest available data indicate a stagnating level in fatalities and serious injuries at level crossings [3]. The main causes of these incidents include road users who are unaware of the level crossing, distraction / inattention, failure of level crossing equipment or a second train unexpectedly approaching the crossing and violations by road users ignoring the warning of approaching trains. Larue et al. [3] reported that investigations both internationally and in Australia consistently reveal that the primary cause of these collisions is the actions of vehicle drivers or

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pedestrians, characterized by lapses, errors, and violations. In the US as many as 60% of drivers disregard lowered gates and flashing lights and attempt to bypass warning infrastructure, even when an oncoming train is clearly visible [3]. In addition, in some cases the drivers are reluctant to stop because they perceive they have sufficient time to cross. Trespasses are common in densely populated regions resulting in severe injuries and fatalities.

Another common incident is suicides causing significant disruption and psychological trauma for railway staff and passengers [2]. Finally, as trains are also used to goods transportation, the railway often is used to carry dangerous goods such as chemicals, petrol, etc.

One of the major causes linked to train accidents is the human error. The study of Baysari et al. [4] in Australia reviewed Australian incident and accident reports and revealed that almost half of the cases were linked to equipment failures, primarily stemming from insufficient monitoring or checking procedures. The predominant causes were lapses in attention, characterized as skill-based errors, often tied to reduced alertness and physical fatigue. Organizational factors are identified as influencing factors of these incidents, highlighting the necessity to address issues related to resource management, organizational climate, and processes to effectively mitigate errors within the Australian railway system.

3. ANALYSIS OF RAILWAY ACCIDENTS

3.1 Railway in Greece

The Hellenic Railways Organization (HRO) was established in 1970 for the organization, operation, and development of rail transportation. The management of HRO is carried out by a board of directors. HRO legal form changed over the years from a public law legal entity to a public limited company with the separation of infrastructure management from transport activity with the establishment of subsidiary companies and their sale to individuals. HRO S.A. became the managing company of the railway infrastructure while the transport business was sold to the Italian company Ferrovie dello Stato Italiane in September 2017 [5].

The current railway network extends along 2552 Km of operational lines (Figure 1). In the study area there are three railway lines: the one from Athens to Thessaloniki, passing through the city of Larissa, with a total length of 87 Km (located in Larissa regional unit), the one from Paleofarsalos to Kalambaka, passing from the cities of Trikala and Karditsa with a total length of 80 Km and the one from Larissa to Volos with a length of 34Km within the limits of Larissa regional unit only. Within the limits of Larissa city the length of the railway lines is 9.5Km. The length of the railway lines pass through the city of Trikala is 5 Km and through the city of Karditsa is 3.8Km. In all cases the railway infrastructure is located in the ground level. In the city of Larissa there are two underground passages for the vehicles while all other crossings are guarded passages.

3.2 Railway accidents in Europe and in Greece

Railway incident data from EUROSTAT database [6] were drawn in order to assess the frequency and the impacts of the railway incidents in Greece compared to other countries. Railway incident data is recorded from 2004 to 2022 at country level (NUTS 1). Railway incidents in the EUROSTAT database are distinguished based on their causes as: (a) train collisions and collisions with track obstacles, (b) derailments, (c) railway crossings, (d) trains in motion, (e) fires. The total number of incidents and the average number of casualties (dead and injured persons) in the member states of the European Union except Cyprus and Malta for the period between 2004 and 2022 are shown in Figure 2. The highest number of railway incidents are met in Poland, Germany and Hungary, while the lowest number of incidents are met in Denmark, Norway and Slovenia. The highest number of fatalities and injured people are met in the countries with the highest number of incidents, that is Poland, Germany, Romania, Hungary, and Turkey.

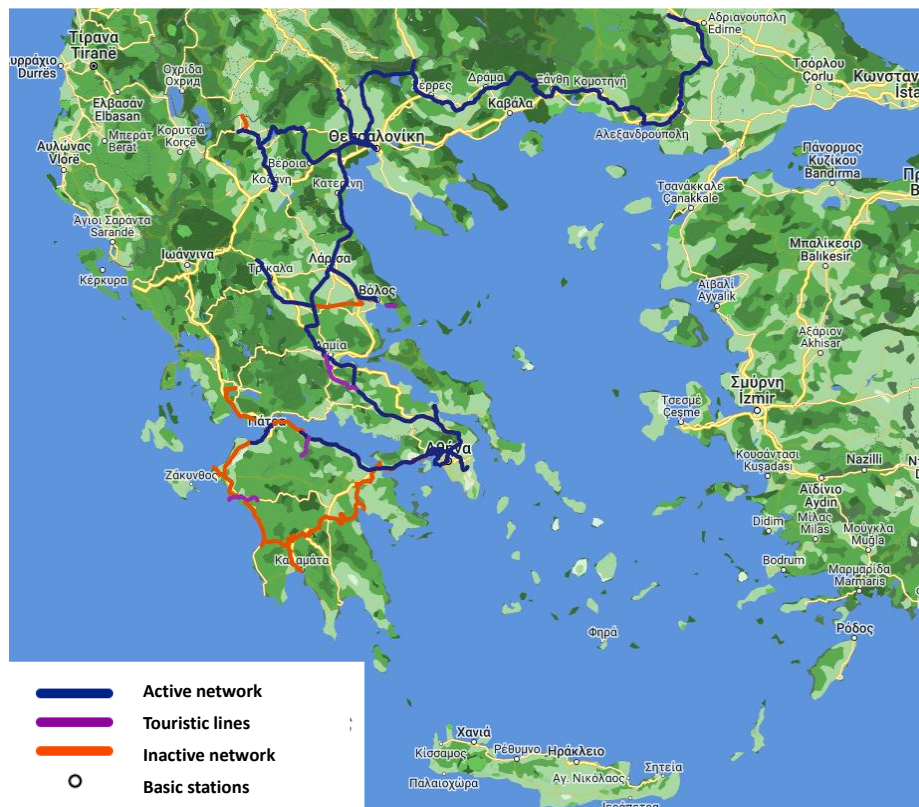


Figure 1. Map of railway network in Greece (<https://ose.gr/>) [5]

As the absolute figures among the different countries are not comparable, we have regressed the numbers of railway incidents, fatalities, and injuries per kilometer of railway line. Figure 3 presents the average numbers of railway incidents, fatalities, and injuries in the European Union Member States other than Cyprus and Malta for the period 2004-2020, per kilometer of railway line. The countries with the highest number of incidents per railway length are N. Macedonia, Montenegro, Hungary and Slovakia and the countries with the lowest number of incidents per Km of railway are Ireland, UK, and Sweden. The countries with the highest average number of fatalities per railway network length are Montenegro, N. Macedonia, and Poland while the countries with the lowest number of fatalities per railway network length are Norway, Ireland, and UK. The countries with the highest average number of injuries per railway network length are N. Macedonia, Turkey, and Hungary while the countries with the lowest number of injuries per railway network length are Ireland, Norway, and UK. Greece has 12.6 railway incidents per 1000Km of network which is higher than the EU average (8.8 per 1000Km). The fatalities in Greece are 7 people per 1000Km and the injuries are 7.1 people per 1000Km while the average EU fatalities are 5 people dead and 3.8 people injured respectively.

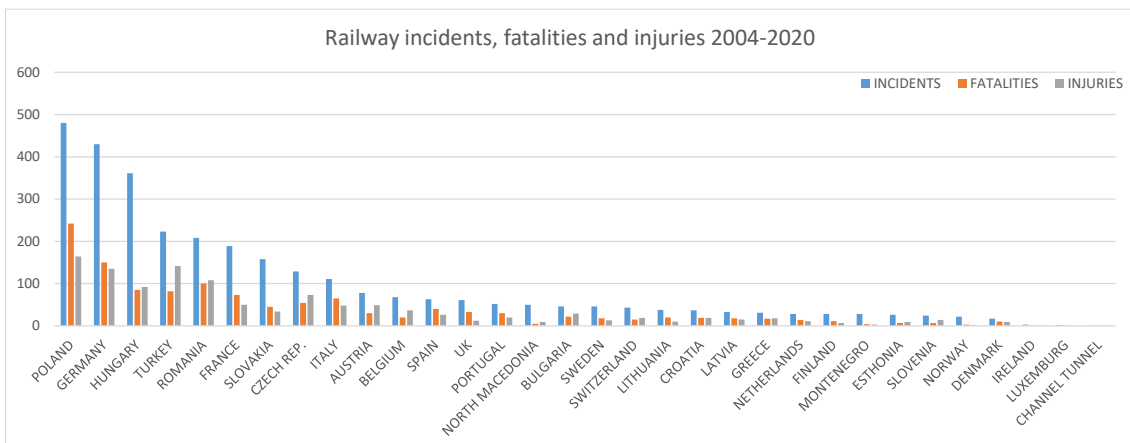


Figure 2. Railway incidents, fatalities, and injuries in Europe 2004-2020 (based on [6])

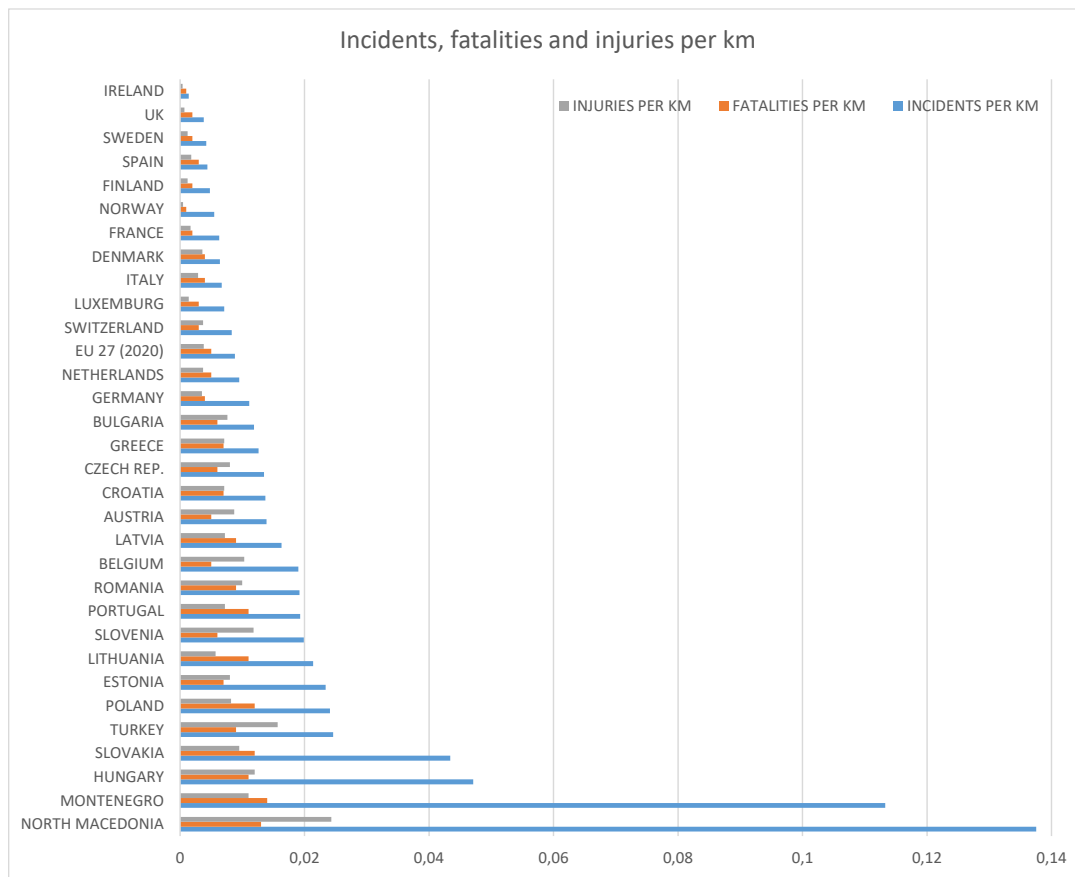


Figure 3. Railway incidents, fatalities, and injuries per railway network length in Europe 2004-2020

From the analysis in the EU countries, it can be concluded that Greece has a higher average number of fatalities and injuries per railway lines length and per incident than the corresponding average of the EU during 2004-2020.

3.3 Railway accidents in Thessaly, Greece

In order to investigate the trend in railway accidents in the region of Thessaly and in particular in the regional units of Larissa, Trikala, and Karditsa, we have gathered the data of the railway incidents from April 1995 until February 2023. During this period 48 railway incidents occurred resulting to 86 fatalities, 201 injuries and 1 missing person. From these incidents, 22 took place on the Paleofarsalos – Kalambaka line, 15 took place on Athens – Thessaloniki line within the limits of the regional unit of Larissa and 11 took place on Larissa – Volos line within the limits of the regional unit of Larissa (Figure 4).

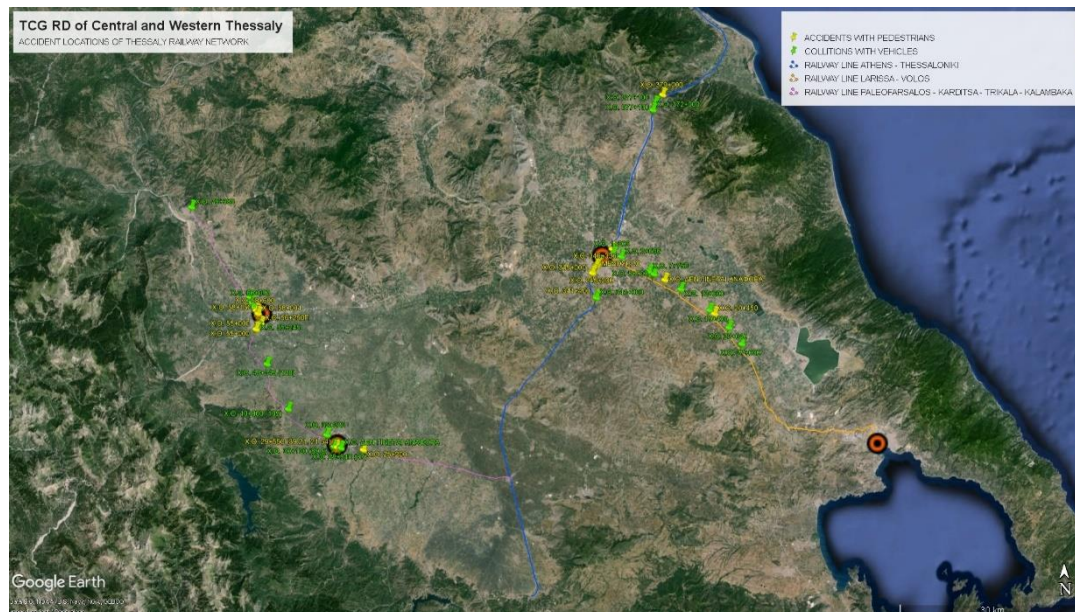


Figure 4. Locations of railway incidents in the regional units of Larissa, Trikala, and Karditsa

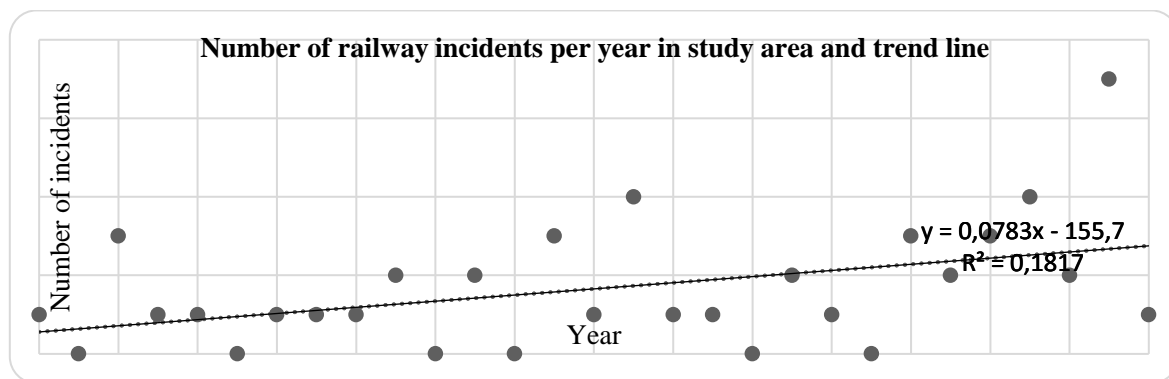


Figure 5. Number of railway incidents in the regional units of Larissa, Trikala, and Karditsa

From the total number of the 48 railway incidents, 6 were recorded as suicide attempts resulting in 4 fatalities and 1 injury. These incidents include 3 falls from a bridge and 3 suicide attempts on the railroad tracks. Three incidents were related to electric shock in the area of Mezourlo (in Larissa city) after a breach of the fence of the depot area and near the Athens-Thessaloniki line. The causes of the remaining incidents are: collision of train with vehicle (23 incidents), pedestrian encroachment (15 incidents), collision of trains (2 incidents) and derailment (1 incident). The railway incidents per year show an increasing trend with some fluctuations per year (Figure 5).

The causal analysis by event type showed that the dominant reason for the trains' collision is the violation of the priority of the train in unguarded crossings, while events of unspecified reasons are

also observed. For the "pedestrian encroachment" incident type, the dominant cause is the vertical crossing of a railway line from a point other than a guarded or non-level crossing (27% of similar incidents) and crossing a railway line (20% of similar incidents).

One of the railway incidents recorded is the devastating railway incident on February 28, 2023, in the area of Tempí which resulted in 57 fatalities and one missing person. As the number of fatalities of only one incident is high and in order to analyze the temporal trend of fatalities and injuries, this incident is excluded from Figure 6 showing the number of fatalities in railway incidents in the area from 1995 to 2022. The data show an increasing trend in fatalities caused by railway incidents in the area. Also, an average number of 2.29 incidents per year are observed, which is in line with the national average (2.4 incidents per year).

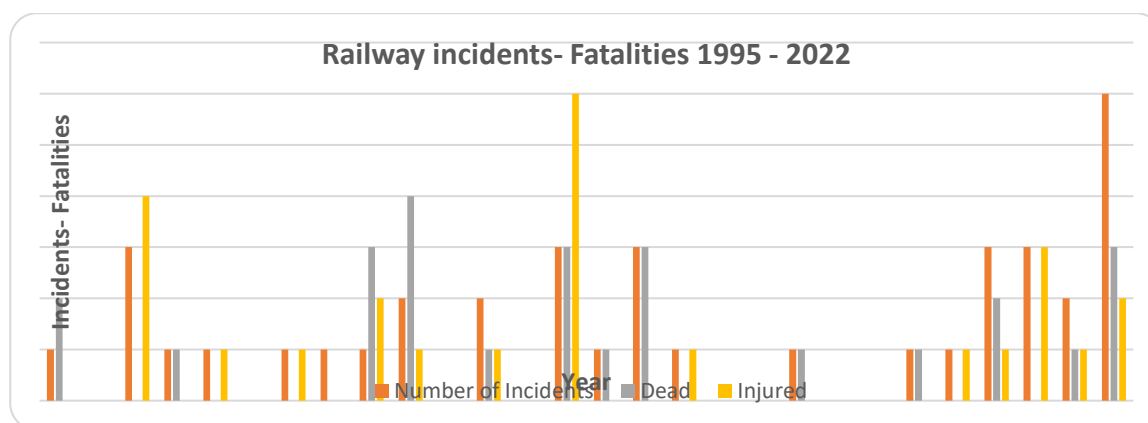


Figure 6. Number of fatalities in railway incidents in the regional units of Larissa, Trikala, and Karditsa (1995-2022)

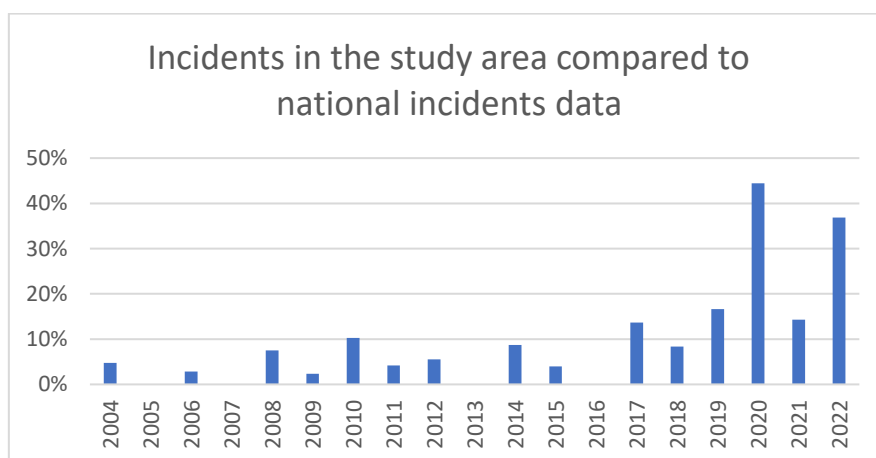


Figure 7. Ratio of the number of railway incidents in the study area over the number of the railway incidents in the country 2004-2022

In order to investigate the incidents trend in the study area and at the national level, the number of incidents in the country are gathered from 2004-2022 (Figure 7). The comparison shows that the railway incidents number in the study area increases compared to the national data. This means that while the trend of railway incidents in the country between 2004 and 2022 is decreasing, the corresponding trend in the study area is increasing.

4. DISCUSSION AND SUGGESTIONS

In the study area of the regional units of Larissa, Trikala, and Karditsa, railway incidents and casualties are recorded from the year 1995 onwards, taking place on the railway lines Thessaloniki - Athens, Palaiofarsalos - Kalambaka and Larissa - Volos. The information was provided by the Police Departments of the regional units. The most common type of incident is the collision of a train with a wheeled vehicle followed by a pedestrian encroachment.

The analysis of the causes of the incidents showed that the majority is due to a violation of safety measures (fences, crossings, etc.) by pedestrians and vehicles. From the total of 48 incidents between the years 1995 and 2023, one derailment and three collisions between trains are recorded. The spatial distribution of railway incidents shows that the largest number of incidents take place in the residential areas, i.e. in the cities of Larissa, Trikala and Karditsa where railway lines pass (Figure 8). A significant number of incidents are also observed on the Larissa - Volos line. The data analysis also shows that there is an increasing trend of railway incidents in the study area, which is not the case for the rest of the country.

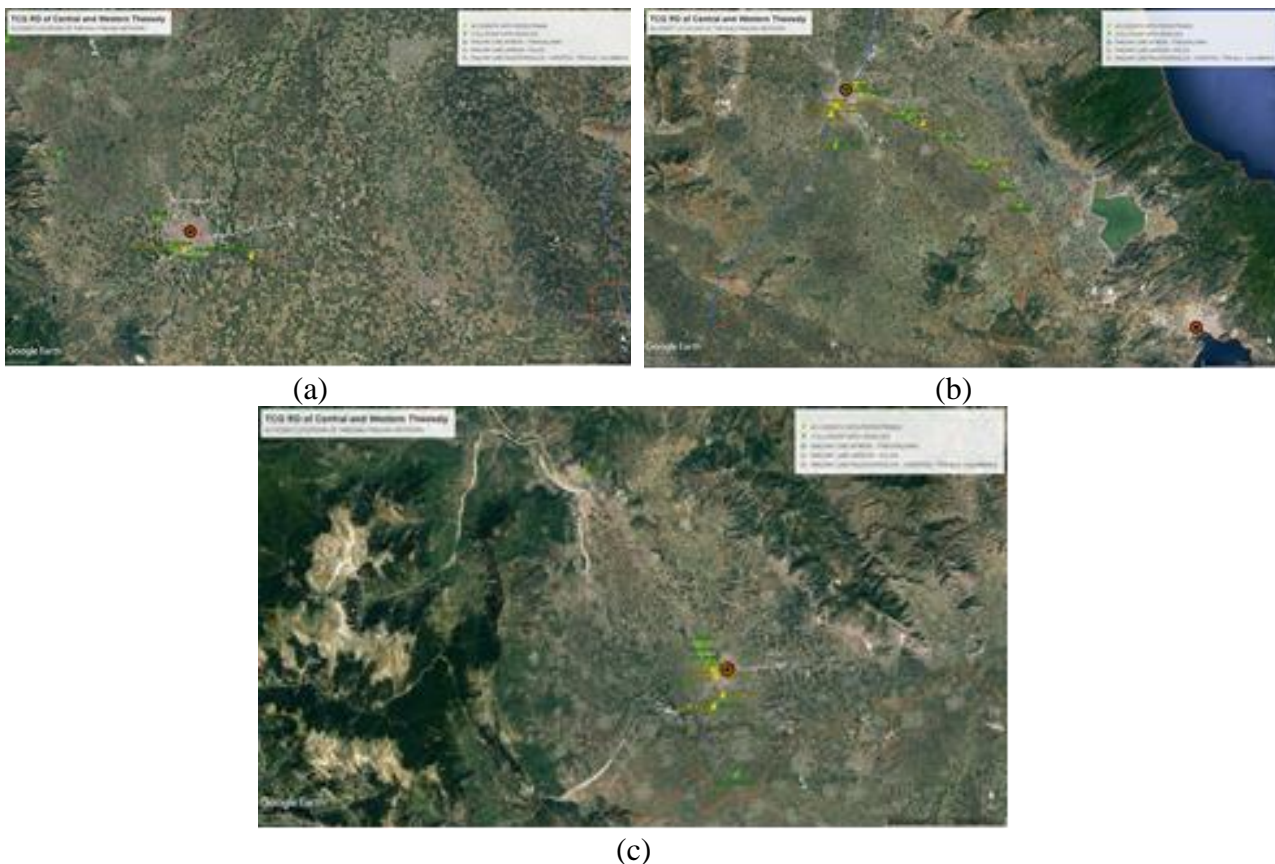


Figure 8. Incidents in railway lines (1995-2023) in (a) Karditsa city; (b) Larissa -Volos line; (c) Trikala city

At the European level, the Greek average of incidents, deaths and injuries per Km of lines in 2004-2022 is higher than the corresponding one of the EU-27, as formed after 2020. Compared to other countries, Greece ranks low in terms of average incidents, deaths, and injuries per number of traveling passengers. Regarding the severity of the incidents, our country presents relatively high averages of fatalities and injuries per incident.

The analysis revealed that measures are needed to reduce railway incidents. Recent advances such as the ETCS (European Train Control System) may enhance safety, especially in the case of collisions, but are technologically challenging [1]. The railway industry addresses derailment risks by implementing rigorous maintenance systems and ensuring high levels of staff competence through comprehensive training. Strategies such as erecting fences, issuing public announcements, conducting educational campaigns, and implementing police patrols are employed to reduce trespasses.

There are two categories of level crossings identified: active and passive ones [3]. Active crossings employ various mechanisms such as visual and auditory signals, including flashing lights, bells, and boom gates, to warn motorists and pedestrians about approaching trains. On the other hand, passive crossings rely on signage, expecting users to be vigilant and yield. The study of Larue et al. [3] mentioned that boom gates are the most effective in preventing collisions. Furthermore, crossings equipped with flashing lights show significantly better safety records compared to those with stop signs and yield indicators. According to Larue et al. [3] an analysis is needed to select the crossings that can be upgraded to active protection. However, some researchers indicate that upgrading may have unintended consequences, such as congestion issues, while complexity with which road users interact at active crossings, it may also introduce other unconsidered risks.

A more effective solution is to engineer out the hazard of rail-road interaction (i.e. grade separate) [3]. Although this solution is the most efficient one, it involves redesigning the road network, construct bridges and tunnels, thus involving high costs. Generally, there is growing interest in urban regeneration around the world [7]. Many advocate for incorporating transport infrastructure, such as railways or highways, underground as part of urban revitalization efforts. This approach involves redirecting or concealing transport routes to free up surface-level space for alternative uses. Notable examples include the Big Dig in Boston and the Rive Gauche redevelopment in Paris, focusing on road and rail realignment respectively [7]. Environmental concerns, like noise pollution and visual degradation, further underscore the need for change. Residents living nearby often advocate for the removal of unsightly concrete structures. Redirecting infrastructure typically involves refurbishing and rerouting major sections underground, necessitating significant financial investment. While such projects face challenges such as extensive excavation and encountering geological or archaeological obstacles, they yield diverse benefits. Redevelopment opportunities arise as former transport areas transform into green spaces, pedestrian walkways, bike paths, and new residential or commercial developments. Additionally, noise reduction, decreased vibrations, and improved safety near the facilities contribute positively to urban cohesion. Underground transportation systems can lead to increased safety for both pedestrians and motorists by minimizing the risk of accidents and collisions. Additionally, improved accessibility can foster greater connectivity within the city. On the other hand, except of the high cost involved, there are other disadvantages. Excavating tunnels and rerouting major transport arteries underground present significant technical challenges, including geological obstacles, utility relocations, and engineering complexities [7]. In addition, construction activities associated with tunneling projects can cause disruptions to local communities, businesses, and transportation networks. Traffic diversions, road closures, and noise disturbances may inconvenience residents and commuters during the construction phase. Finally, underground transport systems require ongoing maintenance and operational expenditures to ensure safety, reliability, and efficiency. Underground tunnels are susceptible to issues such as water infiltration, structural deterioration, and equipment malfunctions, necessitating regular inspections and repairs [7].

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5. CONCLUSION

In conclusion, the analysis of the incidents in the study area and the comparison of the data with corresponding ones for the country and other European countries demonstrate that the upgrading of the railway at the country level has reduced the number of railway incidents and the severity of their effects. However, the railway accident of February 2023, for which a judicial investigation is being conducted, revealed that there are safety issues to be addressed. The purpose of this study is to investigate the causes of the railway accidents in the study area and propose solutions. The analysis of the data showed that while at the national level the number and effects of railway incidents have been limited, this is not the case in the study area. On the contrary, in the study area there is an increasing trend in the number of incidents with the main causes being collisions of trains with vehicles and pedestrians, especially in crossings. This conclusion is in agreement with the fact that at the EU level the predominant type of incidents with the highest number of fatalities are those occurring at level crossings and due to unauthorized persons on railway tracks (responsible for 98% of railway accident deaths). The spatial distribution of the incidents in the study area also shows that they are taking place within residential areas, which leads to the conclusion that these areas require immediate action for the safety of their residents and the safe passage of trains.

The measures to address these challenges include investing in modernizing infrastructure, implementing strict safety regulations, providing comprehensive training for personnel, and raising public awareness about the dangers of trespassing on railway tracks. Additionally, advanced technologies such as predictive maintenance systems and automated safety mechanisms can help mitigate the risk of accidents. Technological advancements offer promise for revolutionizing railway safety by enhancing operational capabilities, mitigating human error, and anticipating potential hazards. Such advancements include innovations such as predictive analytics, autonomous systems, and intelligent infrastructure, which hold potential to transform railway safety in urban environments through data-driven insights and advanced automation. Urban regeneration suggestions include the underground rerouting of transport infrastructure. While rerouting ground transport infrastructure into tunnels offers various benefits such as mitigating social costs, optimizing urban space, and enhancing safety, it also poses challenges related to cost, technical complexity, disruption, and ongoing maintenance. Effective planning, stakeholder engagement, and innovative design solutions are essential to maximize the advantages of underground transportation while mitigating potential drawbacks.

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Multi-criteria Analysis for the Prioritization of Informal Industrial Concentrations (IIC) in respect of remediation and organization. The case of IICs in the Region of Central Macedonia, Greece.

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Abstract

The paper presents a multicriteria analysis method and its application to rank the 30 Informal Industrial Concentrations (IIC) in the Region of Central Macedonia, Greece. IICs are areas characterized by intense economic activity, inadequate infrastructure, deficient urban planning, and environmental challenges (article 41, paragraph 2 of Law 3982/2011). By using multi-criteria analysis, the Region's IICs are prioritized for transformation into Business Parks for Remediation. Overall, Business Parks (BP) are planned and developed by means of a street layout plan, with specific requirements and conditions for the orderly positioning of business activity within an urbanized status. They have contemporary and extensive technical infrastructure facilities to meet the needs of established businesses, promote entrepreneurship, and guarantee environmental preservation. A Business Park for Remediation (BPR), also known as *Epiheirimatiko Parko Exygiansis* in Greek, is a Business Park that has been created, delineated, urbanized, and structured specifically for the environmental remediation of areas with informal industrial clusters.

The criteria considered encompass factors that influence the feasibility analysis and act as either incentives or deterrents for the development of Business Parks. Structurally, the criteria are organized into distinct sets, each comprising specific sub-criteria. The three main categories of criteria are: Technical Environment (infrastructure/accessibility), Human-made Environment (socioeconomic characteristics), and Natural Environment. The process includes rating the criteria, determining the partial utility value of the alternatives, setting the criteria weighting factors and lastly evaluating feasible options.

Keywords: *informal industrial concentrations; multi-criteria analysis; Business Park for Remediation; spatial planning policy; urban planning; Greece*

1. INTRODUCTION

In the previous years, the lack of an integrated spatial consideration of industry location in Greece, combined with the absence of a national industrial policy, resulted in the formation of Informal Industrial Concentrations (IIC). These are frequently located on the outskirts of large urban areas, in strategic locations, near important transportation networks, and contribute significantly to the national and local economies. At the same time, they demonstrate urban planning and environmental problems in both their internal environment and their link to the wider area [1]. They are characterized by intense economic activity, inadequate infrastructure, deficient urban planning, and environmental challenges (article 41, paragraph 2 of Law 3982/2011); nonetheless they "support" industry, logistics, small and medium-sized craft facilities in various regions of the Greek territory [2].

The establishment of informal industrial concentrations (IICs) in the country was made mainly in two time periods [3]: a) between 1970 to 1990, when a substantial effort was made to enact legislation on industrial land use in Greece. During that period, special regulations were issued, aimed at moving industry away from the Greek capital, while measures to protect the environment were also promoted,

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such as the classification of industrial activities based on the type of nuisance they caused. Despite relevant state policies at the time, the persistent effort to dissuade industrial businesses from launching new installations in the major urban agglomerations (Athens and Thessaloniki) led to the continuation of a well-known practice: the establishment of informal industrial concentrations (IICs) at a short distance from the country's major urban centers; b) from 1990 to 2020, when investments gradually declined, precipitating the 2009 economic crisis. New circumstances caused economic and other structural changes. Business Park institutional framework improvements allowed private firms to organize themselves in a business park or informal industrial concentration (ICC), promoting several institutional reforms.

“Business Parks” (BPs) are planned and developed by means of a street layout plan, with specific requirements and conditions for the orderly positioning of business activity within an urbanized status. They have contemporary and extensive technical infrastructure facilities to meet the needs of established businesses, promote entrepreneurship, and guarantee environmental preservation. Currently there are 26 Business Parks (i.e. organized receptors) operating in the country, which, compared to the needs of manufacturing, are unevenly distributed. Most Greek businesses continue to operate in IICs [2]. 185 IICs, with a total area of 307,733 sq.m., have been registered in the Greek territory. The largest concentration is found in the Regions of Attica and Central Macedonia, i.e. in the metropolitan regions of Athens and Thessaloniki [1]. Based on the Greek legislative framework, an appropriate solution for the remediation of IICs is their evolution into modern Organized Receptors of Manufacturing & Business Activities (*OYMED*), i.e. into Business Park for Remediation (BPR), also known as *Epiheirimatiko Parko Exygiansis* in Greek. BPR is a Business Park that has been created, delineated, urbanized, and structured specifically for the environmental remediation of areas with informal industrial clusters.

The paper presents a multicriteria analysis method and its application to rank the 30 Informal Industrial Concentrations (IIC) in the Region of Central Macedonia in Greece. By using multi-criteria analysis, the Region's IICs are prioritized for transformation into Business Parks for Remediation.

2. METHODOLOGY: DESIGN AND APPLICATION

The transformation of IICs into BPRs requires a detailed feasibility analysis based on a multicriteria approach. This method involves evaluating various factors that influence the viability and success of the transformation. The present study employs a spatial multicriteria analysis (MCA) through cartographic overlay modeling. This approach evaluates alternative options from a geographical and spatial perspective at a strategic level, integrating systematically critical factors to prioritize the areas for development.

1. Defining objective

The initial step is the definition of a clear objective. The overall goal of the MCA defines the problem scope, which is to prioritize and rank the 30 IICs for transformation into BPRs based on their need for remediation and development potential. The specific focus is the quantification of remediation needs, which guides the evaluation and ranking process. This involves:

- **Objective Clarification:** The primary objective is to systematically rank the IICs from the most to the least suitable for development into BPRs. This ranking reflects both the urgency of remediation needs and the feasibility of development.
- **Contextual Understanding:** The development of BPRs aims to address inadequate infrastructure, urban planning deficiencies, and environmental challenges in the IICs, taking into consideration the principles of sustainable development and economic growth in the region. This final method will facilitate the prioritization of IICs for conversion into BPRs.

The feasible solutions are examined using one of the four problem formulation (*problematique*) types, according to Roy's *Multicriteria Methodology for Decision Aiding* [4]. In this analysis, problem

formulation (problematique) “ γ ” is applied, which involves ranking the feasible solutions from best to worst based on their evaluation against the defined criteria. This approach is aligned with the project's goal of producing a hierarchical ranking of the IICs.

2. Defining the feasible solutions

In the first stage, the set A of feasible solutions is identified. This set consists of 30 identified IICs in the Region of Central Macedonia, which have been selected as potential sites for development into BPRs. Each IIC represents a unique alternative that will be evaluated in the next steps based on various key criteria to determine its suitability for transformation.

3. Data collection and GIS Analysis

Accurate and comprehensive data collection is fundamental to the success of the MCA. This involved collecting primary and secondary data relevant to each of the defined components. Geographic Information System (GIS) analysis is crucial in this step by providing spatial data that helps understanding the geographical distribution and characteristics of the IICs, by mapping infrastructure, environmental conditions, and accessibility, providing a visual and analytical basis for the evaluation [5]. The collected dataset consists of quantitative, qualitative, and spatial data, which include metrics and information from relevant authorities, services, websites, and reputable online open data platforms. Regarding data that constitute purely spatial parameters (e.g., required distances, areas, zone overlaps, etc.), these are either provided by the respective governmental services or digitized based on official backgrounds, to be processed through GIS. In this initial phase, all necessary information is recorded, and analog data are digitized to create their spatial representation, to create a geodatabase (a vector spatial model), which is necessary for the application of the multicriteria analysis.

4. Identifying the criteria

In this stage, the specific criteria within each component are identified. The criteria consist of factors and restrictions related to the problem under investigation and are derived from the objectives and encompass the factors that will influence the success of transforming IICs into BPRs. These typically include infrastructure quality, accessibility, socioeconomic characteristics, and environmental conditions. In the context of multicriteria analysis, a criterion is defined as any real function g that maps the behavior of each feasible solution to a real number. For any two feasible solutions x and y , the following holds:

$$g(x) > g(y) \Rightarrow x > y \quad g(x) > g(y) \Rightarrow x > y \quad (x \text{ is preferred over } y)$$

$$g(x) = g(y) \Rightarrow x \sim y \quad g(x) = g(y) \Rightarrow x \sim y \quad (x \text{ is indifferent to } y)$$

The set of criteria $G = \{g_1, g_2, \dots, g_n\}$ identified must form a consistent family of criteria with the following properties:

- **Monotonicity:** For any pair of feasible solutions x and y where there exists a criterion $g_i \in G$ such that $g_i(x) > g_i(y)$ and $g_j(x) = g_j(y)$ for every $j \neq i$, it is concluded that $x > y$.
- **Exhaustivity:** For any pair of feasible solutions x and y such that $g_i(x) = g_i(y)$ for every criterion $g_i \in G$, it is concluded that $x \sim y$.
- **Non-redundancy:** A set of criteria is non-redundant if removing any criterion violates the properties of monotonicity or exhaustivity [6, 7].

Specifically, the criteria to be introduced for the multicriteria analysis will constitute parameters related to the framework for the development of Business Parks in general, and widely for the Region of Central Macedonia, as these will emerge from the analysis of the institutional framework for the development of Business Parks, the broader developmental and institutional framework that affects the development of business activities, and the directions of spatial planning.

Regarding the structure, it is noted that the groups of criteria that were defined consist of individual sub-criteria. In this context, the criteria and sub-criteria selected are presented in Figure 7, which

encompass the data collected during the evaluation of the current state of the 30 examined IICs and the broader area in which they are located.

Criteria

Criteria	
g1	TECHNICAL ENVIRONMENT (INFRASTRUCTURE / ACCESSIBILITY)
g1.1	Proximity of the Informal Industrial Concentration (IIC) to transport networks (Road, Railway)
g1.1.1	Proximity of the IIC to the nearest junction of Egnatia Odos or PATHE
g1.1.2	Proximity of the IIC to the nearest railway station
g1.1.3	Proximity of the IIC to the port of Thessaloniki
g1.1.4	Proximity of the IIC to the nearest operational airport (Thessaloniki or Kozani)
g1.2	Proximity of the IIC to Thessaloniki's Central Railway Station (combined transport hub)
g1.3	Service of the IIC by integrated hydraulic networks (water supply, sewerage, stormwater)
g1.4	Service of the IIC by the natural gas network
g2	HUMANMADE ENVIRONMENT – SOCIOECONOMIC CHARACTERISTICS
g2.1	Total area of the IIC
g2.2	Directions of spatial/urban planning
g2.2.1	Inclusion of the IIC in an area of intensification, expansion, qualitative restructuring, or support of the industry
g2.2.2	Priority of spatial policy for manufacturing in the Regional Unit where the IIC is located
g2.2.3	Need for the creation of new organized industrial areas in the Regional Unit where the IIC is located
g2.2.4	Legally established land uses (from General Urban Plans/Spatial and Urban Planning Frameworks and Zoning Regulations) in the area of the IIC compatible with the industrial character
g2.3	Number of industrial units
g2.4	Availability of land for business activities (undeveloped plots)
g2.5	Estimated percentage of coverage of built plots over the total area of the IIC
g2.6	Proximity to developing/planned tourist areas
g2.7	Constraints due to the presence of archaeological sites
g2.8	SEVESO units
g2.9	Economic robustness
g2.10	Entrepreneurship index
g2.11	Availability of land in existing Organized Industrial Areas (OIAs)
g3	NATURAL ENVIRONMENT
g3.1	Environmental protection zones / Environmental restrictions
g3.1.1	Inclusion of the IIC in environmental protection zones where industrial organization is not permitted
g3.1.2	Inclusion of the IIC in a flood zone
g3.1.3	Presence of forest areas within the IIC

Figure 7. List of criteria used in the multicriteria analysis.

5. Defining the criteria alternatives

An alternative is defined as the potential outcome that will be given to a decision option based on the criteria being examined. The alternatives essentially represent the different values that the criteria, defined in the previous step, can take, reflecting the characteristics of the feasible solutions (IICs) being studied. These can be limited in number or there may be a large number of alternatives.

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Geospatial data and collected information are entered into the attribute table of vector layers (shapefiles), with necessary vector spatial analysis conducted in a GIS environment (QGIS).

When numerous alternative options are present, multi-criteria analysis requires grouping these into classes. This grouping uses a spatial analysis model; the Jenks algorithm [8]. The Jenks algorithm identifies optimal "natural breaks" and is employed for this classification process. Generally, the Jenks algorithm is one of the data clustering methods designed to determine the best arrangement of values into different classes. This method minimizes the variance within each range so that the values in each class are as close to each other as possible. Essentially, the algorithm tries to find natural groupings of the data to create classes. The number of classes used for each criterion is predetermined based on its needs and characteristics. The aim is to have the resulting classes such that there is maximum variance between individual classes and minimum variance within each class. The purpose of this task is to identify natural groupings of values that are in proximity with each other while maximizing the value between the other groupings.

6. Determining the Partial Utility Value of alternatives

Partial utility values are used in multicriteria analysis (MCA) to represent the degree to which different options or alternatives satisfy individual criteria. This involves scoring each IIC against the identified criteria. The scores reflect the extent to which each IIC satisfies the criteria, providing a basis for comparing the feasible solutions. This method helps in breaking down the overall decision-making process into manageable parts, allowing for a more nuanced and detailed evaluation of each criterion. Partial utility values provide a way to quantify and compare the extent to which different feasible solutions meet specific criteria. This quantification is crucial for objective and consistent comparisons, especially when considering multiple criteria. Each criterion is evaluated separately, clarifying how each solution performs across different dimensions. Since alternatives are measured on various scales (e.g. km for distance, percentage for performance), partial utility values standardize these measurements into a common scale for meaningful comparisons. The process includes reclassifying data into up to five classes and transforming factors/variables into a unified scale and reference unit. Each partial utility function $U_i(G_i)$ determines the value/utility of the feasible solution based on their performance in criterion g_i , while each weighting coefficient w_i indicates the trade-off that the decision-maker is willing to make in a reference criterion to achieve an increase of one unit in criterion g_i [6]. The fundamental assumption underlying the use of the additive utility function concerns the mutual preferential independence of the evaluation criteria.

$$U(G) = \sum_{i=1}^n w_i u_i(g_i)$$

Standardization of criteria is required to allow for trade-off between criteria in the calculation of the final evaluation score. Regarding the proposed scoring of criteria/sub-criteria, which corresponds to the significance level of the evaluation criteria, this can be carried out on a scale from 0 to 10 with proportional weighting, considering the following calibration milestones:

0: No response to the criterion	1-9: Partial response to the criterion	10: Full response to the criterion
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The score for each criterion and each IIC area will derive from the value or the class where the value falls, based on the data obtained from the analysis of each examined area. According to Russell and Norvig [9], this method is a value/utility function in which the user converts ranges of attribute values into a single utility score based on her choices. In this case, attribute categories or attribute intervals can be converted into utility scores using the value/utility function. The utility values across the set of studied criteria and their values (alternative options) are presented in the following figure.

Criterion	Alternative Options	Values	Utility Value / Weight (U _i)
g.1.1.1	E1	0-4 km	10
	E2	4-15 km	8
	E3	15-28 km	6
	E4	28-51 km	4
	E5	> 51 km	2
g.1.1.2	E1	0-2 km	10
	E2	2-5 km	8
	E3	5-17 km	6
	E4	17-28 km	4
	E5	> 28 km	2
g.1.1.3	E1	0-15 km	10
	E2	15-31 km	8
	E3	31-41 km	6
	E4	41-55 km	4
	E5	> 55 km	2
g.1.1.4	E1	0-10 km	10
	E2	10-20 km	8
	E3	20-30 km	6
	E4	30-50 km	4
	E5	> 50 km	2
g.1.2	E1	0-20 km	10
	E2	20-30 km	8
	E3	30-40 km	6
	E4	40-60 km	4
	E5	> 60 km	2
g.1.3	E1	full service by hydraulic networks	10
	E2	partial service by hydraulic networks	5
	E3	no service by hydraulic networks	0
g.1.4	E1	served by the natural gas network	10
	E2	planned to be served by the natural gas network	5
	E3	not served and not planned to be served by the natural gas network	0
g.2.1	E0	0-100 hectares	0
	E1	100-500 hectares	2
	E2	500-1,000 hectares	4
	E3	1,000-17,000 hectares	6
	E4	17,000-23,000 hectares	8
	E5	> 23,000 hectares	10
g2.2.1	E1	YES	10
	E2	NO	0
g2.2.2	E1	3	10
	E2	2.0 - 2.5	8
	E3	1.5	6
	E4	1	4
	E5	0.5	2
	E6	< 0.5	0
g2.2.3	E1	very high	10
	E2	high	8
	E3	medium	6
	E4	relatively low	4
	E5	low	2
g2.2.4	E1	YES	10
	E2	NO	0
g2.3	E1	>= 110	10
	E2	70-110	8

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	E3	40-70	6
	E4	20-40	4
	E5	0-20	2
g2.4	E1	0-500 hectares	2
	E2	500-1,200 hectares	4
	E3	1,200-1,900 hectares	6
	E4	1,900-6,800 hectares	8
	E5	6,800-22,000 hectares	10
g2.5	E1	0-10%	0
	E2	10-15%	5
	E3	> 15%	10
g2.6	E1	> 1,000 m	10
	E2	< 1,000 m	0
g2.7	E1	No archaeological site	10
	E2	Presence of archaeological site - Resulting area	EXCLUSION if <=100
g2.8	E1	YES	10
	E2	NO	0
g2.9	E1	0-0.5%	2
	E2	0.5-0.9%	4
	E3	0.9-1.0%	6
	E4	1.0-8%	8
	E5	> 8.0%	10
g2.10	E1	0-1.0%	2
	E2	1.0-1.1%	4
	E3	1.1-1.2%	6
	E4	1.2-10.0%	8
	E5	> 10%	10
g2.11	E1	10-20 years depletion of industrial land	10
	E2	20-30 years depletion of industrial land	8
	E3	30-40 years depletion of industrial land	6
	E4	> 1000 years	4
	E5	no OIA	2
g3.1.1	E1	Inclusion of the IIC in environmental protection zones where industrial organization is not permitted	EXCLUSION
	E2	Non-inclusion of the IIC in environmental protection zones where industrial organization is not permitted	
g3.1.2	E1	Inclusion of the entire area of the IIC in a flood zone	0
	E2	Inclusion of part of the IIC area in a flood zone	5
	E3	Non-inclusion of the IIC in a flood zone	10
g3.1.3	E1	No forest areas present	10
	E2	Presence of forest areas - Resulting area	EXCLUSION if <=100

Figure 8. List of all alternative options, including values and weights.

7. Assigning criteria weights

In the multi-criteria analysis (MCA) process, assigning weighting factors to various criteria is a critical step. Recognizing that not all criteria are of equal importance, the determination of these weights significantly influences the final evaluation and ranking of feasible solutions. Assigning appropriate weights to each criterion ensures that their relative importance is accurately reflected in transforming Informal Industrial Concentrations (IICs) into Business Park for Remediation (BPRs). The delineation of weighting factors, or weights, represents a pivotal stage in the MCA process. At this stage, the team of analysts integrates their preferences regarding the significance of each criterion into the modelling framework. These preferences are quantitatively expressed as weighting coefficients (w_i) for each criterion. This step is essential because, with known weighting coefficients

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for each criterion, along with homogenized criteria and clearly defined alternatives, the final evaluation of each alternative can be effectively derived. The preferences are quantified by assigning weights (w_i) to each criterion on a scale ranging from 1% to 100%, reflecting the criterion's importance. High weights are attributed to criteria of critical importance, medium weights to those of moderate importance, and low weights to criteria deemed less important.

The quantification process is rooted in a comprehensive evaluation of policy directions, which can either foster or hinder specific developments. This evaluation is augmented by the consultants' expert judgment, which is based on their extensive technical knowledge in spatial planning and regulatory frameworks. The determination of weights is guided by the directives found in regulatory documents and strategic plans. For instance, the weighting factors are influenced by the strategic directions outlined in the *Business Plan for the Development of Business Parks* issued by the General Secretariat of Industry, as specified in the Government Gazette 3437B/2013. This alignment ensures that the weighting process is consistent with broader policy objectives and regulatory mandates. Ultimately, the scoring process applies these weighting factors to each criterion within the evaluation scale, ensuring a robust and policy-aligned assessment.

The decision rule employed in this context is the Weighted Linear Combination (WLC) technique. This technique allows the user to specify a set of weights representing the relative importance of criteria according to the user's preferences and involves calculating a weighted sum of the criteria scores for each feasible solution. The weight of a criterion defines its impact on the compensatory aggregation. Mathematically, the score of feasible solution i is calculated as $s_i = \sum w_j x_{ij}$, where w_j is the weight of criterion j , and x_{ij} is the standardized attribute value of alternative i for criterion j [10]. The WLC method integrates the assigned weights and the criteria scores in a linear function, where each criterion's score is multiplied by its respective weight, and the results are summed to derive a final score for each alternative. The WLC technique is particularly advantageous in MCA as it allows for a straightforward and transparent aggregation of diverse criteria, facilitating a balanced consideration of all relevant factors in the decision-making process. Through the meticulous application of the WLC technique, the final evaluation reflects a comprehensive and balanced assessment, guiding informed decision-making in the transformation of IICs into BPRs.

8. *Ranking and evaluation of the feasible solutions*

With the partial utility values and criteria weights determined, the subsequent step involved aggregating these values to produce a composite score for each IIC. This process entailed combining the individual scores and weights to rank the IICs according to their suitability for transformation into Business Parks and Business Park for Remediation (BPRs). This ranking identifies the IICs that are the most viable candidates for development. The evaluation of the 30 IICs was conducted based on each of the established criteria, resulting in a hierarchical ranking derived from their accumulated scores. This evaluation highlights the IIC areas that should be prioritized for remediation. Utilizing the utility of the alternative options, as calculated through the utility function, the final overall utility (U) value is determined. Through necessary processes within the GIS environment, the (U) values for each IIC area under study are aggregated, yielding a total score from all criteria. This approach enables the ranking of feasible solutions. Consequently, an accompanying database is produced, presenting the hierarchical ranking of the examined areas for the development of Business Parks and BPRs.

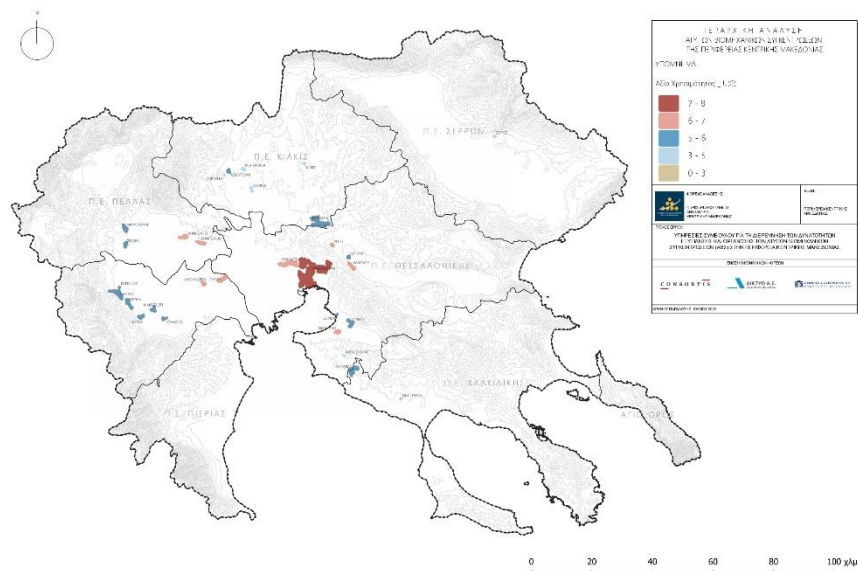


Figure 3. Map of the IIC areas involved in hierarchical ranking resulting from the multicriteria analysis.

3. RESULTS AND CONCLUSION

The study conducted a comprehensive evaluation of 30 Informal Industrial Concentrations (IICs) in the Region of Central Macedonia to determine their suitability for transformation into Business Parks for Remediation (BPRs). A multicriteria analysis (MCA) was utilized, integrating various criteria, including technical infrastructure, socio-economic characteristics, and environmental restrictions. The final ranking of the IICs is presented in Figure 4.

RANK	LOCATION	PARTIAL UTILITY	RANK	LOCATION	PARTIAL UTILITY
1	Oraiokastro	8.16	16	Lagyna	5.45
2	Anchialos	6.97	17	Lakkoma	5.41
3	Alexandria	6.69	18	Naousa	5.29
4	Kavalari	6.63	19	Makrochori	5.27
5	Neo Rysio	6.6	20	Patrida	5.17
6	Liti	6.33	21	Axioupoli	5.16
7	Giannitsa (A)	6.15	22	Mavrovouni	5.09
8	Giannitsa (B)	6.1	23	Kouloura	5.07
9	Platy	6.05	24	Serres	4.65
10	Nea Santa	5.85	25	Kato Scholari	4.59
11	Thermi	5.8	26	Kilkis	4.27
12	Thermi	5.8	27	Aspros	4.2
13	Veroia	5.73	28	Gorgopi	3.83
14	Skydra	5.67	29	Nea Kavala	3.81
15	Kopanos	5.55	30	Nea Triglia	3.09

Figure 4. Final ranking of the IICs.

The presented methodology provides a robust framework that is adaptable to different regions and contexts. The MCA approach, and especially the use of WLC, ensured a multi-part assessment of each IIC by taking into account all relevant factors in decision making process. Furthermore, these criteria were corroborated with other policy objectives, ensuring that such evaluation supports strategic development goals. The methodology can be potentially applied in cases of IICs beyond Central Macedonia Region, but also in various regional planning and development settings. During the process, certain gaps were identified in relation to data availability and criteria calibration. Overall, the study underscored the importance of a structured and balanced approach to evaluating industrial concentrations, contributing to the decision-making process of strategic planning and sustainable development.

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Accessible urban design logic and accessibility of inherited city structures: Comparative Case study of neighborhoods Cerak Vinogradi and Višnjička Banja in Belgrade, Serbia

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Abstract

The paper investigates the wheelchair accessibility of neighborhoods Cerak Vinogradi and Višnjička Banja in Belgrade, Serbia. Accessibility plays an important role in social sustainability as a part of sustainable urban development. In Serbia, during the last two decades, numerous laws and regulations have been adopted that oblige designers and contractors to build accessible spaces, but the lack of a control system for the implementation of these regulations leads to improper implementation. This paper researches the requirements that should be included in the design logic in order to ensure the accessibility of residential areas for wheelchair users. The focus is on the Cerak Vinogradi and Višnjička Banja neighborhoods, significant examples of late modernism. The goal of the paper is the proposition of design recommendations for the formation of new accessible settlements and assessment of the current situation with the formation of a map for orientation and problem-solving. The research method includes the analysis of the accessibility of public spaces and entrances to buildings through field research and accessibility mapping. The results show that Cerak Vinogradi has better entrance accessibility, while Višnjička Banja shows a clearer pattern of inaccessibility of public spaces. In the Cerak Vinogradi neighborhood, accessibility problems mainly arise from the low-grade materialization of paving and numerous "dead ends". In Višnjička Banja, accessibility problems are more pronounced due to inadequately designed cross passages and large height differences. Additionally, design logic to be applied in future projects to ensure accessibility is identified. This includes placing streets in the direction of isohypsis to minimize height differences, carefully planning building entrances to avoid internal obstacles such as stairs, ensuring continuity and legibility of space, as well as properly solving parking problems to ensure the smooth movement of people in wheelchairs.

Keywords: *accessibility, social sustainability, disability, wheelchair, heritage*

1. INTRODUCTION

Accessibility plays an important role in social sustainability as a part of sustainable urban development, and in the past two decades, several laws and regulations have been successfully implemented in Serbia that oblige designers and contractors to build accessible spaces. However, there is no system to control the implementation of regulations regarding accessibility, which is why newly built ramps are too steep or do not exist at all [1]. Due to the lack of a control system, it is necessary for us as architects to be one step ahead and to understand from the initial urban planning phase which of our decisions create barriers for people with disabilities. The paper researches the requirements that should be included in the design logic when considering the issues of the morphology of residential areas to ensure the technical requirements that enable the smooth communication of wheelchair users.

Although some newly built buildings are accessible, there is no systemic solution for the adaptation of inherited buildings, interventions are carried out on the buildings when necessary, concerning residents' reports. Accessibility is possible only if urban structure consisting of old and new residential buildings, public institutions, and spaces are connected. The paper investigates the wheelchair

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accessibility of neighborhoods Višnjička Banja (Figure 1.) and Cerak Vinogradi (Figure 2.). These settlements represent a significant part of the architectural heritage of late modernist architecture and urbanism. The connection between residential buildings and public spaces does not ensure accessibility, and people with disabilities do not have access to information on which buildings/roads are accessible, which creates additional problems in their daily communication. The complications and effort required to leave the house in an unregulated system further demotivate people with disabilities [2], so that they practically do not use the public spaces of Belgrade.

All the mentioned factors point to the importance of looking at accessibility at the system level, which is why it is necessary to conduct the research primarily in planned settlements. The problem of accessibility is especially evident in settlements located on steep terrain. The settlements of Cerak Vinogradi and Višnjička Banja were selected for analysis because they were planned in the same period and on a similar steep terrain morphology. The main research questions are which design decisions have influenced the accessibility quality of the analyzed settlements and which problems occur in the settlements independently of the designers. The goal of the research is to understand the origin of the problems that arose in the context in order to establish design recommendations for designing the new accessible settlements, and on the other hand, to assess the state of the selected settlements and to create a map that can be used for orientation and problem-solving. The paper provides an overview of accessibility in the historical and social context, and a brief description of the settlements Cerak Vinogradi and Višnjička Banja, after which the method of data analysis and systematization will be given. The paper ends with a discussion of the collected data with a focus on general design recommendations and problems in context and a general conclusion.



Figure 1. Višnjička Banja
(<https://architectuul.com/architecture/visnjicka-banja>)



Figure 2. Cerak Vinogradi
(<https://www.kcb.org.rs/2021/04/naselje-cerak-vinogradi-kulturno-dobro-republike-srbije/>)

2. PHYSICAL AND SOCIAL CONTEXT OF RESEARCH

2.1. Accessibility in social, historical and architectural-urban context

The term "accessibility" has different meanings in different disciplines and contexts. Given that the concept of accessibility is defined by the relation between a person and the material and immaterial context that surrounds them, accessibility is relevant in social sciences and it is not possible to research it with quantitative methods, but it is necessary to conduct qualitative research. Accessibility has the greatest importance in the fields of economics, sociology, urban planning, and architecture, most often in the intertwining of these fields. In the literature, it is most often observed in the physical context, but in the broadest sense, it represents the individual's ability to satisfy physical and spiritual needs in the context in which they exist.

Every person encounters barriers that prevent them from satisfying their needs regarding their social status, the country they live in, physical health, etc. For example, countries that are poor in natural resources have limited access to necessities such as water and food, and religious minorities around the world may encounter a lack of religious infrastructure, which can act as a barrier to meeting religious needs. Nowadays, conversation about the accessibility of information due to digitization is active, because digital literacy is needed to function within society. Identical barriers are not equally limiting to all people; accessibility, therefore, consists of a complex scope that can only be researched from fragments, by selecting users and the barriers they face in order to remove them.

Space in conjunction with the social context plays a significant role in the creation of barriers, which is why the concept of accessibility is very important in architecture. Architects design barriers to achieve certain goals; stadiums and arenas have physical barriers, which are overcome by buying tickets for events, and in this case, the physical barrier is connected to the economic factor. School and kindergarten facilities are supervised, accessible only to children, parents, and staff, and designed with controlled barriers to ensure children's safety. In prison facilities, the design of barriers is the most significant, because they represent spaces where access to inclusion in society is limited for people who are not safe for it. This term most often implies the accessibility of physical space for people with disabilities and the removal of barriers by adapting the space to ramps and elevators. This fragment is the most researched and legally regulated, and it will be explored in the paper. In relation to the fact that limitations and barriers always exist in architectural work, we can conclude that the goal is not to create barrier-free architecture, but optimally regulated barriers that enable a normal life for people with disabilities.

Another thing that is important to understand is that the accessibility of architecture in the context of disabilities is understood as a problem that existed until the second half of the 20th century, after which the situation improved. However, society's attitude towards people with disabilities is part of a historical course with phases of improvement and deterioration. Since ancient times, people have been organized into social systems and alliances, and one of the greatest achievements of human civilization is the care of the weaker members of society and the development of a system of care for them. Religious buildings were initially used as places to care for the sick, such as in the temples of ancient Egypt, and Christian monasteries that took care of the sick. During the Industrial Revolution, the opportunity for mobility that never existed before occurred, and in this period, an ideological change occurred where caring for the weaker members of society lost importance [3]. After the First and Second World Wars, the situation worsened with a large number of injured people who were unable to work. During the 70s the conscience of the condition of people with disabilities was reawakened [4], and until today, the necessary parameters of an accessible space have been quite researched. The next step is the implementation of the observed necessary parameters at the system level, as well as the consideration of needs that are not only physical but also spiritual.

2.2. Cerak Vinogradi and Višnjička Banja

During the 70s of the 20th century, a sudden wave of industrialization and urbanization in the former Yugoslavia caused migration from the countryside to the city. There was a need for large cities, and by the end of 1980, the construction of 800,000 apartments was planned.

The concept of the Cerak Vinogradi (Figure 3.) neighborhood is a hierarchical organization of spatial sociological levels of the neighborhood to create favorable conditions for humane housing. Pedestrian residential streets are grouped into small neighborhoods that are encouraging residents to gather. The pedestrian paths of the three neighborhoods are directed towards the stretch of the neighborhood park, on which the center of the neighborhood, the school, the pre-school facility, and free spaces rest [5]. A series of buildings that were placed on the sloping terrain on one side of the park were selected for analysis, to research the communication between the buildings and the relationship with the park. Streets and traffic are separated from the park areas by buildings, with only narrow fire protection/integrated streets passing through. The Cerak Vinogradi neighborhood was recognized as a cultural heritage and was selected for display at the MoMA Museum of Modern Art in New York, as part of the "Concrete Utopia - Architecture of Yugoslavia 1948-1980" exhibition. After the exhibition was completed, it was selected for the Museum's permanent collection, as one of two works from Serbia, thus confirming its status as a national and international cultural heritage [6,7].

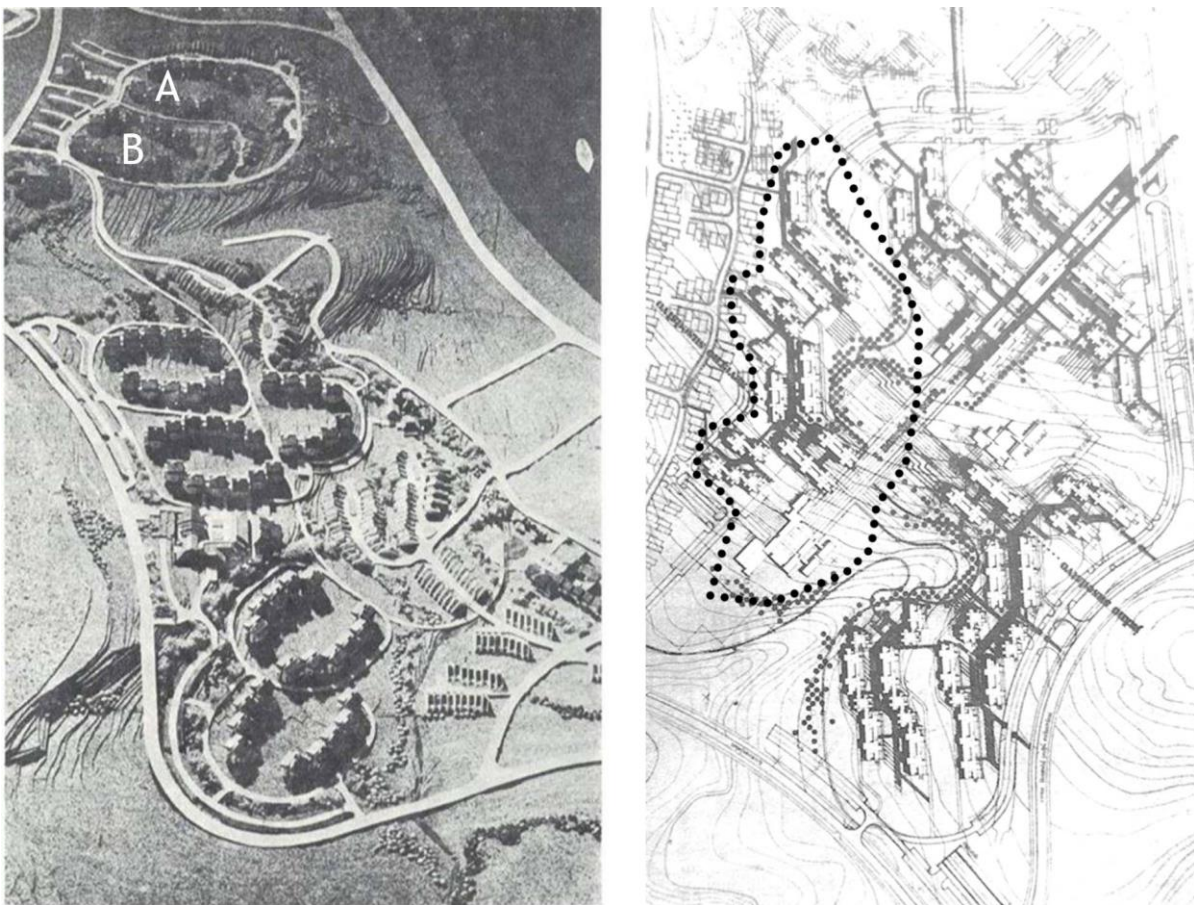


Figure 3. Višnjička Banja model (left) and Cerak Vinogradi plan (right)

(<https://www.facebook.com/photo/?fbid=2388036251273543&set=a.487321424678378>, Šobota, Đ., 1978., Model izgradnje stambenog naselja "Cerak Vinogradi" u Beogradu, Beograd: Arhitektonski fakultet, 1978)

The Višnjička Banja neighborhood is a residential neighborhood built as an investment by the Belgrade Housing Association, with planned high-density collective and individual housing zones. In addition to residential buildings, the urban project provides for an elementary school, two kindergartens, a local community center, and provides one parking spot per resident [8,9]. Višnjička Banja is made up of several rings of a similar organization that are connected by a common street in the south. Rings A and B from the urban setting were selected for the analysis (Figure 3), which consist of a common ring-shaped street, placed along the slope of the terrain. Within the individual rings, there are two rows of multi-family buildings of higher density that are symmetrically placed along the common park space located between them. The terrain slopes downward towards the north. The neighborhoods were selected concerning the characteristic that they were planned on hilly terrain and at a similar time. Relevant segments were selected based on the general analysis and through a more detailed observation of the context, the objects to be studied were selected. For the analysis, two segments were selected that represent the essence of the relationship between urban planning and architectural setting, i.e. relationship between public spaces and facilities. Segments measuring around 250x250m were selected (Figure 4.), and the selected buildings surround the public green area along the entire decline of the terrain. Public spaces on Cerak and in Višnjička Banja are formed similarly, the buildings separate the park area from the street, with the difference that there is one common park space on Cerak, while in Višnjička Banja each ring has its own smaller private park.

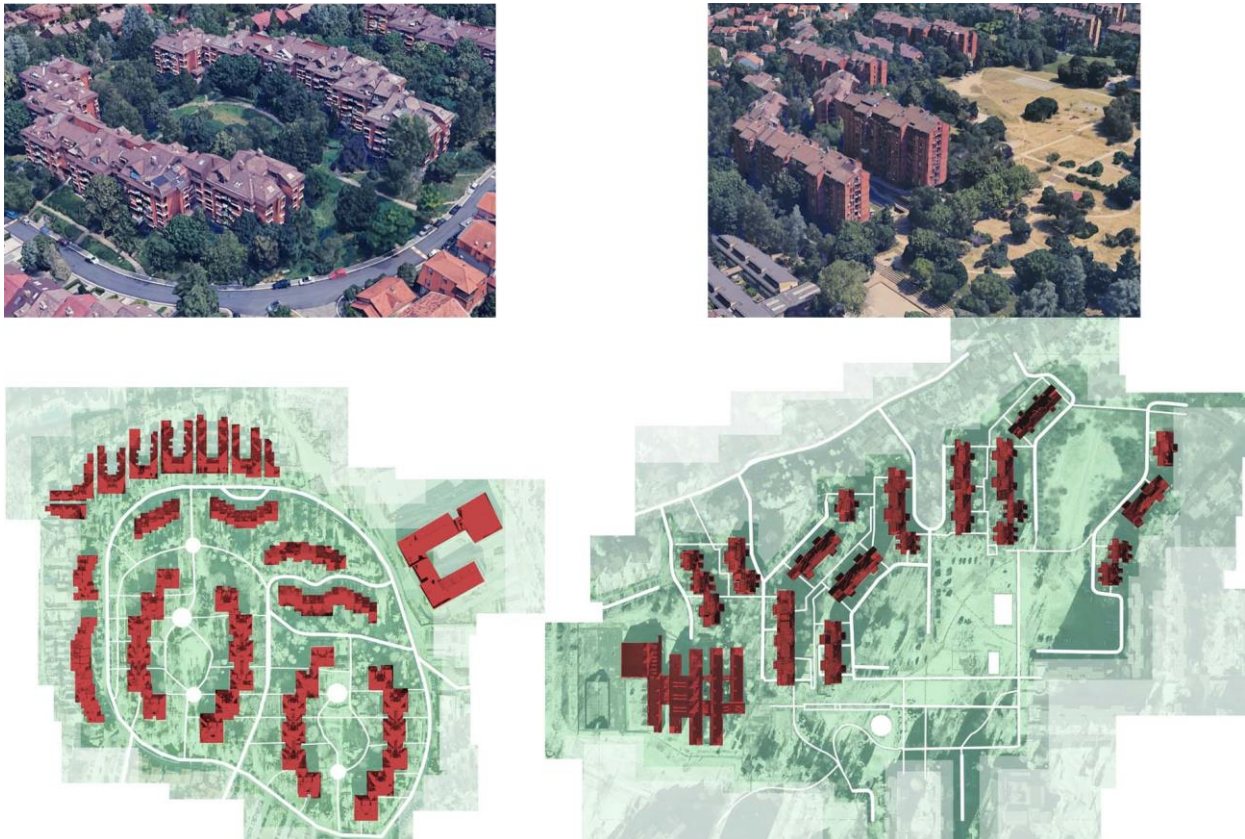


Figure 4. Selected segments in Višnjička Banja (left) and Cerak Vinogradi (right) (google earth and author illustration)

3. METHODOLOGY

Accessibility is analyzed regarding three aspects: public spaces, access to building entrances, and literature review of relevant regulations and documents. These three aspects were chosen, because the conclusions regarding accessibility as well as the design logic can be drawn by intertwining them. Three tools were used to research these aspects: a literature review, an analytical drawing, and a table (Figure 5.). The literature review is significant for all three analyzed aspects. The literature that generally studies the subject of accessibility is significant for analyzing aspects of public spaces and entrances, it provides input data on how the space should be organized, materialized, and connected. The Alliance for Accessibility of Serbia provides a useful overview of current regulations, inconsistencies, and unfulfilled conditions. Graphic and written documentation of the projects of the analyzed settlements gives an insight into the understanding of the wider picture and the observation of patterns (mostly the access to public facilities, and the urban layout of the settlement is similar). The analytical drawing indicates the flow of movement and its interruptions. The table in which the access to the entrances systematizes the data on the accessibility of the facilities and the level of necessary intervention. By synthesizing the data from the table and the drawing, a stance and conclusions are formed concerning the data that emerges as a result.

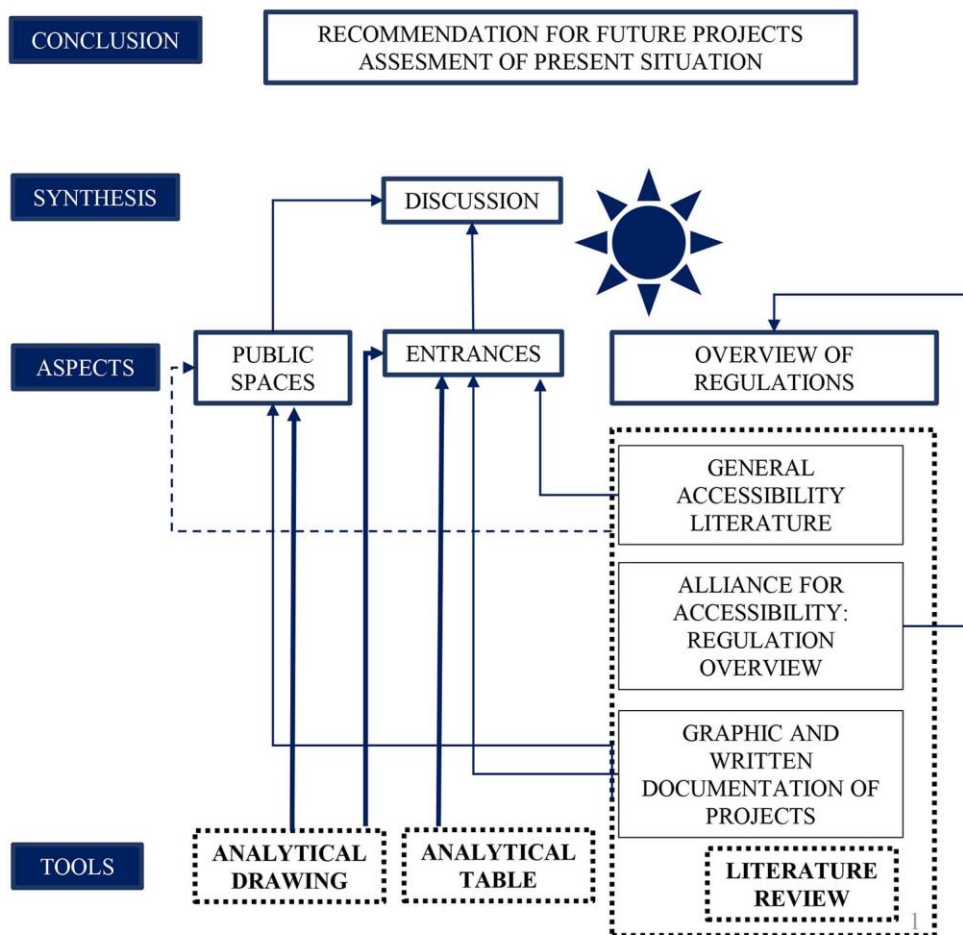


Figure 5. Methodology diagram

3.1. Analytical drawing

Analytical drawing was used to reveal the problems that occur in public spaces. Streets with sidewalks and footpaths are mapped in the drawing, different categories are formed concerning the conditions that interfere with accessibility. Streets represent an important communication flow that enables people with disabilities to connect with other parts of the city, public institutions, and facilities. Due to the aforementioned importance of streets in communication, they are mostly marked with a thick green solid line as passable.

The impossibility of using the sidewalk is a problem that puts people who don't have walking problems at risk, even though the streets represent a space that people in wheelchairs know for sure that they can use, this type of communication is not safe. Such situations of the relationship between the sidewalk and the street are marked in yellow as slightly problematic. Sidewalks and footpaths are important because they are the only surfaces that people in wheelchairs can use for safe movement. Pedestrian paths and sidewalks are marked in three categories: passable, slightly problematic, and extremely problematic.

Passable sidewalks and footpaths represent spaces that can be accessed from the entrance of buildings and the street. They are marked with a thin dashed green line. Mildly problematic segments are those that are easy to solve, while extremely problematic segments are those that require more energy to solve. The slightly problematic segments are separated by one low step, poor paving, poor materialization of the paving, and a sidewalk where cars are parked illegally. Such parts are marked with a thin dashed yellow line. Extremely problematic segments are those in which movement is not possible and they are marked in red, and arrows indicate places where there is a height difference. A red arrow indicates an altitude difference that cannot be overcome, a yellow one with difficulties, and a green one that is well overcome (Figure 6.).



Figure 6. Types of roads and sidewalks a) passable sidewalks b) problematic and unpassable sidewalks c) both sidewalks are unusable, people need to walk on the road d) types of ramps: problematic; passable, unpassable

3.2. Analytical table

To analyze the relation between buildings and public space, the buildings are labeled CV1-17 and VB1-19 and it is written how many entrances there are in which unit. Access to the entrances was analyzed through a table listing the entrances, the number of floors, the height of access to the entrance, and the number of steps. Concerning entrance accessibility, buildings are marked in three categories according to a similar system as pedestrian streets. Accessible entrances are entrances to buildings that are accessible from the street without steps or using a suitable ramp. Accessible entrances are marked in green color. It is estimated that the average step is about 15 cm, and in relation to that slightly problematic entrances are those that are not accessible from the street, but there are up to 6 steps (90 cm), which requires a ramp of 11 m length, with one break. Extremely problematic entrances are those whose access is prevented with more than 7 steps, because this requires a ramp longer than 11m, as well as entrances whose access is too narrow, that is, all accesses that require greater intervention. Online portals used to create the table are Beoland; GIS Geosrbija; google maps; Street View; google earth; Cadmapper.

4. RESULTS

4.1. Public space

By comparing the maps on which the accessibility of public spaces is documented, it is noted that a pattern of inaccessibility can be observed in the Višnjička Banja (VB) settlement (Figure 7.), while in the Cerak Vinogradi (CV) neighborhood there are no patterns, there is only one space within the block that is not accessible (Figure 8.). In relation to the slope of the terrain and the way the buildings are organized in the VB settlement, it was necessary to make transverse passages that would enable easier communication of public spaces that also serve as an entrance to the building. The entrances to the multi-story buildings in the VB neighborhood are not accessible, which is why inaccessible zones of public spaces appear inside the "rings". The "readability" of the space could be highlighted as a positive aspect of this settlement, it is very clear which parts are not accessible, which is why it is easy to bypass them and use the available space without interference.

In the CV neighborhood, the park space is represented by the spaces within the blocks, as well as the main park space between the blocks. In the CV neighborhood, it can be seen that most of the public space is physically accessible, but the problem that arises is the poor materialization of paving and a large number of "dead ends". Commonly several steps are placed in the public space without necessity, but contribute to the ambient value of the whole. In some situations it is necessary to go over 50m to access different levels that physically border each other, which leads to confusion and makes the public spaces of the CV inaccessible in terms of the readability of the space. The extremely inaccessible segment of the CV neighborhood represents the design culmination, where the public space is the most complex and takes place on several levels. A problem that can be observed in both neighborhoods is the parking of cars on the sidewalks. This behavior can be observed in a pattern on sidewalks that are not adjacent to houses.

4.2. Access to entrances

Considering that the selected neighborhoods were built at a similar time and have similar characteristics, the initial assumption was that the problems with the entrance accessibility would be similar. However, after a tabular review of the entrance accessibility data, it was found that this assumption is not correct. When looking at the accessibility map of the entrances in the neighborhoods VB and CV, it is noticed that the buildings in Višnjička Banja are mostly problematic in multi-family buildings, while in the neighborhood CV the entrances to the buildings are mostly slightly problematic or accessible (Table 1.). Also, in the CV neighborhood there is a pattern in the accessibility of entrances, while in VB the data varies. In situations where the slope of the terrain is less steep, the entrance is easy to access (eg grouping VB3), while in situations where the terrain is steeper, the height difference can be over 20 steps compared to the street (eg grouping VB1). Accessible entrances are mostly in family houses, which affects the smaller number of users and makes these data less relevant. One of the problems in the Cerak Vinogradi settlement is that the entrances are accessible, but inside the entrance, there are stairs that are difficult to overcome. In the category of slightly problematic entrances, there is a difference between Višnjička Banja and Cerak Vinogradi. In Cerak Vinogradi, the height difference is 2-4 steps, while in Višnjička Banja, the number of steps is 7-12, which requires ramps longer than 15 meters.

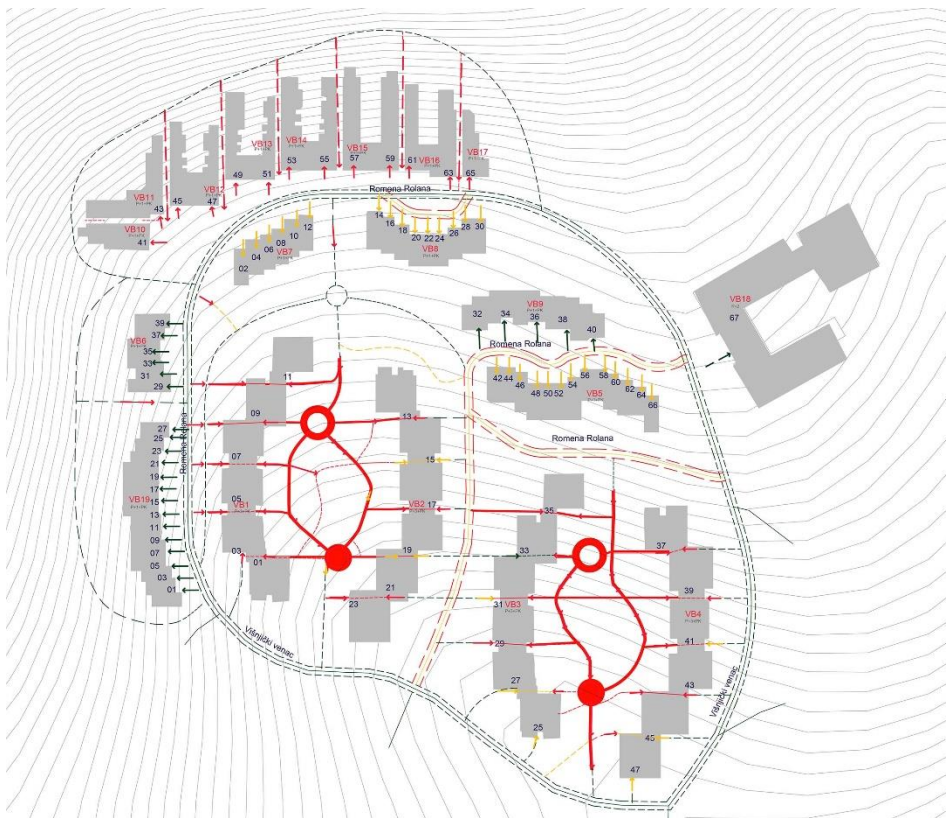


Figure 7. Višnjicka Banja accessibility map



Figure 8. Cerak Vinogradi accessibility map

Table 1. Entrances accessibility (green -accessible, yellow -problematic, red-unaccessible)

Group	Street	Entrance	Steps
VB1	Višnjički venac	1	12
VB1	Višnjički venac	3	15
VB1	Višnjički venac	5	20
VB1	Višnjički venac	7	20
VB1	Višnjički venac	9	20
VB1	Višnjički venac	11	20
VB2	Višnjički venac	13	10
VB2	Višnjički venac	15	4
VB2	Višnjički venac	17	12
VB2	Višnjički venac	19	5
VB2	Višnjički venac	21	7
VB2	Višnjički venac	23	20
VB3	Višnjički venac	25	4
VB3	Višnjički venac	27	6
VB3	Višnjički venac	29	7
VB3	Višnjički venac	31	6
VB3	Višnjički venac	33	1
VB3	Višnjički venac	35	7
VB4	Višnjički venac	37	12
VB4	Višnjički venac	39	12
VB4	Višnjički venac	41	8
VB4	Višnjički venac	43	7
VB4	Višnjički venac	45	6
VB4	Višnjički venac	47	6
VB5	Romena Rolana	42-66	4
VB6	Romena Rolana	29-35.	0
VB7	Romena Rolana	2-12.	4
VB8	Romena Rolana	14-30.	4
VB9	Romena Rolana	32-40.	0
VB10	Romena Rolana	41	20
VB11	Romena Rolana	43	20
VB12	Romena Rolana	45;47	20
VB13	Romena Rolana	49;51	20
VB14	Romena Rolana	53;55	20
VB15	Romena Rolana	57;59	20
VB16	Romena Rolana	61;63	20
VB17	Romena Rolana	65	20
VB18	O Š „Milena Pavlović–Barili“	67	6
VB19	Romena Rolana	1-27.	0

Group	Street	Entrance	Steps
CV1	Breza	8	4
CV1	Breza	10	4
CV1	Breza	12	4
CV2	Breza	11	1
CV2	Breza	13	2
CV3	Breza	6	6
CV3	Breza	4	4
CV4	Breza	9	4
CV4	Breza	7	
CV5	Breza	2	3
CV6	Breza	1	0
CV6	Breza	3	3
CV6	Breza	5	3
CV7	Kestenova	2	4
CV7	Kestenova	4	6
CV7	Kestenova	6	6
CV8	Kestenova	5	0
CV8	Kestenova	7	0
CV9	Kestenova	9	3
CV9	Kestenova	11	4
CV10	Kestenova	1	0
CV10	Kestenova	3	1
CV11	Jasenova	8	6
CV11	Jasenova	10	2
CV12	Jasenova	6	1
CV12	Jasenova	4	7
CV13	Jasenova	2	5
CV14	Borova	2	7
CV14	Borova	4	6
CV14	Borova	6	6
CV15	Borova	1	0
CV15	Borova	3	2
CV16	OŠ Ujedinjene Nacije)	8	

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5. DISCUSSION

Although a higher percentage of public spaces is accessible in CV, the quality of accessibility of public spaces is more favorable in VB concerning the networking and readability of spaces and systemic problem-solving would be simpler. The first step in the creation of central accessible park spaces of the VB is the adjustment of the transverse passages where the entrances are located, and then the networking within the park space. Interventions in public space that would be necessary for the CV neighborhood are the implementation of ramps to eliminate "dead ends". "Desire paths" that exist on the site overcome the height differences and indicate the areas where the space should be paved to enable the flow and connection of the space. Parking on the sidewalk and poor paving often result in the necessity of using the roadway for people in wheelchairs, which is an unpleasant and demotivating phenomenon. In this context, the first step in establishing sidewalk accessibility is to systematically solve the parking problem and sanction illegal parking.

It was concluded that the Cerak Vinogradi neighborhood has better entrance accessibility characteristics compared to Višnjička Banja, where most of the residential areas are not accessible. Interventions in the CV neighborhood would involve adjusting the space inside the building's entrance where there are several steps, and these interventions are similar on all buildings and would not negatively affect the ambient value of the whole. In the VB settlement, the interventions would be ramps that would have unique dimensions for each entrance and would require the removal of handrails that represent part of the neighborhood's ambient value.

The design logic that has been observed is related to the urban layout of the streets and the reaction to the terrain. In CV, the streets are placed in the direction of the isohypsis, and the entrances are placed perpendicular to them. This design decision makes it easier to overcome height differences, making entrances more accessible. In Višnjička Banja neighborhood, the streets are placed steeply and along the slope of the terrain, which creates greater height differences and makes the entrance more difficult to access. The focus of the urban layout of the Višnjička Banja neighborhood was to provide a view of the river to as many apartments as possible, which conditioned the layout of the streets. In the CV, the focus was on the establishment of people-friendly spaces, away from car traffic, with integrated streets that contribute to the favorable features of accessibility to the entrances.

Accessible design logic should be applied in future projects concerning the following guidelines: it is desirable to place streets in the direction of isohypses to minimize height differences, careful planning of building entrances to avoid internal obstacles such as stairs, ensuring continuity and legibility of space, as well as proper solving parking problems, to ensure the undisturbed communication for people in wheelchairs. In case some factors require the steep placement of streets each entrance needs special attention, which represents a design challenge that can contribute to the quality of the entire project.

6. CONCLUSION

This paper researches the accessibility of Cerak Vinogradi and Višnjička Banja and highlights the importance of looking at accessibility in a wider social context. Accessibility is not only a technical, but also a social problem that affects the daily life of people with disabilities, it is important that accessibility is not only seen as a physical ability to move, but also as enabling equal chances for all citizens to meet their physical and spiritual needs. Analysed problems, such as inaccessible entrances, poor materialization of paving and improper parking, complicate the communication and use of public spaces, which leads to social isolation and demotivation of wheelchair users.

This research fits into the broader context of social sustainability by pointing to the necessity of a systemic approach to accessibility. The essence of improving accessibility lies in the creation of a system that will ensure the consistent application and improvement of legal regulations and standards. It is necessary to establish an effective system of control and maintenance of accessible spaces, as well as continuous education and sensitization of designers, contractors and the general public about the importance of accessibility. In this way, future neighborhoods can be designed to remove existing barriers and prevent the creation of new ones, enabling disabled people to be included in social life. Further research may focus on the application of artificial intelligence (AI) in the creation of these systems. AI can play a key role in analyzing existing structures, identifying problems and proposing optimal solutions to improve accessibility. By using AI technologies, such as machine learning and big data analysis, it is possible to create dynamic and adaptive models that will effectively contribute to the design and implementation of accessible urban spaces.

In conclusion, accessibility must become an inseparable part of design logic and urban planning, with the aim of forming inclusive, sustainable and socially responsible urban environments.

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Exploring Blue-Green Infrastructures for Rainwater Management: the Case of Fethiye, Turkey

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Extended abstract

"Sustainable Cities and Communities" which is one of the United Nations' 17 Sustainable Development Goals, aims to make cities and human settlements inclusive, safe, resilient, and sustainable. One of the most important principles of a sustainable city is rainwater management especially considering the increasing frequency of extreme weather events due to climate change which can negatively affect the quality of life. For stormwater management; compared to traditional piping and storm ponds, Low Impact Development (LID) practices provide more sustainable solutions (Chen, Samuelson & Tong, 2016). Blue-green infrastructure, which is designed to achieve long-term sustainability, provides many benefits related to society, culture, business, and ecology. While not sufficient on its own to protect the threat of wildlife, it has been shown to increase habitat connectivity (Nguyen, Meurk, Benavidez, Jackson & Pahlow, 2021). The study focuses on the critical aspect of rainwater management within the context of sustainable urban development, particularly in a specific case study which is Fethiye, Turkey. The reason for choosing the case-study area is high rainfall, heavy rains, and floods affecting daily life, and infrastructure works including rainwater-related works. According to the precipitation normal report prepared by MGM, Fethiye received between 600 and 800 mm of precipitation in 2021 while the normal precipitation in Turkey is 573.4 mm. Heavy rains and floods occurred recently (2021,2022 and 2023); and various houses, workplaces, and greenhouses were damaged in these raids. In addition; infrastructure and superstructure works are done including the undergrounding of power lines by AYDEM in some regions, the renewal of drinking water and stormwater drainage lines by MUSKI, and the expansion of infrastructure lines by telecommunication companies. It was completed by pouring hot asphalt (BSK) with the motto of "modern Fethiye" in July 2022. In this framework, infrastructure works and preferred methods related to rainwater management in Fethiye were examined. To understand the general organization of the rainwater management system, a diagram supported with photographs, was created for the case-study area. After the current situation was fully examined, similarities and differences between the case-study area and blue-green street pilot projects from Hamburg and Copenhagen were analyzed. Finally, the study was completed with recommendations for the case-study area.

Keywords: *sustainable development; rainwater management; blue-green infrastructure; urban green area; climate and risk resilience*

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Deployment of mobility hubs and its impact in the urban context of Vienna and Munich

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Abstract

Due to climate change, cities are facing serious problems caused by rising temperatures. Converting street space into areas with high standards for a pleasant quality of life is a suitable strategy to mitigate the negative effects. For example, the city of Vienna recently published a climate roadmap as a guideline for designing a "climate-friendly" built environment. Tree planting should lead to shaded areas and low surface temperatures. However, these measures require space. Redistribution of the space allocated to car traffic could both provide the necessary space and decrease urban air pollution. In addition to limiting car traffic, improving public transport services and enhancing infrastructure for walking and cycling, several European cities are introducing new shared modes of transport as a missing link in the transport system. In this context, the concept of mobility hubs has been introduced to make the various mobility services more accessible by integrating the different transport options. As part of the European SmartHubs research project, a multidimensional typology for mobility hubs was developed, which includes three dimensions: physical, digital and democratic integration (SmartHubs integration ladder). Each dimension has 5 levels that allow the comparison of different hubs with different services to analyze potential impacts (Geurs, et al., 2022). However, the degree of impact on mobility behavior and the framework conditions to become a sustainable alternative to the private car is currently less known (e.g. Miramontes, et al., 2017; Miramontes, et al., 2019, Tsouros, et al., 2021, Gkavra et al. 2024). For this reason, a standardized survey was conducted in four urban areas in Europe.

The paper will focus on the comparison of the results gained in the cities of Vienna and Munich, as these cities have similar spatial characteristics, e.g. in terms of number of inhabitants or the availability of public transport, and shared modes of transport are already available in both cities. A total of 1022 people responded to the questionnaire. Almost 66% of respondents stated that they had already seen a mobility hub and are aware of it. Of these, around 40% had already used at least one of the sharing services offered at the hubs. The most popular shared modes of transport in Munich are shared e-scooters or shared cars, each with a proportion of around 37%, while in Vienna car sharing is used most frequently at 28% (multiple answers possible). The younger the people are, the higher their interest in shared modes of transport seems to be. The sample design enables the analysis of the socio-demographic characteristics and mobility behavior of certain population groups to form the basis for an impact analysis and further recommendations.

Keywords: *shared mobility, mobility hub, mobility services*

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1. INTRODUCTION

Due to the climate change, cities are facing serious emerging problems caused by rising temperatures. Converting street space into areas with high standards for a pleasant quality of life is a suitable strategy to mitigate the negative effects. For example, the City of Vienna recently published a climate roadmap as a guideline for designing a "climate-friendly" built environment. Measures such as tree planting should lead to shaded areas and low surface temperatures. However, these measures require a lot of urban space allocation. On the contrary, redistribution of the existing space dedicated to car traffic could both provide the necessary space and decrease urban air pollution. In addition to limiting car traffic, improving public transport services and enhancing infrastructure for walking and cycling could contribute to a more sustainable mobility network. Several European cities are introducing shared modes of transport to fill in a missing link in the transport system. In this context, the concept of mobility hubs has been introduced. Mobility hubs aim to increase accessibility make the various mobility services more accessible by integrating the different transport options.

Ideally, both public transport and multiple shared modes, such as shared bikes and shared cars, should be present in a mobility hub. The hubs should have a dedicated space that also facilitates more mobility infrastructure e.g. parking of private vehicles. Additionally, non-mobility facilities such as repair, eating, shopping, and logistic pick-up points should be added to increase the attractiveness and efficiency hubs. In the course of the European SmartHubs project a multidimensional typology for mobility hubs was presented, the SmartHubs integration ladder, which includes three integration dimensions: physical, digital and democratic integration. These dimensions can be used to assess and compare different mobility hubs regarding the consideration of universal design principles [1].

With the abovementioned characteristics, mobility hubs have the potential of transforming both the mobility and urban space layers in the cities. Despite these assumptions, until today, there is limited research on specifying their (potential) impacts to both pillars. Past research, which focused on user profiles, found that public transport users are more likely to be early adopters of shared mobility [2] [3]. Users of public transport were also found to be more inclined to switch their mode of transport to shared e-mobility than car users [4]. Another study, comparing mobility hub user profiles in Manchester, Utrecht and Malmö, found user satisfaction and positive previous experiences with shared mobility to be an important factor in possible future uses of shared mobility services [5]. A study concentrating on shared e-scooter use in Munich found a high influence of temperature and precipitation on e-scooter use [6]. An attempt to describe the general interest and knowledge concerning shared mobility and characterize a user profile was made by Krämer and Bongaerts, using data from Switzerland, Germany and Austria. Their research found that while awareness of shared mobility services is relatively high in all three countries, only few people consider it to be relevant regarding their own mobility. Furthermore, they found that no coherent demand segment for shared mobility exists for these countries [7]. Research focusing on equity in transportation stressed the need to install infrastructure for electrical vehicles in areas with currently low demand, e.g. low income and rural areas, to increase accessibility and awareness and thereby increase shared mobility usage and usage of electrical vehicles overall [8].

The impacts of mobility hubs were discussed in a recent study conducted in Munich, where users of shared bikes and cars were found to increase their use of public transport after adopting shared mobility [9]. Another study focusing on shared car usage in Berlin and Munich showed, that a large share of car-sharing users doesn't own a private car, naming absence of need to own one as the main reason [10]. Nonetheless, to create a comprehensive understanding of the changes in mobility behaviour induced by mobility hubs and the circumstances under which mobility hubs pose a true alternative to private motorised mobility, more research is necessary.

Within the European SmartHubs research project a standardized survey was launched in four European regions in Belgium, the Netherlands, Germany, and Austria. The survey had multiple goals, including identifying the current level of awareness and usage of mobility hubs. Furthermore, the

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survey collected data on the barriers that people face towards embracing mobility hubs. The present paper discusses the descriptive results of the data collected in two European cities, Vienna and Munich. The main research objective is to enrich our knowledge on mobility hubs' current usage, and corresponding impacts as well as determining the factors that restrict their potential.

2. URBAN CONTEXT OF VIENNA AND MUNICH

For a better understanding of the urban characteristics in the study areas, the present chapter describes both Vienna and Munich regarding their population, strategies on future transport development and shared mobility services. As of October 2023, Vienna had 2.002.821 inhabitants [11], up to the year 2048 the population is estimated to grow to 2,2 Million [12]. Munich had a population of 1.589.038 in January 2023 and an increase in population numbers to 1,81 Million is projected for the year 2040 [13].

In 2023, Vienna's modal split shows a strong emphasis on public transport and walking, each making up 32%. Motorized private transport comes in second place with 26% while the share of bicycle use makes up for 10% [14].

The most recent available data on Munich's modal split comes from data collected in 2017. The data

revealed that motorized private transport, public transport and walking each accounted for 24% of the modal split. The modal split for Munich also differentiates between actively driving and being a passenger in motorized private transport. As being a passenger constitutes 10% of the modal split in Munich, the total share of motorized private transport users sums up to 34% of the modal split. The bicycle as a mode of transport accounts for 18% of the modal split [15].

According to the City of Vienna reports, 240 mobility hubs are already installed across all districts of the city [16] [17]. Other sources state, that 185 permanent mobility hubs exist that can be expanded with 50 digital and mobile stations for major events taking place in the city [18]. The mobility hubs each consist of a bike sharing station and for around 50 of them, car sharing stations are added [19] (see Figure 2 for an example). Additionally, four companies (Lime, Bird, Link, Voi) provide shared e-scooters [19].

Munich implemented a new platform in the course of the development of their new mobility strategy called Münchenunterwegs over which information on mobility hubs, called Mobitatsstationen, are distributed (see Figure 3 for an example). Nonetheless, information on their number and available offers is scarce. By 2026, 200 mobility hubs are planned to be installed that should include car, bike and e-scooter sharing options. A consultation of the mapped stations shows around 50 already installed mobility hubs. The Munchner Verkehrsgesellschaft MGV provides the largest share of available shared bikes and works with a station-based model while all other providers use a free-floater system. [20]

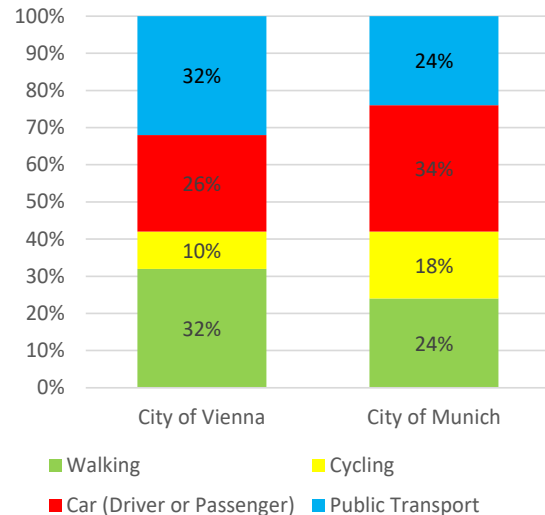


Figure 1. Modal Split of Vienna and Munich



Figure 2. Mobility Hub “WienMobil” in front of the railway station “Westbahnhof”



Figure 3. Mobility Hub in Munich

Munich is in the process of developing its new mobility strategy with the target year 2035 and provides a comprehensive outline. The main focus is to ensure higher accessibility and quality of stay in public spaces. Furthermore, living without a car should be possible and the total share of walking, bikes, more sustainable cars, and public transport should be raised to 80% by 2025. More specifically, Munich aims to raise the share of public transport in the modal split to 30% until 2030. With all these advancements transport in Munich is supposed to be climate neutral by 2035. The new strategy also includes the centralization of all mobility offers and creating framework conditions for a comprehensive offer of shared mobility. Shared mobility should become more attractive than motorized private transport and the transition from one mode of transport to another should be as easy as possible. The specific goal for the already-implemented mobility hubs is to rise their number to 200 by 2026 [21].

The City of Vienna issued their mobility strategy STEP25 in 2014, defining fairness in the public space, health and active mobility, compactness and short ways respectively, ecological mobility, resilience and efficiency as the main goals. The strategy is complemented by a list of measures for each mode of transport to achieve said goals. In more detail, the spatial share of public spaces for walking, cycling and public transport should rise, 30% of the population should participate in active mobility, 45% of all trips for the daily demand should be done using a form of active mobility and emissions and energy demand should decrease by 20% by 2025 [22].

3. SURVEY SAMPLE

The goal of the joint SmartHubs survey was to get more (quantitative) understanding of the current and potential use of mobility hubs gaining an insight into the characteristics (socio-demographic, mobility) of current and potential users of mobility hubs as well as on people’s barriers and willingness to use mobility hubs under various circumstances. To enable the analysis data had to be representative for the population as well as allow in-depth analysis on particular groups of the population. Therefore, based on the sociodemographic characteristics of the population, groups of interest and the SmartHubs objective on equity analysis, minimum sample requirements were defined prior to the data collection [23].

The whole area of the City of Vienna was targeted for data collection by commissioning a panel company. In Munich, data were collected by a panel company as well, but most responses were collected in-person at the main campus of the Technical University. Finally, some individuals responded online via a public open survey link distributed on media channels (e.g. via LinkedIn).

A total of 1022 people responded to the questionnaire in Vienna and Munich. Compared to the proportions of age groups as presented in the census data, the survey data show a higher share of younger participants in Munich due to the selected data collection methods, and in both cities less people older than 65, a well known hard-to-reach group in surveys. However, the total number of persons reached is sufficient to serve as basis for in-depth analysis, but needs to be considered for a stratified analysis of the data (Figure 4).

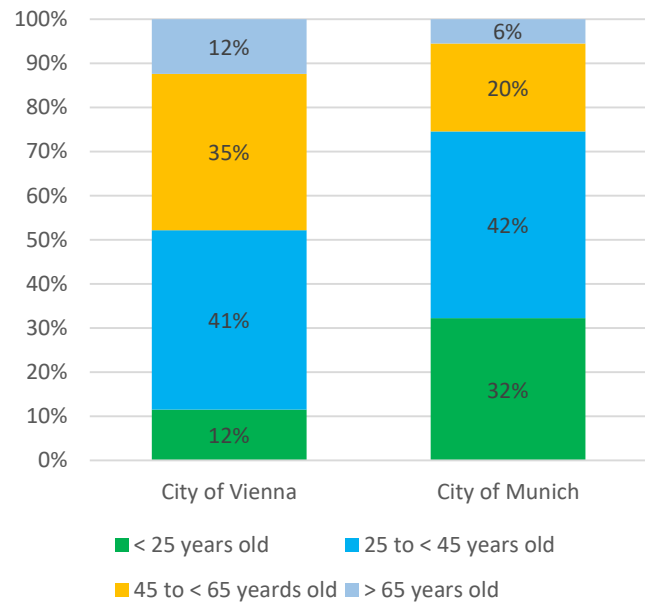


Figure 4. Age distribution of the respondents

4. SURVEY RESULTS

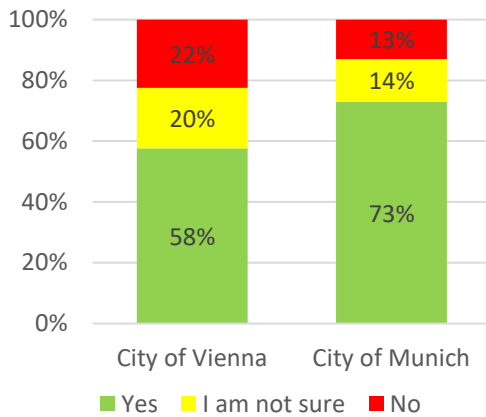
4.1 Awareness and mobility behavior among survey participants

Substantially more respondents in Munich than in Vienna stated that they have seen a mobility hub already (73%), of which 41% have used the service provided there. A remarkable number of 20% are not sure about their recognition of a mobility hub in Vienna. These results indicate that the awareness strategy and the noticeable design of the mobility hubs in Munich could have been more successful. However, it has to be noted that many of the mobility hubs have been established around already existing public transport stations in Vienna. Thus, the concept might not to be fully clear for the respondents. Moreover, the sample, as described in Section 3, consisted of more young people in Munich than in Vienna, who seem more familiar with shared modes (Figure 5).

The most popular shared modes of transport in Munich are shared e-scooters and shared cars, each with a proportion of around 37%, while in Vienna car sharing is used most frequently (28%) (multiple answers possible).

The detailed analysis of the socio-demographic characteristics determines the hypothesis that the services offered at mobility hubs are attracting younger people in particular and interest in them is lower for older people. Only 4% (Vienna) and 8% (Munich) of the respondents older than 64 years stated that they have used a mobility hub at least once. However, it is remarkable that only 56% of the respondents aged 25 to 44 years in Munich have already used any shared service (Figure 6).

Have you ever seen a mobility hub in your city?



Have you ever used a mobility hub in your city?

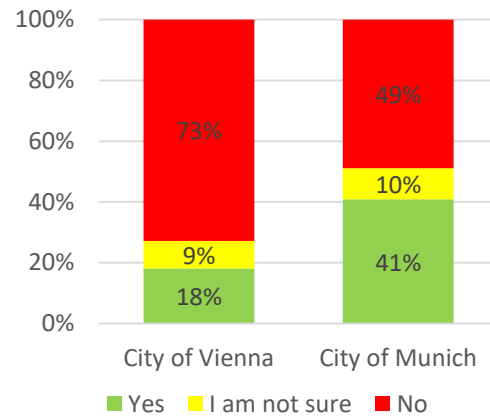


Figure 5. Recognition and usage of mobility hubs

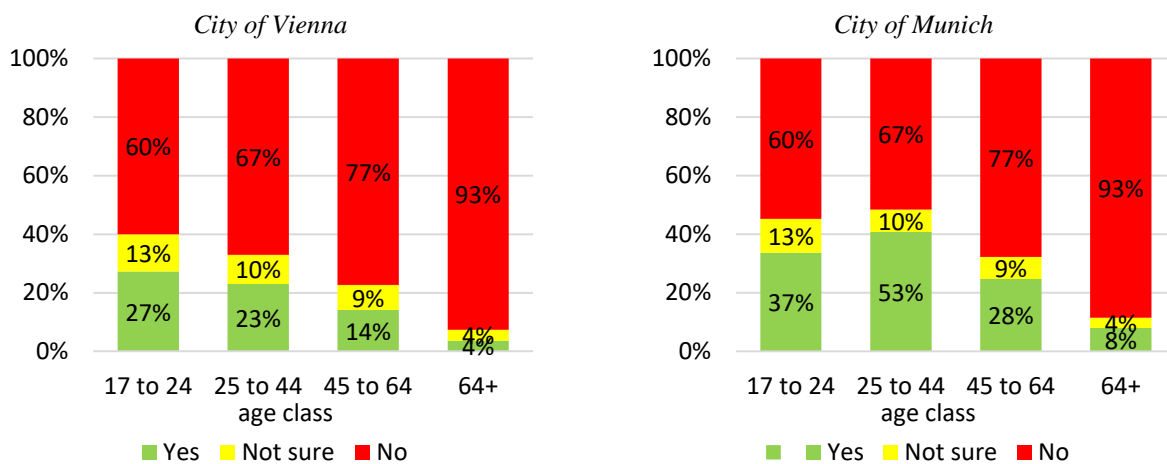


Figure 6. Age classes of hub users and non-hub users

A noticeable difference between Vienna and Munich is the share of hub users aged 25-44. While the age distribution of hub users in Vienna was as expected and agrees to previous findings [1][7], the share of hub users in Munich aged 25-44 surpasses the one of the youngest age group represented in this study (Figure 6). A possible explanation might be the higher prices for bike sharing in Munich compared to Vienna. The biggest provider in Munich, MVG, operates with a minute-based pricing system with 9 cent per minute for the standard tariff and 5 cents for students (no age limit) [24], whereas the pricing system of Vienna's provider, Wiener Linien, operates with a 30-minutes-based system and 0,75 cents per half hour for the standard tariff [25]. This means that students in Munich pay 1,50 Euros per half hour- double of the price in Vienna.

The main communality between Vienna and Munich regarding hub users and non-users is the age group of 64 years and over, showing an extremely small share of users in both cities (4% in Vienna, 8% in Munich). This could relate to the fact, that most sharing options, such as the bike sharing options mentioned earlier, require bookings and payment via either an app or online. Older people tend to be more reserved towards using new apps [26] and face greater accessibility issues (e.g. font size, navigation issues etc.) [27]. Thus, the need for accessible on-site information and payment options seems evident for attracting older people.

The survey also asked people for their modes used on a daily basis. It turned out that hub-users are using environmental-friendly modes more often in both cities. In particular, cars are used less frequent, but even more clearly bikes are used as a regular mode of transport. More than half of the hub users are taking their bike at least once a week, whereas this share drops to 39% among non-hub users (Figure 7).

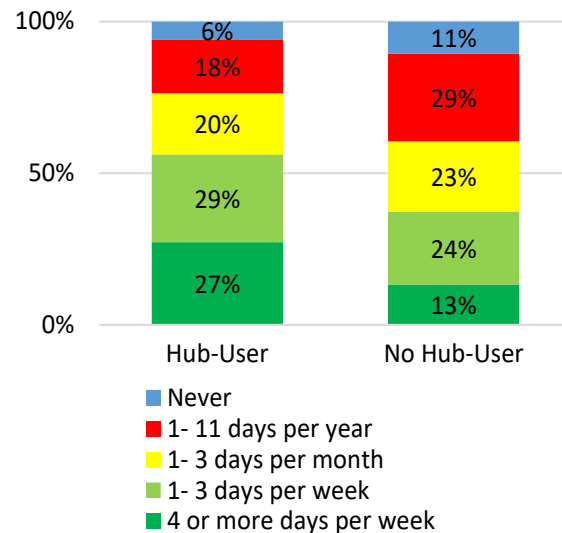


Figure 7. Frequency of using a bike

4.2 Barriers to using shared modes at hubs and potential usage of mobility hubs

As there is a substantial number of people in our dataset who have never used a mobility hub before, the survey also examined the reasons for not using hub-based services and distinguished between different options of shared modes. About one third of the respondents preferred using their own car (Figure 8), which means car ownership matters. As a consequence, the success of mobility hub in terms of reducing car traffic in a city depends not only on an appropriate offer, but on including restrictive measures to private car usage as well. The high share of respondents preferring their own bike reflects the high share of bike ownership in both cities and the usage of private bikes as daily mode as revealed by the present modal split in Munich (see Figure 1).

The second most frequent concern of people who have never used any service offered at mobility hubs are the costs. Considering the fact that most of the users belong to the age class younger than 25 years old the pricing scheme of shared modes should be embedded in an inclusive and affordable mobility pass that will enable using all kind of hub modes, including public transport as well. A deeper analysis of the data in Munich determines that employed persons are using car sharing more than students do (compare chapter 4.1. above). E-scooters are fairly new means of transport and the analysis of our survey clearly indicates the concerns, e.g. not fulfilling particular travel needs like carrying a bag or people feeling unsafe when using a e-scooters. Thus, it needs to be considered that the current service design accommodates the needs and requirements of a particular population group, mainly younger people and early adopters (Figure 8).

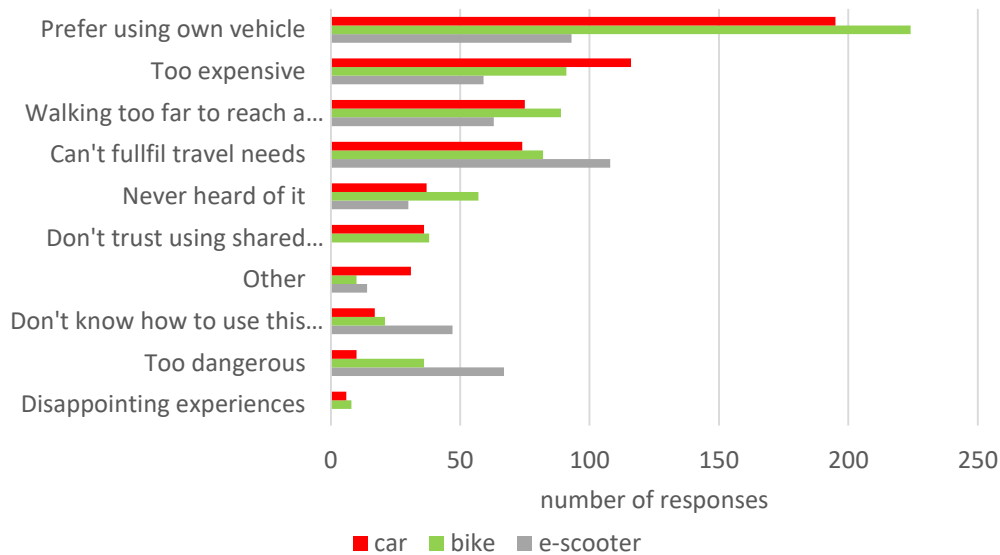


Figure 8. Reasons for not using a shared mode (multiple answers possible)

Despite the given barriers mentioned, respondents who never used a mobility hub before reported how likely it is that they use any service at mobility hubs in the future. Not surprisingly, students could imagine the most to use the services in the future. However, it is remarkable that the share in Munich (34%) is by far higher than in Vienna (21%). This could be explained by the fact that cycling is more represented in the daily mobility of younger people, in particular in Munich (compare Figure 1). Moreover, it clearly indicates less accessibility for older and retired people (Figure 9).

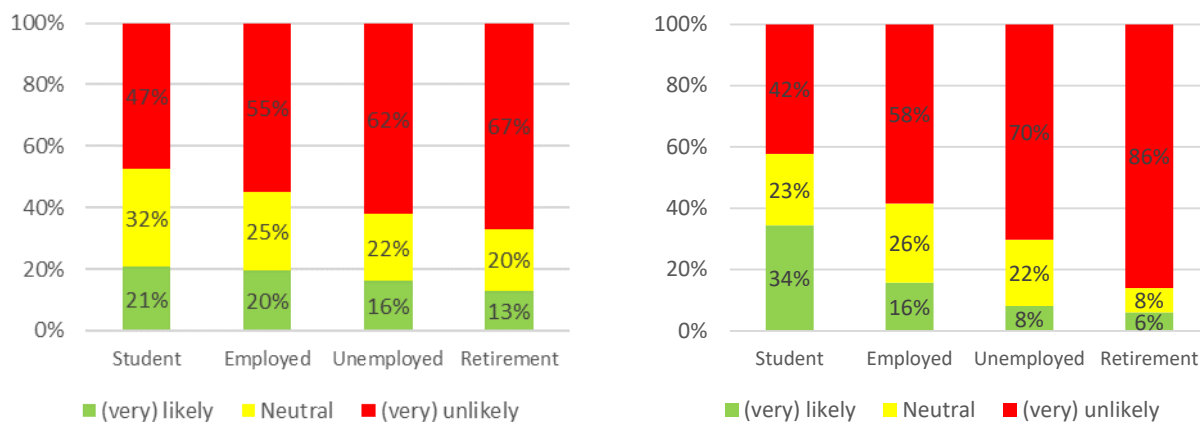


Figure 9. Likelihood of using a mobility hub in the future

4.3 Evaluation of different mobility hub elements

Apart from the availability of different shared modes at mobility stations, other service facilities can contribute to making them more attractive. For this reason, the questionnaire asked the respondents to rate possible additional elements regarding their importance. As there are no remarkable differences between Munich and Vienna, the responses of survey participants are presented together for both cities. An “all-in-one-app” (for planning, booking and paying) is seen as the most important service. This can be seen as an indication that people are not satisfied with the current procedure (in case of a user) or the procedure how to use a mobility hub is unclear for non-hub users. However, this result can also be attributed to the high share of young people in the survey sample. The per group

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detailed analysis shows that older people in particular are not as familiar with the use of apps and would like to have more information on site. The existence of additional services such as parcel boxes was rated as the least important, but there are only few examples of implementation in practice and respondents may lack experience or be unable to directly imagine and assess the added value (see e.g. [28] for further research on this matter).

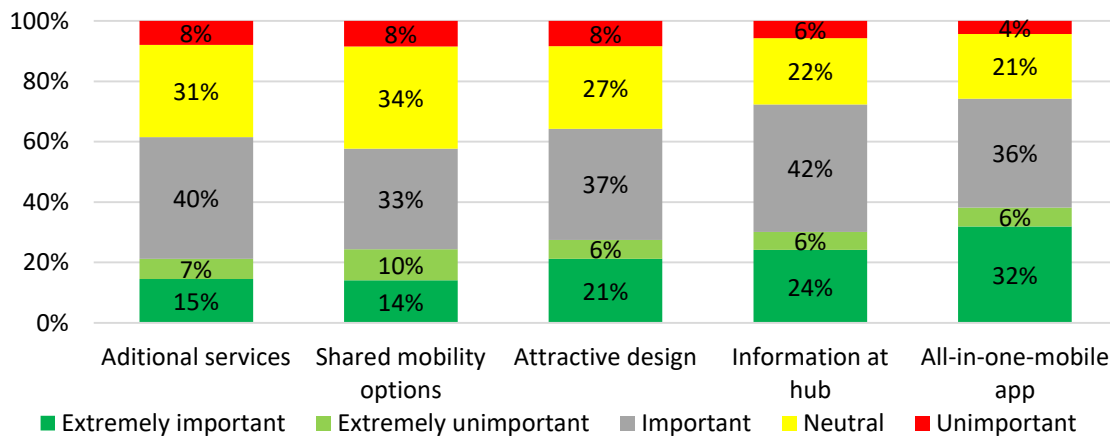


Figure 10. Rating different services offered at mobility hubs

4. CONCLUSION

The sample design of the standardized survey launched in four European regions within the SmartHubs research project enabled the analysis of the socio-demographic characteristics and mobility behaviour of certain population groups to form the basis for an impact analysis and further recommendations. The findings on awareness level suggest mobility hub strategies in two European cities, Vienna and Munich, have managed to communicate the presence of mobility hubs. Nevertheless, there is an unequal distribution of awareness and usage across the population groups. For example, current design and communication strategies appear to better reach younger people. On the contrary, older people are less attracted. Overall, it seems that the majority of people do not experience the benefits of mobility hubs until today and many of them still prefer travelling by their modes. Nevertheless, despite existing barriers, such as physical and digital accessibility and affordability, most people would be willing to use hub-based modes in the future. Future research could focus on specifying under which circumstances people would use mobility hubs. Similarly, based on the findings of this study, mobility hubs could contribute to advancements in the urban landscape by providing attractive designs that facilitate not only mobility services but also serve other functions. However, ensuring sufficient information both on the spot and online via a user-friendly app is considered of high importance to make hubs more accessible and attractive.

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Changes in the Connotation of Livability and China's Practice under Sustainable Development

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Extended abstract

The concept of livability has been an important driving force for urban construction and development in both ancient and modern times, and this paper introduces the Chinese practice in the context of sustainable development based on combining and summarizing the connotation of the livability concept. In this paper, we first take the timeline as a clue to summarize the changes in the connotation of the concept of livability. In the West, the ideological origins of the concept of livability can be traced as far back as ancient Greece, and the problem of livability brought about by the rapid development of modern industrialization and urbanization has become an important incentive for urban change, Howard's theory of the Garden City is considered to be the origin of the modern concept of livability in the West. From the 1960s to the 1970s, along with the rethinking of modernist planning ideas, the pursuit of a comfortable pleasant, vibrant, and humane urban environment became the goal of livable development. From the 1970s to the 1990s, the connotation and practice of the livability concept was extended from the humanistic perspective to sustainable development, and since Habitat II in 1996, The concept of sustainable development continues to influence the concept of livability.

China's concept of livability also runs through ancient and modern times. Ancient China pursued "paradise" and "peach blossom garden", and the idea of "resembling heaven and earth, nurturing mountains and managing water" runs through the traditional concept of city camping in ancient China. The modern development of the concept of livability originated mainly from Wu Liangyong's research on human settlements in the 1990s. Since the 21st century, it has been widely discussed in academia and practices, and different cities have also incorporated the concept of livability into various aspects of urban planning and development.

In the context of sustainable development, the concept of livability has a richer connotation, emphasizing various aspects including, natural and ecological environments, communities and housing, urban functions and public spaces, infrastructure, and transportation. Based on this, this paper introduces two of China's "livability" practices in the context of sustainable development: the Nanjing Xiaoxihu Area Conservation and Renewal Project, and the Guangzhou Enning Road Yongqing Fang Renovation Project. In the light of the sustainable development goals, we analyze the initiatives and scientific systems of these cases in realizing a sustainable ecological environment, intensive and reasonable space, economic prosperity and development, social inclusion and equity, and cultural preservation and inheritance, to provide experience and reference for the future development of livability.

Keywords: *the concept of livability; China's practice; sustainable development; Xiaoxihu; Yongqing Fang*

Ideal and Reality - China's Interpretation of the Concept of Sustainability and Practices of Stock Renewal

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Abstract

The paper introduces the concept of sustainability in China's human settlements' construction: taking the timeline as a clue, it summarises the characteristics of China's human settlements construction from the pre-Qin period to the modern era and the concept of sustainability embodied in them, taking into account the elements of nature, the context of the time, culture, and the strategy of urban development. The origin and prototype of China's human settlements ideal can be traced back to the pre-Qin period, and in the cyclical change of dynasties, it has achieved inheritance and innovation, and embodied the concept of sustainability in the four dimensions of ecological resources, spatial order, social governance, and cultural aesthetics, displaying the characteristics of wholeness, hierarchy, order, inclusiveness and artistry.

Of the four dimensions that the sustainability concept focuses on - in terms of ecological resources, it focuses on creating harmony between humans and nature, paying attention to the carrying capacity of ecological resources, and realizing the integration and sustainability of humans, nature, and human settlements; in terms of spatial order, it builds the spatial order of "world-region-city-community", emphasizing the coordinated development of all levels, and focusing on the organization and balance of functions, to provide high quality and order in ecology, production, and life. In terms of social governance, based on the spatial foundation of human settlement creation, it relies on the synergistic governance of spatial units of different scales to realize the ideals of Chinese society; and in terms of cultural inheritance, it takes culture as the vein, integrating natural, social, regional and cultural aspects. From ancient times to the present, the construction of human settlements, which embodies the concept of sustainability, has shown vigorous vitality.

The new era of China's construction continues the concept of sustainability. In this paper, we take Fuzhou's urban construction as an example to introduce China's practices in the period of stock renewal. Through analyzing the background, design concept, construction initiatives and results, participating subjects, support and guarantee, and operation and governance of the cases, the paper explores the cases' initiatives in the protection of ecological resources, creation of spatial order, synergistic social governance, and preservation of cultural inheritance, to provide experience and reference for the future development of sustainable concepts and sustainable construction.

Keywords: *ecological resources; spatial order; social governance; cultural inheritance; China's Practice*

1. INTRODUCTION: THE IMPORTANCE OF SUSTAINABLE DEVELOPMENT AND CHINA'S INTERPRETATION

1.1 Sustainable development becomes a must for world development

The sustainable development of urban territories is key to the achievement of sustainable human development, and in the 21st century cities have become decisive drivers of economic growth and centers of opportunity, prosperity, innovation, and social and cultural interaction. Currently, 55 percent of the global population lives in urban areas, and the number and proportion of urban dwellers continue to grow. As a result of urbanization and global population growth, the share of the urban population is expected to reach 68 percent by 2050. As a result of rapid urbanization, cities are facing

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increasingly severe social, economic, and environmental challenges in various aspects. The topic of sustainable urban development has become a widely discussed theme around the world [1]. Since 1989, under the advocacy of the United Nations and the support of governments and institutions around the world, a series of conferences and activities have been held to address the negative impacts of economic development on society resources, and the environment. In 2015, the United Nations Summit on Sustainable Development (UNSSD) adopted the "Transforming our World: the 2030 Agenda for Sustainable Development" to respond to the outstanding contradictions between economic development and society, resources, and the environment, with 17 goals of sustainable development, clarifies the global vision of development by 2030. The concept of sustainable development has become a global consensus for addressing challenges and guiding national and regional development.

1.2 The concept of sustainable development embedded in China's human settlements construction

China is an ancient civilization with a long tradition. During the five thousand years of its history, under the influence of ecological, economic, cultural, social, and technological factors, and at different levels of human settlements, such as the world, the region, the city, the gate of heaven, and the building, the five elements of nature, society, people, housing and support interacted with each other and influenced each other, thus forming a splendid and glorious culture of human settlements. No matter whether traditional or modern, the concept of sustainable development has always been embedded in the process of China's human settlements construction, which is specifically manifested in four aspects: ecological resources, spatial order, social governance, and cultural aesthetics. Taking the timeline as a clue, the article will introduce the characteristics of China's human settlements construction from the pre-Qin period to the modern era and the sustainable concepts embodied in it, taking into account the elements of nature, the context of the era, culture, and the strategy of urbanization. These concepts, aiming to realize the harmony and unity of environmental protection, social progress, and economic development, are not only the inheritance of traditional wisdom but also a response to modern challenges, contributing Chinese wisdom and solutions to global sustainable development.

1.3 The continuation and sublimation of the concept of sustainable construction in the new era

Since the reform and opening up, China has experienced the largest and fastest urbanization process in world history. Data from the Ministry of Housing and Construction show that by the end of 2022, China's urbanization rate had reached 65.22%, with 920 million people living in cities and towns, and the area of built-up urban areas had reached 63,000 square kilometers [2]. At this stage, China has stepped into the second half of new urbanization, urban development has entered an important period of urban renewal, urban development has shifted to solve the problem of "good or bad", and the importance of sustainable development has been highlighted. In urban development and construction, China has continued and innovated the concept of sustainable development, and adopted the White Paper on Population, Resources, Environment and Development in the 21st Century in 1994, which incorporates the sustainable development strategy into the long-term planning of economic and social development. Since 2000, China's Ministry of Housing and Urban-Rural Development has established the "China Habitat Environment Award" [3], reflecting the overall achievements of cities in improving the human environment [4]; adhering to the concept of better cities for a better life, further promoting China's urban governance experience, and jointly promoting the sustainable development of cities around the globe, China has pushed UN-Habitat to set up the *Global Sustainable Cities Award* [5], recognizing the efforts made in the field of urban environment and development and promoting the development of cities around the world. In practice, the concept of sustainable development has been upheld in everything from small community renewal and space

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remediation to large historical and cultural neighborhood preservation and urban system governance, and a large number of excellent projects and cases have emerged, providing the world with Chinese experience in sustainable development.

2. THE CONCEPT OF SUSTAINABILITY IN THE CONSTRUCTION OF TRADITIONAL CHINESE HUMAN SETTLEMENTS: FOUR DIMENSIONS

Taking the timeline as a clue, and taking into account the elements of nature, era background, culture, and urbanization strategy, we summarize the sustainable concepts embedded in China's traditional human settlements since the pre-Qin period. The origin and prototype of China's human settlements ideal can be traced back to the pre-Qin period, and in the cyclical change of dynasties, it has achieved inheritance and innovation, and embodied the concept of sustainability in the four dimensions of ecological resources, spatial order, social governance, and cultural aesthetics, displaying the characteristics of wholeness, hierarchy, order, inclusiveness and artistry.

2.1 Natural ecology: Harmony between human beings and nature is the priority in the construction of human settlements

The construction of a suitable relationship between human beings and nature is the first key to the construction of human settlements, and in the process of traditional Chinese human settlements construction, emphasis is placed on the creation of harmony between human beings and nature, and attention is paid to the carrying capacity of ecological resources. Nature is the basis for the development of human settlements, in the past process, it has been realized that the scale of human settlements construction can not exceed the carrying capacity of natural resources, the so-called "measure of the land to make a euphonium, the degree of the land to inhabitants" (*Zhou Li*). Thus, the measurement of land area and the determination of the degree of natural fecundity were used as a basis for harmonizing resources with the scale of land and population for human settlements.

Human settlements is gradually formed by people in the process of continuously utilizing and transforming nature, and the process of human settlements construction is a process of transforming the wilderness, building a disaster-resistant security support system, developing agriculture to cultivate suitable land, and forming a humanization of nature, which is how traditional Chinese human settlements construction utilizes and transforms nature. In all aspects of utilizing and transforming nature, traditional water conservancy technology and the accompanying water conservancy culture play a key role. Major water conservancy projects on a regional scale play a crucial role in the construction of regional settlements systems. For example, *the canal of Zheng* project created *Guanzhong Region*. *The Dujiangyan* project created Chengdu. And *the Tangpu dike system* created Suzhou. The construction of Dujiangyan, a traditional large-scale water conservancy project, honors the idea of "conforming to nature", closely integrates the construction of water conservancy projects with hydrological and topographical conditions, and successfully solves the problems of flood control and drought prevention, ensures the safety of the basic life, and builds an overall artificial natural system supporting the development of regional human settlements on a larger scale [6][7].

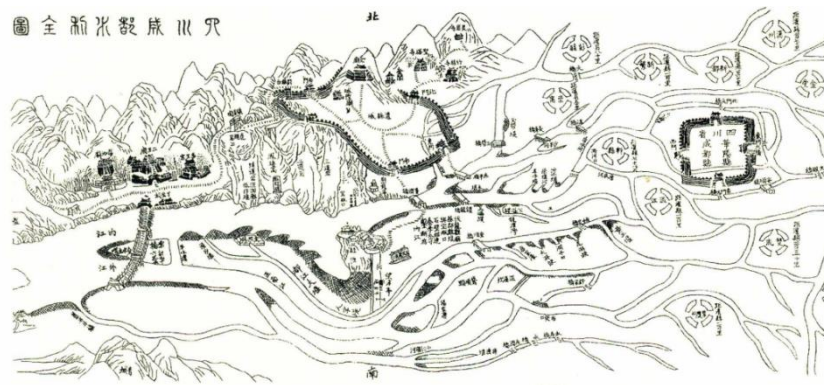


Figure 1. Sichuan Chengdu Water Conservancy Map (The History of China Human settlements, ISBN978-7-112-16785-2)

The establishment of an artificial canal system at the national scale promoted the overall prosperity of the habitat. The excavation of canals communicated the water transport routes of various regions, facilitated regional transportation, integrated the Chinese habitat on a larger scale, and promoted the prosperity and development of the regions along the routes. In addition, the ancients would culturally disseminate their experience of using the "artificial nature" system after it had been cultivated, for example, by accompanying it with a system of "annual repair" and maintenance of water conservancy projects, and by writing books on the management of artificial nature systems.

2.2 Spatial order: traditional oriental wisdom in the search for harmonized development of space at all levels

The construction of traditional Chinese human settlements embodies the wisdom of Oriental traditions, seeking to establish a harmonious spatial order at various scales. This approach aims to create a habitat that is ecologically sound, culturally rich, aesthetically pleasing, and conducive to a high quality of life. By adhering to the spatial hierarchy of world-region-city-community-architecture, these settlements are meticulously planned to ensure ecological balance, cultural vibrancy, and aesthetic harmony.

Throughout history, the design of human settlements in China has consistently focused on the overarching spatial order. This includes selecting the world's settlement centers through the principles of *Picturing Heaven and Law of the Earth*, which underscores the interconnectivity of the city's core with its surroundings. Monumental projects like *the Great Wall*, the repair of *the Chidao*, and the excavation of canals were undertaken to establish a robust support network, reflecting the societal ethos of *family-country-world*. Moreover, the development of administrative and urban systems, along with the refinement of *the Yuezhen and Haidu sacrificial systems*, contributed to the completion of the world's spatial habitat structure.

Ancient Chinese human settlement planning and design were guided by the philosophy of "settling people, benefiting them through skill, and touching them with beauty". This philosophy encompassed strategies like site selection, layout, construction, and landscaping, blending spiritual and material aspects. The goal was to harmonize with the natural environment, as seen in the reverence for the "Five Mountains", which symbolize the spatial order on a world scale. The process involved detailed environmental analysis to choose the best location, followed by careful planning of the spatial arrangement within the natural setting. This created a framework for the human settlements, prioritizing key areas for overall harmony. While physical structures were important, integrating cultural elements was crucial for adding depth and elevating the spirit of the place. This approach aimed to create enduring and inspiring landscapes that resonate with both beauty and cultural significance.

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2.3 Social governance: realizing social ideals based on synergistic governance of different spatial units

Society is the nexus of the organization of human settlements, and the law of harmonious society formed by the Chinese nation unifies the spatial order of human settlements with the social order of the crowd, combines multi-scale spatial synergy in social governance, guarantees the solidity of the state, the continuity of the nation and the happiness of the people, and facilitates the nurturing, development, and maturation of the cultures and ideologies of traditional Chinese societies. In ancient China, people formed groups in forms of space, i.e., settlements, and developed from primitive settlements to capitals and even states, developing a set of social order structures from the family down to the state and even the world. The order not only conformed to the general pattern of heaven, earth, and man but also met the needs of people's production and life. This order was organized by the ritual and music system on a large scale, while on a small scale, it was mainly based on clans and geography, etc., and worked on the spatial organization of the human environment on different scales and levels, and was realized through the construction of human settlements, which ultimately led to the realization of harmony among the residents, education, and culture, and collaboration in production.

Agriculture is the foundation of Chinese civilization and the root of the vernacular nature of society[8]. Ancient Chinese human settlements pattern, based on agricultural production, shaped a vernacular society rich in the characteristics of agricultural civilization, giving rise to a system of grass-roots social organizations based on the land, *the Xiangli organization*, based on which township rules and regulations, *the Xiangli system* and *the Baojia system* were linked to each other to maintain the social order of the rural areas.

In ancient China, the design of human settlements was deeply intertwined with cultural values, emphasizing the nurturing of its inhabitants. The traditional living spaces were crafted to educate and instill a sense of social order rooted in ritual and propriety. The layout of cities, from the grand axes to the intimate courtyards, reflected a hierarchy that mirrored societal values. This spatial organization was not just about physical structures but also about fostering a sense of belonging and community, uniting families and the nation. The emphasis on ritual in both private and public life aimed to maintain harmony and stability. Moreover, the integration of social, festive, and spiritual spaces ensured that residents experienced both material comfort and spiritual fulfillment, contributing to a cohesive and inclusive society.

China's traditional human settlements construction has evolved a grassroots spatial governance system with the county as the core[9], which is still significant for today's sustainable development. This governance structure ensures security, improves livelihoods, establishes political power, and promotes education. It emphasizes creating a stable and safe home, a peaceful and prosperous community, and a strong educational and cultural foundation, using Confucianism and the imperial examination system to nurture a rich local culture. This approach underpins the stability of the nation and reflects a deep understanding of sustainable governance.

2.4 Cultural aesthetics: focusing on beauty and the pursuit of spiritual care with culture as a vein

Historically, the Chinese have cherished life and sought an aesthetic lifestyle. They crafted their settlements to blend natural beauty, societal harmony, and cultural diversity, with cultural aesthetics as the core. The concept of *settlements between heaven and earth* reflects the ancient belief in the unity of humanity with the cosmos. Differing from the Western buildings with rich variations of light and shadow, the traditional Chinese pays more attention to the broader outdoor space, organizing several single buildings around different sizes and numbers of patios, courtyards, and squares to form architectural clusters of different scales and functions, to meet the various spatial needs of social life.

This design philosophy extended to the city's integration with nature, creating a distinctive *mountain-water-city* rhythm.

China's historical human settlements are a human life-centered appreciation of beauty and artistic creation, life is all-encompassing, so the beauty of the settlements is also a comprehensive integration of various types of culture and art, such as calligraphy, literature, painting, sculpture, and so on, which can be summed up by the word *art and literature* in the Chinese tradition. The classical garden epitomizes this blend, featuring pavilions, streams, and plant arrangements that evoke poetry within a painting. Despite social stratification, these settlements fostered a shared aesthetic standard, allowing elegance and commonality to coexist harmoniously. The ancient theatre exemplifies this, serving both as a venue for popular entertainment and a space for cultural edification[9].

Based on material space shaping, the aesthetics of the traditional Chinese human settlements have been sublimated to the connotations contained in the material space. "The wise man enjoys the water, the benevolent man enjoys the mountains" shows that Confucius, while appreciating the natural beauty of mountains and waters, took the natural form of prosperity as a symbol of the moral attributes of human beings. Ancient people's appreciation of natural beauty implies the feeling and realization of the universe, history, and life, and the physical habitat and the virtual human spiritual emotion are interrelated and perceived.

Traditional Chinese human settlements aesthetics are deeply rooted in life, enhancing it through a fusion of various arts and cultures. These aesthetics serve not only to enrich life but also to elevate it, imparting moral and spiritual upliftment. In crafting these environments, the focus is on a higher state of being, where the beauty of the habitat is as diverse as the times, places, and people it encompasses.

2.5 Harmony and beauty in the construction of traditional Chinese human settlements

Behind the construction of the Chinese human settlements lies the philosophical concept of wholeness: the habitat is centered on human beings, with a diverse life as its core, stretching out in time and interconnected in space. Time, space, and the human world are constantly changing, and thus the human settlements as a whole are evolving and changing, with new wholes being formed at various stages based on the original. In the process of cyclical dynastic change, China's human settlements construction has been characterized by both inheritance and innovation, showing vigorous vitality.

The concept of sustainability is embedded in the construction of Chinese human settlements, although there is a big environmental constraint of feudal rites, the core emphasizes the harmony and unity between human beings and all kinds of elements in the construction of human settlements and pursues the harmony and unity between the artificial environment and the natural environment, the material environment and the spiritual home, and the spatial order and the order of the crowd. Based on shaping the material space, the construction is further oriented to the beauty, and the pursuit of the care for spirituality and heart, and the establishment of standards on the significance of the human existence and the value of the existence. The four dimensions of natural ecology, spatial order, social order, and cultural aesthetics concerned with the construction of traditional Chinese human settlements, take the shaping of space and establishment of the system of "human settlements in the world" as the goal and ideal, and lead the construction of human settlements as a whole, emphasize the appropriate order between human beings and nature, make use of nature and transform nature under the state of harmony and sustainability, and combine the construction of human settlements with the landscape and landscape scenery. The construction of the environment is combined with the landscape scenery. This process, presents the "Trinity" synergistic and balanced construction strategy, with rules and order as the means of construction control, reflecting the characteristics of self-organization and self-adaptation. Environmental construction relies on the integration of planning, architecture, gardening, art, and other fields, and is characterized by wholeness, hierarchy, order, inclusiveness, and artistry.

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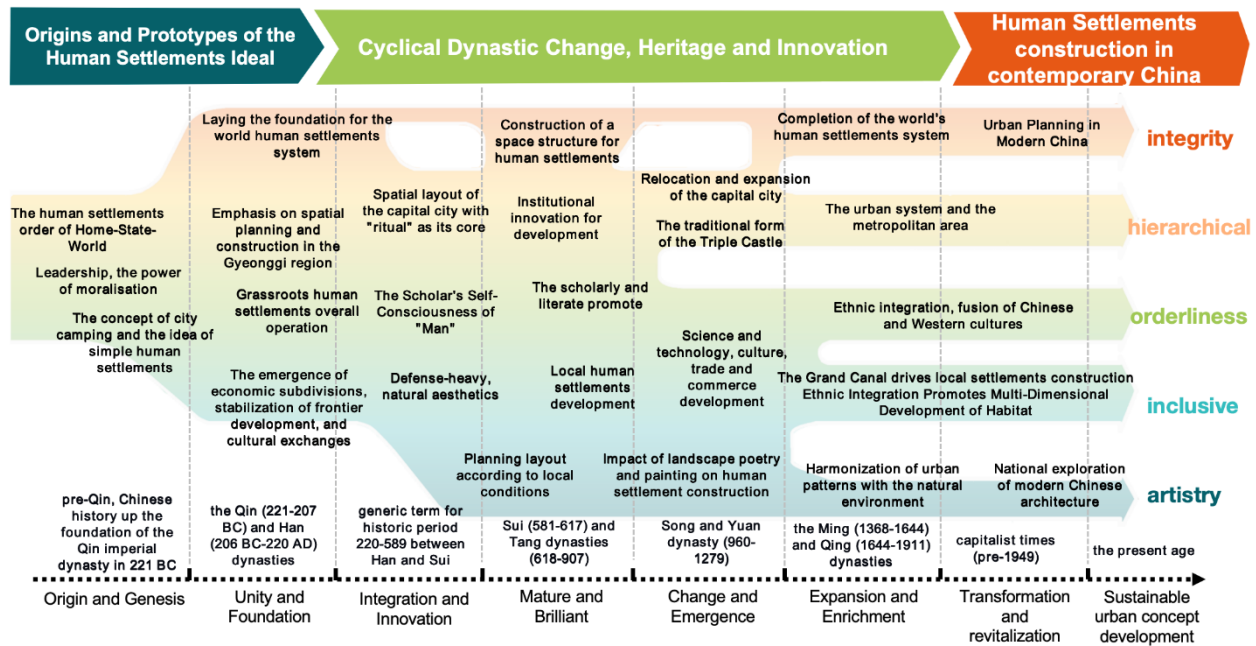


Figure 2. Human settlements construction turnover in China

3. CONTEMPORARY PRACTICE OF CHINA'S SUSTAINABILITY PHILOSOPHY: THE FUZHOU PROGRAM FOR SUSTAINABLE CITIES

Fuzhou, the capital of Fujian Province, is located on the southeast coast of China and is one of the second batch of famous historical and cultural cities in China, with 340 kilometers of coastline three excellent deep-water harbors, and a forest coverage rate that ranks among the top of the provincial capitals. On October 28th, 2023, Fuzhou as the only city in China, was awarded the inaugural Global Sustainable Cities Award (Shanghai Prize)[10]. The award takes economic vitality and urban prosperity, ecological construction and green development, urban safety and resilient development, and capacity building for sustainable development as the four main selection dimensions. The winning city must have excelled and made great progress in all four areas, and the actions taken must be sustainable.

As a thousand-year-old banyan city among green hills and green water, Fuzhou's sustainable urban construction from its ancient founding to the modern era is embedded with the oriental ideas of traditional Chinese human settlements construction, and fused with the modern concepts of sustainable development. In the following section, the traditional and modern sustainable urban experiences of Fuzhou will be introduced.

3.1 Construction of a traditional human settlement environment integrating mountains and rivers into the city

Located in the hilly area of Fuzhou, mountains are an important element in its natural environment. The topography of Fuzhou is a basin, which is divided into three parts: plains, hills, and mountains, and is distributed in layers from the bottom of the basin to the outer edge. Hilly areas surround the center of the basin, forming a "left Qi, right Gu, before the Wu Hu after Gao Gai", towering around the Fuzhou Plain this unique landscape natural pattern [11].

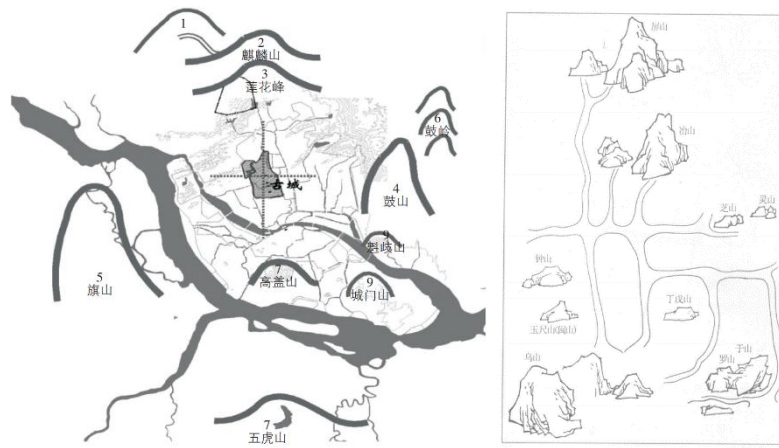


Figure 3. Fuzhou General Layout Map (left[12]), Map of the location of the mountains in Ancient City(right[11])

Fuzhou City not only has a very favorable environment outside the city but also has a very superior small environment inside the city, with small mountains such as Mount Luo and Mount Zhong in the city. The two-fold natural landscape skeleton inside and outside the city constitutes a unique landscape pattern of "city in the mountains, mountains in the city". Traditional Chinese landscape culture believes that there are Penglai, Yingzhou, and Fangzhang "three mountains" in the sea. In the ancient city of Fuzhou, there are three groups of "three mountains" known as "three mountains hidden, three mountains present, three mountains invisible". The three mountains hidden refer to the three famous mountains in the city, the north is Mount Ping, the east is Mount Yu, and the west is Mount Wu, into a *Pin*(品) tripod.

Fuzhou is also rich in water elements, and historically it is an important port city for foreign trade. Located in the south of the ancient city center, the Minjiang River, which runs from northwest to southeast across the Fuzhou Basin and into the East China Sea, is a long-flowing river. Historically, the Zicheng of the Jin Dynasty, the Luocheng of the Tang Dynasty, the Jiacheng of the Liang Dynasty, and the Outer City of the Song Dynasty all had moats, and the expansion of the city wall made these moats become the inner rivers of Fuzhou Ancient City so that merchant ships could directly enter Fuzhou Ancient City by following the rivers. Almost all of the river systems dug for the city of Fuzhou during the various dynasties have been preserved to this day.

Ancient urban planning and construction in Fuzhou was by the natural environment, realizing overall harmony within the city and harmony with nature. The construction of the city wall conformed to the mountainous terrain, and the internal layout of the city was also based on the topographical features. Ancient Fuzhou city construction has been centered on the three mountains, with Mount Ping as the main location, forming the north-south main axis, and Mount Yu and Mount Wu as the auxiliary mountains, confronting and defending the left and right. The main buildings and functional areas are distributed on both sides of the main axis, built in the Wu Tower on Mount Wu and built in the White Pagoda on the mountain, echoing each other, separated from the city axis on both sides of the avenue. The three hills in the city and the two towers facing each other have become the symbol of Fuzhou and a unique urban spatial art pattern.

Fuzhou's urban development has remained true to its original site, despite several expansions driven by military, political, and economic changes. The city's distinctive layout, featuring three mountains, has been preserved throughout history. This reflects Fuzhou's alignment with traditional Chinese principles of harmonizing with nature and making rational use of the environment, embodying the enduring concept of sustainable living. Key aspects of Fuzhou's planning include:

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Ecological Harmony: The city's location is exceptional, nestled south of the Minjiang River and surrounded by mountains on three sides, embodying the traditional *Feng Shui philosophy*.

Landscape Integration: The city's layout follows the natural contours of the land, resulting in a harmonious *mountain-water-city* spatial order.

Cultural Landscape: Fuzhou combines its landscape and water conservation efforts, enhancing the city's beauty through projects like moat excavation and river dredging.

Cultural Aesthetics: The city's unique landscape culture, influenced by local Min traditions and Central Plains culture[13], has been celebrated by historical figures like Li Yangbing and Xin Qiji through their literary works.

3.2 Green and digital economy-oriented modern sustainable development

As early as the 1990s, Fuzhou became the first city in China to formulate a 20-year development plan after Comrade Xi Jinping personally drew and organized the implementation of the 20-year strategic vision for the economic and social development of Fuzhou City. Over the past 30 years, Fuzhou has continued to explore the path of sustainable development and has introduced several influential, innovative, and replicable comprehensive solutions in the economic, social, and environmental aspects, which have resulted in a fundamental change in the cityscape [14].

In terms of ecological construction and green development, Fuzhou is surrounded by mountains on three sides, and the urban area is embraced by 58 mountains, which makes Fuzhou's urban development once faced with the dilemma of "looking at the mountains but not into the mountains, and it is difficult to enjoy the green". With the "City of a Thousand Parks" construction action, the construction of *Fudao*, country parks, bead parks and pocket parks, the mountains, water, people, the city into one, for the public to open up the last meter of the pro-mountain water. At the same time, the implementation of the Minjiang River Basin ecological protection and restoration of mountains, water, forests, fields, lakes, and grasses, and to promote the protection of biodiversity. Nowadays, the air quality of Fuzhou composite index of 2.51, air quality excellence rate of 97.5%. An average of nearly 15 square meters per person with parks and green space, can breathe the oxygen provided by the 200 trees, every 10,000 people have a length of 3.64 kilometers of the greenway.





Figure 4. Ecological construction and green development in Fuzhou(pictures are)

In terms of urban safety and resilient development, Fuzhou is born with water, but also vulnerable to natural disasters. Facing urban flooding and the black odor of water bodies and other phenomena, Fuzhou implementation of urban water system management project, optimize the allocation of water resources, reduce water use and waste, through the widening of the river, the river landscape enhancement of the riverbanks and other means, so that the city's 139 rivers to regain a new lease of life, the water management of the city's more than 8 million residents to create a safe and resilient new home. The city's flood prevention and drainage capacity has been increased from one in five years to one in 20 years, and the efficiency of emergency disposal of drainage and flood prevention in urban areas has been increased by 50%. The storage efficiency of the urban water system has been increased by 30%, and the flood prevention and control capacity has been raised from one in five years to one in 20 to 30 years. The city has successfully withstood more than 10 typhoons and more than 300 short-duration heavy rainfalls.

In terms of economic vitality and urban prosperity, digital industries such as big data, Internet of Things, and new displays, forming chains and clusters, as well as the flourishing green and digital economies, constitute the underpinnings and driving force of Fuzhou's sustainable economic development. Fuzhou ranked 2nd in GDP growth rate of major cities in China in the past decade, with a digital economy scale of over 610 billion yuan, more than 50% of GDP, over 1,300 high-tech enterprises in the digital economy, and an increase of more than 18,000 yuan in the annual per capita disposable income of urban residents. In addition, the city has focused on combining culture and tourism, utilizing old urban areas to promote urban consumer tourism, creating 17 distinctive historical and cultural districts, and repairing more than 1,200 key cultural relics. Focusing on the renewal of urban communities so that citizens can enjoy more of the fruits of reform and development, more than 500 parent canteens have been built across the city, 35 major projects of child-friendly renovation have been launched, 18 sustainable community pilots have been built, special plans have

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been compiled to improve the quality of accessibility facilities, and attention has been paid to the needs of all citizens to create a sustainable, all-age-friendly urban community.

In terms of sustainable development capacity building, the world's first 16 MW ultra-large capacity offshore wind turbine was connected to the grid and generated electricity in Fuzhou, the nation's first marine fisheries carbon sink transaction was completed in Fuzhou, and digital platforms such as "e Fuzhou" are used to enhance the efficiency and quality of urban public services and the sustainability of urban governance. In December 2023, the People's Government of Fuzhou issued the "Construction of Sustainable Development Communities in Fuzhou", a pilot project for the construction of sustainable development communities, actively responds to the United Nations' 2030 Agenda for Sustainable Development, focuses on the people-centered development ideology, creates a modernized international city, and promotes the work of building a sustainable city in Fuzhou. Fuzhou, a livable and happy city, has well demonstrated the city's practices of integrated planning, innovative development, and response to climate change, contributing to global sustainable development with the Fuzhou Program for Sustainable Urban Development.

1. SUSTAINABLE DEVELOPMENT IN THE PERIOD OF STOCK RENEWAL HAVE A LONG WAY TO GO

China has inherited and developed the concept of sustainable development in the construction of human settlements, from the traditional to the new era. The road to sustainable development is still a long one. Since the reform and opening up, China has experienced the largest and fastest urbanization process in the history of the world, and at the present stage, it has shifted from "incremental expansion" to "stock renewal". This is not only a concrete embodiment of proactively adapting to the transformation of the main contradiction in China's society, but also an inevitable requirement for realizing high-quality development. In the face of the ever-changing natural environment, social needs, and technological advances, we must continue to explore and innovate to ensure that the construction of human settlements can adapt to the challenges of the future and realize truly sustainable development. This requires the joint efforts and wisdom of Governments, enterprises, and all sectors of society, as well as the inheritance and development of traditional wisdom, to protect the Earth's homeland while promoting the harmony and progress of human society.

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Smart and green regeneration for the creation of a theme park: the case of the Thermis dam

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Extended abstract

The park, as an open air public space, performs important functions to the urban living (or lifestyle); it facilitates the coexistence of humanity and environment; it boosts productivity, and physiological health; and it is directly linked leisure activities.

The present paper concerns the research carried out for the Diploma Thesis, University of Thessaly, Greece. As case study, the Park of Fragma, Municipality of Thermi, Thessaloniki, has been analysed and redesigned adopting a 'Green & Smart' approach. More specifically, analysing the park's potential, the redesign scheme contributes not only to the differentiation of daily life's boundaries, but also to tourism development, while adding dynamic stimulus to the place for intercity competition.

The proposed redesign scheme strengthens the ecological dimension, the leisure aspects and the human-centric approach to urban design.

Keywords: *public open spaces; smart and green regeneration; theme and leisure parks*

Exploring transport inequalities in Palermo and Naples. The role of spatial accessibility to the rail system

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Abstract

Inequalities are widening across the world and recent studies indicate that there is a clear relationship between urban growth and spatial inequalities. The shape of urban inequalities is influenced by the interplay of factors that range from socio-economic, land-use, environment and housing to transport and mobility aspects. Notwithstanding the relevance of the challenges relating to the field of transport inequalities for both academics and (on a few occasions) political bodies, in many cities from Southern Europe, there are still pressing levels of deprivation and marginality that are aggravated by the lack of appropriate knowledge and instruments to identify and tackle such unbalances. Simultaneously, in the last three decades, different urban planning paradigms studies and approaches like the Transit Oriented Development or 15 Minute-city concepts, have emerged and stressed the role of spatial accessibility as a relevant condition for reducing urban inequalities. On such a basis, the convergence between city and transport appears as a significant strand of urban planning studies that can support policymakers in addressing the urban development of cities that witness unequal access to transit networks. Taking as case studies Palermo and Naples, two of the largest cities of Southern Italy, this paper aims to understand the spatial interplay between the rail system and the urban system. In particular, the study focuses on key socio-demographic aspects, land-use features and accessibility, and relies on different spatial analysis elements. As part of a wider research project that seeks to understand spatial inequalities, the preliminary outcomes of this paper unfolded interesting insights regarding transport inequalities which can be useful to develop a more sustainable, and inclusive transportation system.

Keywords: *accessibility; transportation; inequalities; Palermo; Naples.*

1. INTRODUCTION

While European cities seek to foster social cohesion and sustainable development, they face the challenges posed by rising socio-spatial disparities [1]. Urban inequalities are the result of a wide array of thematic domains, including transport poverty [2], accessibility [3, 4], housing [5], spatial justice [6], energy poverty [7], digitalisation [8, 9], social segregation [10], among others. Concurrently, the distribution of resources and opportunities across urban territories [11] cannot be done independently from the geographies within the places where they occur [12]. This was made even clearer with the Covid-19 Pandemic especially in terms of equitable access to basic urban services and infrastructures, green spaces and mobility opportunities [13, 14].

Against this backdrop, the efforts to rethink urban planning paradigms by emphasising the creation of sustainable and liveable cities, can play a direct role in reducing the many faces of intra-urban inequalities. For instance, urban development concepts such as the Transit-Oriented Development (TOD) [15] (Calthorpe Associates, 1990) and 15-Minute City [16] advocate for enhanced accessibility, social inclusion, community building, and the integration of urban and transport planning. In the TOD concept, train stations take an important role as the main public transport modes that connect neighbourhoods and hubs and create highly dense development areas that offer more equal opportunities.

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In this paper, we present the cases of Palermo and Naples, two of the largest urban conurbations in Southern Italy, which are also places of widespread territorial challenges translated into spatial inequalities and complex mobility and transport settings. The work is part of an ongoing study that seeks to promote a better understanding of the accessibility to urban mobility nodes as a key aspect to support design strategies that answer spatial inequalities by integrating land use and transport. In particular, the research question raised by this paper is how each city is interlinked, from a socio-spatial perspective, with their railway system.

To answer such question, after setting the theoretical framework, the paper delves into a brief contextualisation of the two cities that illustrates some key socio-economic aspects, and the main features of the railway systems. Subsequently, is presented an initial set of maps that highlight the geographic distribution of urban features in relation to the rail network, followed by a discussion on the elements resulting from the spatial analysis. In the conclusion, the paper offers a critical view regarding the observations made and the potential of this type of analysis, followed by the limitations of the study and the following steps of the research.

2. TRANSPORT INEQUALITIES AND ACCESS TO RAILWAY SYSTEM

Transportation is essential for accessing opportunities and exercising our rights as citizens, and as advocated by different theories of justice, it is vital to ensure inclusive mobility policies and strategies. These policies can shape the distribution of resources, prioritise disadvantaged groups, or reduce inequalities [17]. In addition, the fair design, management and operation of transport systems can enhance accessibility for all individuals.

While transport inequality is not a new concept within the transportation field, traditionally the key interrelated aspects of transport poverty have been categorised as [2]: (a) lack of access to transport or mobility as a consequence of limited public transport infrastructure, unreliable services, or lack of personal car ownership due to financial constraints [18]; (b) the difficulty of reaching certain key activities, such as employment, education, healthcare services, shops at reasonable time, ease and cost [19]; and (c) the financial capacity (affordability) due to high ticket prices, fuel cost and maintenance expenses that create financial burden [20].

There is an ever-increasing relationship between the share of population most socially and economically disadvantaged and those mostly affected by transport disadvantages. For instance, a European study has highlighted how the disproportioned spread of public transportation networks limits the access of low-income groups to essential daily activities, such as commuting for work, education, healthcare, grocery shopping, and other critical trips [21]. However, it is also crucial to underline that transport disadvantage and transport-related social exclusion are not inherently equivalent [22]. One can experience social exclusion while having adequate access to a transport system, although one can face transport challenges while being socially well-integrated [23].

To address urban inequalities and grasp the complexity of sustainability issues, it is crucial to strengthen the integration between the city, its transportation and land use planning [24, 25]. For instance, this strand of urban planning studies can support policy makers in addressing the urban development of cities that witness unequal access to transit networks.

The challenge for urban planning and policy lies in balancing the essential role of mobility in enhancing cities' welfare and well-being with the unsustainable nature of current transportation practices. Equity and accessibility are related concepts that change depending on the context and frame of reference [26]. Accessibility represents the interaction between the transportation system, the spatial distribution of social groups and services, individual characteristics, and time constraints [11]. It underscores transport's role in facilitating opportunities vital for well-being, including employment, education, social interactions, and human capital development.

Alongside, there are urban development concepts, such as TOD or x-Minute City, that combine planning, sustainable mobility and well-being. These models advocate, among other things, for

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enhanced accessibility to relevant urban functions, social inclusion, community building, and the integration of urban and transport planning. For instance, by densifying populations and activities around transit nodes it may be possible to achieve better accessibility and increase the efficiency of public transportation [27, 28]. In such cases, the importance of public transport, particularly the railway system, comes from the fact that providing efficient and integrated transport alternatives to car ownership is crucial for overcoming social isolation and car dependency while also contributing to a more sustainable development.

3. TWO SOUTHERN ITALY CASES

This section briefly introduces the two cities that are the object of this study, giving readers an outline of the factors that may have affected the development of the rail system and, in turn, its capacity to respond to the mobility need of people. While both cities have a prominent role in their regions, it is worth noting some relevant differences related to their role within their respective metropolitan systems.

The city of Palermo is the capital of Sicily and the second largest urban area of Southern Italy by population, with 628.894 inhabitants in January 2024. It is the core city of a metropolitan area with a population of 1.198.594 inhabitants, 52% of which reside within Palermo's municipal boundaries. The conurbation process outside these boundaries has been rather limited due to geographical reasons and the urban area of Palermo concentrates most functions, including health, education, culture, tourism, and government.

Differently, the metropolitan area of Naples has more than twice the population of that of Palermo, concentrated in a rather narrow land area, which makes it the first Italian metropolitan area for demographic density. Although the city of Naples is the place of the main strategic functions of the region, relevant production and service activities are located outside its municipal boundaries and the city itself hosts only 31% of the metropolitan area population. Moving our focus on the socio-demographic trends, land-use features and characteristics of the railway system, other analogies and differences can be outlined among the two cities.

Palermo has experienced a continuous demographic decline in the last three decades (-7%), only partially compensated by the rise of foreign population (+13% between 2013 and 2023). The development of Palermo's urban fabric followed different expansion periods associated with several historical events. Most of the current urban area is primarily the result of the great expansion taking place in the second half of the 20th century, motivated by different drivers, including the dereliction of the historic centre, the lack of effective planning regulations, and the influence of the mafia on the real estate sector. At the same time, due to the morphology of its land area – surrounded by mountains –, the urban fabric is still limited by relevant environmental resources, including nature reserves such as 'Monte Pellegrino' and 'Capo Gallo' or the Orto River valley (see Figure 1, left).

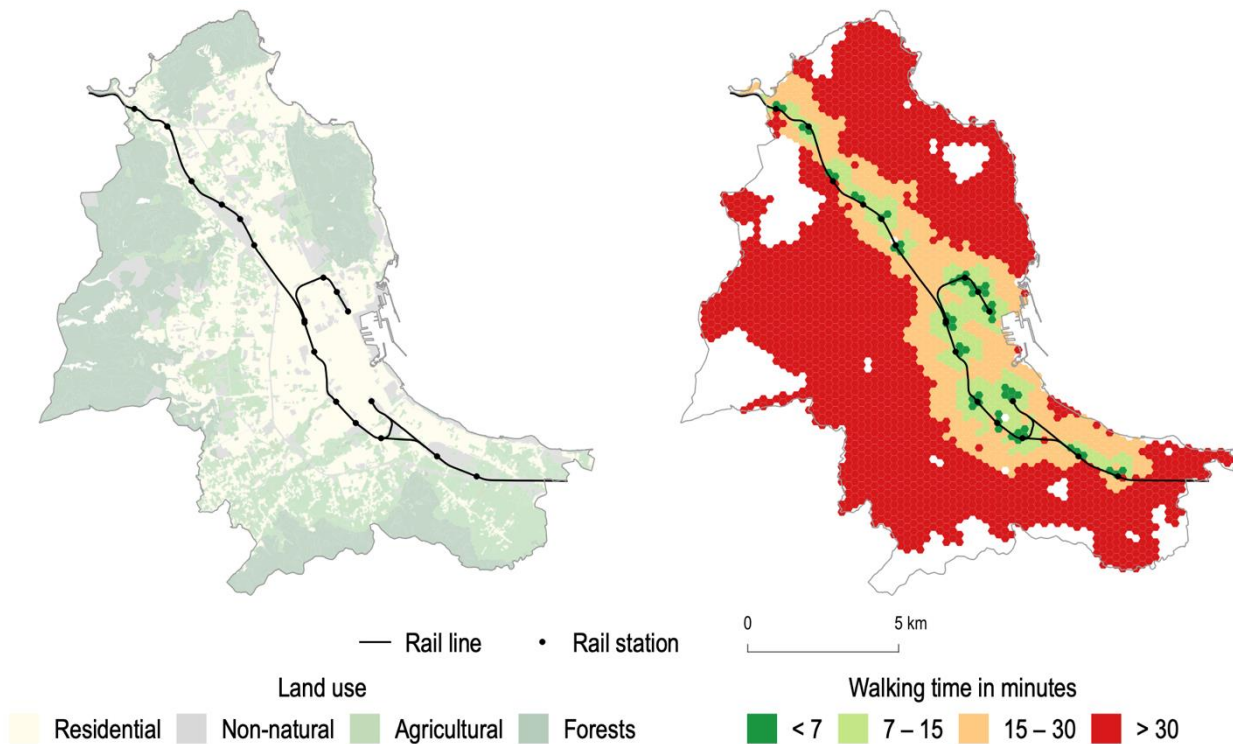


Figure 1. Palermo: land use coverage (left) and walking time to the rail system (right).

Despite the city being the daily destination for thousands of commuters (268.802 from the city itself and 52.789 from neighbouring towns in 2011), the public transportation system has been long underdeveloped, and the city is still known for its ‘car-dependency’ status [29].

Currently, the city is not equipped with a proper underground network and the transit system relies on two train lines (see Figure 1), managed by the Italian Railway Authority. In recent years, however, different mobility strategies (see the ‘Integrated Plan for Mass Public Transport’ of 2013 and the ‘Sustainable Mobility Plan’ of 2019) have stressed the need to expand and improve the rail network, creating ground for a better integration with different transport modes (including the three existing tram lines).

The specific strategy for the rail system includes the redevelopment of the two existing rail lines, namely: the construction of four new stations and 3 km of underground line on the ring line (full completion is expected in 2029); and the construction of three new stations on the bypass line, that upon completion will be among the largest projects ever funded by EU’s structural funds in Italy.

Similarly to Palermo, Naples has experienced a constant population decline over the past thirty years (-8%) against a population movement towards cities of the metropolitan area. For the high density of population (7.772 inhabitants per square kilometres) and urban functions, Naples is the target of more than one million daily commuters that reach the city for work and study reasons (379.383 from the city itself and 912.124 from neighbouring towns in 2011).

Naples’ highly urbanised layout spreads from the organic and highly dense network of narrow alleys of the historic centre towards the residential outskirts. The latter resulted from multiple expansion periods including the post-1980 earthquake construction boom. The city’s hilly terrain results from the complex Vulcanic system (‘Campi Flegrei’ at the West and ‘Somma-Vesuvio’ on the East) and despite being urbanised it encompasses several green areas (such as the ‘Parco dei Camaldoli’ and Bosco di Capodimonte’ towards the West and North of the city centre correspondingly, see Figure 2, left).

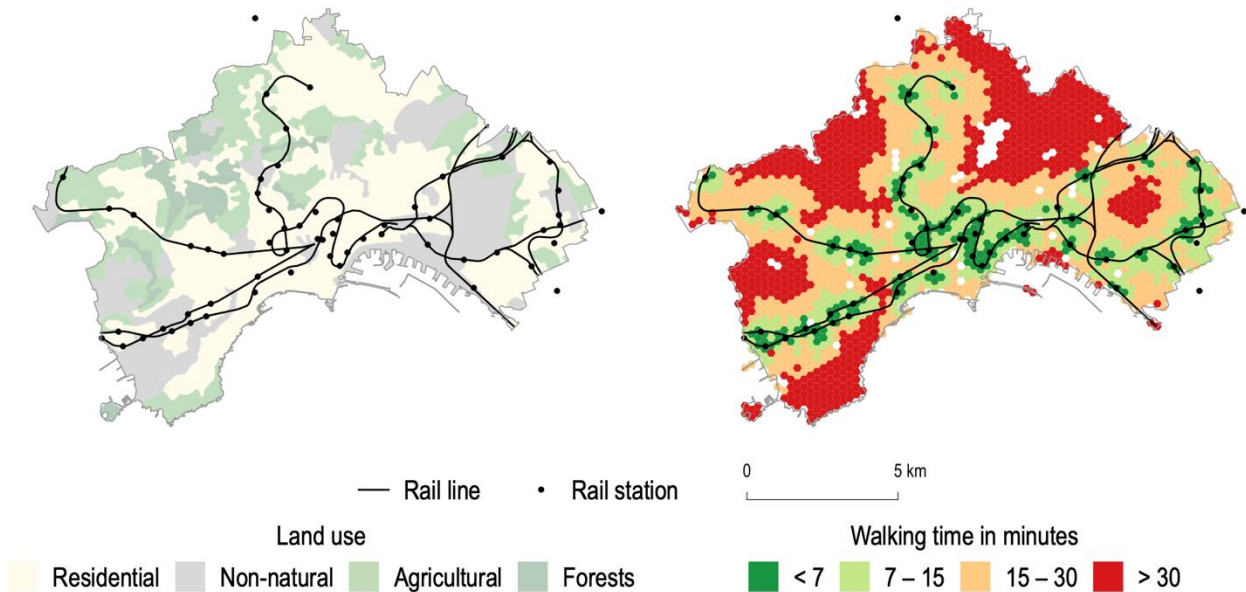


Figure 2. Naples: land use coverage (left) and walking time to the rail system (right).

Thanks to its rich historical background (Europe's second-largest city in the 17th century), Naples boasts a longstanding public transportation system, with a notable emphasis on rail network (see Figure 2). The system is a vital component of the city's transportation network, offering extensive coverage and accessibility to various neighbourhoods. It connects residential, commercial, and peripheral areas, with a strong focus on intermodal connectivity (see Figure 2, right).

Ongoing developments and expansions wish to further enhance its reach and service quality, making it an integral part of urban life. Stations are distributed to cover major residential, commercial, and tourist areas, ensuring that most of the Naples' population is within reasonable walking distance of a metro or train station. Today the city has three rapid transit system lines in use and nine sub-urban lines, and despite being operated by different providers (e.g., The Italian Railway Authority or the Metropolitan Mobility Company), the rail network (particularly Line 1 of the underground), provides a good accessibility to/from the historic center and peripheral areas such as 'Piscinola' or 'Scampia'. On the other hand, other sub-urban lines ensure that even the more distant neighbourhoods (including neighbouring municipalities) are served and have a reliable access to the city centre.

4. METHODOLOGY AND ANALYSIS

The scientific community has come up with a vast array of approaches to explore the dynamics of spatial development around transportation nodes [28, 30, 31, 32]. Given the purpose of this study we focused on accessibility by walking to rail stations. The reasoning behind this choice relates directly to the critical role that the rail system can play in highly congested urban contexts; the impact that public transportation can have as a driver of social equity; and the intrinsic transportation benefits of walking.

As part of an ongoing research project that will develop more advanced spatial analysis tools to identify intra-urban inequalities, our approach, in the current moment, mixes a descriptive analysis with quantitative data analysis. The methodology followed was based on a spatial analysis of publicly available data (Public Open Data portals, ISTAT, OpenStreetMaps, Corine Land Cover), developed with QGIS software.

The first step was to establish a hexagonal grid (250m height, 5,4ha area) over the municipal boundaries, followed by mapping all active rail stations (points). Thereafter, the walking time around the stations was estimated using the “OD-Matrix from Points” algorithm (QNEAT3 plug-in). Due to the experimental nature of the approach, and with the goal of reaching a better understanding of the relationship between the city and the rail system, a particular set of features related to transport demand was selected (see Table 1) to test the method.

Travel demand			Walking time to rail station
FEATURE	GRADING	SCORE	GRADING
Population density (units: people)	0	0,00	> 7 minutes
	< 200	0,25	
	200 – 500	0,50	
	500 – 800	0,75	
	> 800	1,00	
Commuters for work or study (units: people)	0	0,00	7 – 15 minutes
	< 250	0,25	15 – 30 minutes
	250 – 1000	0,50	> 30 minutes
	1000 – 2000	0,75	
	> 2000	1,00	
Local services and urban functions (units: absolute value)	0	0,00	
	< 5	0,25	
	5 – 10	0,50	
	10 – 15	0,75	
	> 15	1,00	

Table 1. The travel demand criteria and normalisation, and the accessibility to the rail system.

For the spatial analysis, we considered as starting point the smallest scale available by ISTAT: census tracts (polygons) for statistical data, and points for local urban services. In a second step, data was reaggregated over the hexagonal grid where the different features were projected. An areal interpolation with weighed areas was used in the case of statistical data (population and commuters), and a direct count of overlaying features was done in the case of points.

Due to the different grading scales (see Table 1), the final step encompassed normalising each feature on a 0 to 1 scale and calculate a final score (by summing partial scores) for each hexagon (the closest to 3, higher the transport demand). By applying a filter to highlight hexagons with a high transportation demand score, it was possible to represent the accessibility conditions in both cities (see Figure 3).

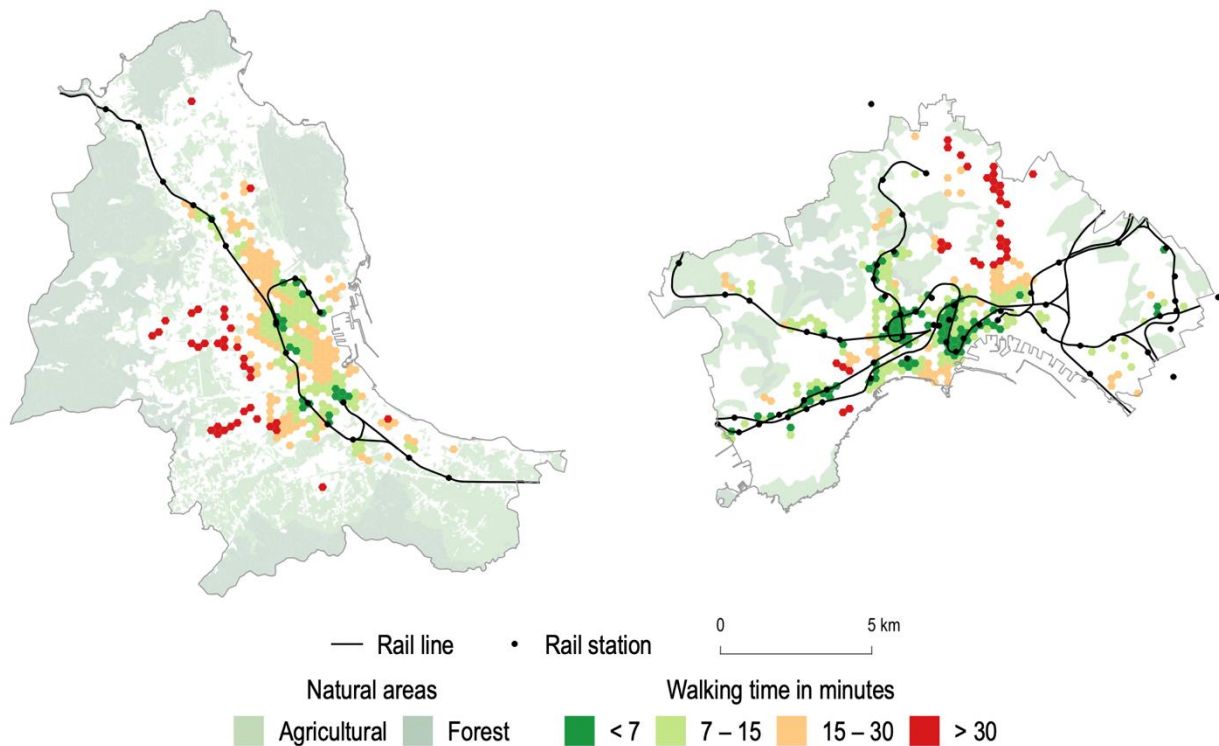


Figure 3. Walking time to the rail system of high demand areas in Palermo (left) and Naples (right).

In a general way, the presence of green patches can be seen as an effective implementation of the rail system within the city. In other words, there is good walking accessibility in areas with great transport demand. Light green areas show potential in terms of match between demand and the rail service and they can be the target of ‘chirurgical’ interventions to improve walkability and reduce the access/egress times to the rail nodes. Orange and red areas can open space for different reflections as they represent areas with considerable long walking times to the rail system, despite the presence of high density of residents, commuters and points of interest.

As Figure 3 reveals, regardless of Naples having a more extensive network than Palermo, both cities have relevant red patches that shall be investigated (in West of Palermo, and in the North of Naples). At a first glance, these areas seem to match highly populated neighbourhoods where a proper access to rail system could improve social equity. From a policy maker point of view, these red spots can be taken as neighbourhoods that request prioritised interventions.

In contrast, there are relevant green patches on both cases. Palermo presents areas with good accessibility around two biggest transit hubs and a few areas that concentrate important public infrastructures such as the University or the Hospital. Naples has a relevant number of green patches that overlay the rapid transit system on great part of the centre and along the line that spreads towards the West. A great portion of the city is therefore accessible to the rail system within 15 minutes by walking. Finally, one difference that stands out concerns the orange patches in the two cities, which are more noticeable in Palermo. Some of these areas will become more accessible with some of future developments of the rail ring, a fact that opens space for a successive research step that shall take into consideration the effects of planned interventions.

Yet another aspect that shall be looked after in a future analysis is the presence of the tram and bus system, as well as bike lines. This can help illustrating the complementary, potential role of other mobility options in feeding the rail system like in other remarkable cases (e.g., Helsinki). Further stages of the analysis shall also cover additional features of what we called “demand”, such as socio-

demographics, housing or work. This will be of key importance as we want to accommodate more aspects of urban inequalities.

In short, looking at the specific cases under analysis, some preliminary considerations could be taken such as the apparent poor accessibility of some residential areas, but more interestingly, the method has proved to work when trying to identify hotspots that are worth focusing further research.

5. CONCLUSION

This paper offers an evaluation of the city-rail interplay within two of the largest Italian cities, under the lens of planning concepts (TOD, 15mC) that look at the transportation hubs as key places for the quality of life in urban areas, and a focus on proximity to the transit network as a condition to reduce mobility inequalities. Naples and Palermo appear to be interesting targets for this type of analysis, as they are urban areas historically affected by an overall inefficiency of public transport, the relevance of car dependency, and poor attention to transport and land use integration.

Even from the limited perspective of this study, the analysis suggests that in places with longer attention to the development of urban railways – as in Naples – the interaction between the transport network and the built environment has led to a polycentric urban structure. In contrast, as only recent investments in Palermo are turning the rail network into a metropolitan service, wider portions of the built area have no coverage by the system. This is the case of several highly populated peripheral districts where no rapid transit service is yet available, and parts of the city centre that await the completion of the rail ring expansion.

The main limitations of this work are twofold. The first one lies in the consideration of only few socio-demographic variables to measure attractiveness of the rail stations. Furthermore, there is only an approximate evaluation of the attractiveness of each urban areas due to the presence of local services. In a further step of the research, a more accurate location of urban functions able to generate significant mobility flows will be implemented, as well as of a temporal perspective to consider trips outside the home-work range. The second limitation lies in the scale of observation, which here is limited to the municipal areas. As it is well known in literature – and particularly relevant to the Naples case – a large amount of the home-work trips is generated within the metropolitan areas, creating additional demand for transportation to the core city and, conversely, wider areas of marginality due to transport poverty in the periphery.

This type of analysis can help policy makers to acquire a better understanding of the mechanism regulating mobility flows within urban areas, to which extent the transport system has a spatial pattern that helps meeting the demand for transportation of different kind of users while reducing the marginality of other groups. At the same time, this kind of multilayered transportation geography can give urban planners recommendations in addressing future development within the city, in which districts (around the rail nodes) densification strategies are suggested by low density of population and activities and, by contrast, which missing links could be realised to lower the pressure over the most congested station areas.

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Urban Transformation for Future Sustainability: Density Scenario Analysis of Case Study in Altstetten-Albisrieden, Zurich

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Extended abstract

The concomitant of rapid population growth and urban development has confronted the delicate balance of the ecosystem and the natural environment. It unveils a complex interplay between the quest for increased spatial efficiency and the imperative to create sustainable and liveable urban environments. As a result, the majority of the voting population of Switzerland agreed that densification needs to be established as a legally binding policy objective, requiring cities to develop inwardly within their existing boundaries in order to create more housing and job positions. The challenge is evident as a projected around 23% resident population increase upon the existing urban area in Zurich without compromising the high quality of living. An urban planning strategy for densifying the city is imminent.

The study collaborates with the City of Zurich and searches for strategies and approaches to urban densification and transformation in the context of Zurich. It generates densification scenarios based on a real case of Altstetten-Albisrieden, Zurich, a district that very well represents the social and geographic situation of the city. The district has comparatively low population density and indicates excellent potential for accommodating future population growth.

The study has created eight scenarios to identify influential factors and their impact on social and environmental perspectives. These scenarios cover the situations of complete rebuilding, partial redevelopment, and building retrofits. The feasibility of each scenario is evaluated in accordance with the baseline of building densification requirements, the latest Building and Zoning Plan of Zurich (BZO 2016), and building features, such as development year and structure types, and further indicates possible challenges and strategies.

The scenario analysis results propose the pivotal role of green spaces near buildings, as they impact the microclimate of the whole area and the availability of community green spaces. To maintain the current resident-share ratio of these green spaces, new developments must be built in a compact manner. Therefore, building typology designs with more green surfaces are crucial, and the inclusion of greenery elements like rooftop gardens and green facades should be encouraged. In addition, the main concern is to increase the green surface plot ratio (GsPR) for each redevelopment. The specified minimum open space for each parcel is not enough; there should be clear limitations on the green surface plot ratio to promote the growth of green spaces around buildings in the zoning and building regulations.

Keywords: *densification, urban transformation, scenario analysis, Altstetten-Albisrieden, Zurich*

The design dimension of the student social housing: New approaches for the changing European city

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Abstract

The university residence as a design theme is today in the centre of a renewed scenario of reflections due to a change not only in the architectural paradigms (increasingly integrated with the urban context) but also with reference to the users' ways of use, no longer limited to the student population but extended to other more and more different categories. In this context, the design of furnishing elements (relating to both accommodation and common spaces), after a long period of undoubted marginality, is now experiencing renewed interest as a result of both the need to increase the quality levels of university residences in their complex, and of the awareness of the contribution that design can provide with respect to the needs of modifiability, adaptability and flexibility which have now become essential.

If the now consolidated trend (also implemented by the regulatory system with very culturally advanced laws and decrees) is to overcome models that respond to merely demanding and quantitative requests, the approach to design strategies not only recognizes design's ability to contribute to improve the quality standards of university residences, but also borrows themes and issues that have always characterized the discipline itself; among these: sustainable production, recovery of material culture, process innovation, attention to materials and components' life cycle, cost-effectiveness, social relationship between individual dimension and collective dimension of the solutions. Thus, the reconstruction of a continuity with the great design masters' experiences of the past century appears possible today, just as the reconstruction of the relationship between user, object, space and architecture becomes possible and necessary.

Keywords: *student housing; furniture design; public city; sustainability; social architecture.*

1. INTRODUCTION

The design for contemporary university housing, although still not entirely organic, today shows an interesting panorama of projects and creations; the trend of new design schemes is to relate architectural construction and the functional dimension of space to more specific requests deriving from new economic conditions, cultural interests and social sensitivities. Among these, at least three can be identified: the reuse of existing buildings, energy sustainability, social participation.

The reuse of existing buildings refers to design-schemes for university housing created in buildings of high historical-architectural value. In this case, interior and furniture design takes on an important central role in reuse strategies because it has to offer solutions for contained and non-modifiable spaces. Spaces in reused buildings are at the same time multifunctional, transformable, adaptable and customizable, and modular. Even the relationship itself with architecture no longer appears univocal: Given that is impossible to work on the typo-morphological configuration of the accommodation and common spaces, it is only interior and furniture design that implements design strategies suited to the quality of the historic building providing a quicker solution to accommodate the new needs of the students (increasingly differentiated and dynamic), transforming building constraints into new spatial opportunities.

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Energy sustainability constitutes a new specific trend in design-schemes for creating university residence; it expresses a renewed environmental sensitivity and a new form of dialogue between construction technology and architecture.

Finally, social participation constitutes a new characteristic of the design-schemes for university residence. Design strategies aiming at composition and configuration scenarios are always new and transversal with respect to the official functions of the environments (whether private or public) and through self-construction experiences.

In a future scenario - not too distant -, it is clear that the design furnishings for university residences can no longer ignore their centrality in the design process taking on the responsibility of being the driving force in the development strategies aiming at the quality of people's life, the environment and buildings, precisely by virtue of the significant characteristics of flexibility, modifiability and configurability - always with respect to different and changing needs of socialization, to the integration of the public and private dimension (understood both as co-living and co-working), in total harmony with the most innovative approaches to the students' new social housing models.

2. THE RESEARCH FRAMEWORK

The reflections contained in this article are part of a wider multidisciplinary research called "RUSH. Responsive University Housing: Innovative Solutions for Socio-economic and Urban Regeneration of Neighbourhoods in Southern Italy", under development since 2023 between Polytechnic of Bari, Polytechnic of Milan and University of Florence. The research is aimed at combining technical and scientific skills to implement the student housing within an urban ecosystem made of a new vision for the temporary support to hospitality and with new strategies of urban contexts' regeneration in the Mediterranean areas.

Through the definition of facilities and opportunities of co-living, co-learning and co-working, the research objective refers to the definition of responsive support models to create innovative urban ecosystems through an inter-scalar approach and a virtuous process of economic, social and environmental recovery and resilience. As regards design, a specific objective is the definition of new morpho-techno-typological models of student housing in terms of adaptability, environmental sustainability and building rehabilitation.

In this framework, the role of design goes beyond architecture and construction because when the building already exists and no modification is permitted, it's the object/product which is asked to give a contribution to the promotion of virtuous processes of regeneration, creating interconnected communities, activating services and promoting principles of sharing economy, ecological digital transition and sustainability, working in terms of physical and social flexibility and adaptability.

Under an economic point of view, the role of design is strongly compatible with the more general sustainable economic urban development strategies because innovative design solutions, aimed at creating innovative university residences in new urban ecosystems, can help to improve the students' social dimension and enhance their attractiveness and their integration to the city and its neighbourhood.

Under a social point of view, this innovative character of design is the starting point for the creation of micro-communities intended as social groups linked to collective living places in which people can enhance the existing relationships and create new ones.

In this phase of the research, the activities are addressed to detect study cases in which the contribution of design comes out as a recognizable and measurable element within all the parameters of intervention.

3. THE DESIGN DIMENSION OF STUDENT HOUSING

3.1 General framework

Within the aim of strengthening the quality of the university residences, both in terms of architectural construction and individual/collective space for users, the problems related to students' hospitality now take into account the role of furniture design, currently in a phase of renewed attribution of cultural value by users, by national and local public administrations as well as by productive companies' marketing strategies [1, 2].

The big increase in the number of graduate students which appears to have tripled in the last three generations and the radical change in the new university students' needs and requirements, with their rituals, habits, lifestyle, study methods and tools, make the actual university spaces not adequate anymore owing to their difficulty to be flexible, able to accommodate different functions and changes according to the rapid social transformations [3].

If in general the new economic, social and political conditions at a European level tend to promote new visions of urban planning and architectural interventions for university residences made of reuse of traditional building typologies, settlement methods' renewal, definition of new relationships with the urban context, application of innovative-sustainable strategies and new technological-constructive solutions, in the field of design the research seems to take on the contours of an almost autonomous path [4].

This path, on the one hand shows an interest for the valorisation of symbolic and figurative aspects, for the creation of situations of customizable domesticity in contrast with the homologation of standardized solutions, on the other it supports conditions of 'nomadism', recognizes a value in 'movement' and transience of the daily life rituals.

The criteria of modifiability, adaptability and flexibility, as well as the increasingly articulated ways in which university spaces and structures are used by the student population, today become extended to furnishing objects, artefacts and product-services for students, which increasingly start offering significant contributions in changing the student housing paradigms towards social, open and participatory models [5]: this affects the traditional typology of student housing (where individual spaces are rigidly separated from the common areas, these rationally distinguish according to their specific functions), whose models seem to have been definitively overcome in favor of systems made up of integrated nuclei in which common spaces, leisure areas, spaces for socialization are now fluid and interconnected [6,7].

3.2 Study cases

There are many university residences built in Europe since the 1990s, but few are completed with innovative reflections on furniture design (see, citing only the best known, the Studentenwohnhaus WIST in Graz by Klaus Kada (1987), the Antipodes I student residential building in Dijon by Herzog&De Meuron (1990), the residences for the Parma university campus by Massimo Carmassi (1996), the Residenza Caponnetto Novoli in Florence by C+S Associati (2002), the DUWO Student Housing in Delft by Mecanoo (2007), the student residences for the University of Limerick by Grafton Architects (2012), the 98 student accommodation in Paris by Lacaton&Vassal (2013), the Villa Val di Rose University Residence in Sesto Fiorentino by Ipostudio (2013), the Woodie Student Housing in Hamburg by Sauerbruch Hutton (2016), the expansion of the Milan College by Piuarch (2020), the Grand Morillon Student Residence in Geneva by Kengo Kuma (2021), the ESMA student accommodation in Montpellier by Mateo Arquitectura (2021), the Hainbase student residence in Hainholz-Hannover by Max Dudler (2021), etc.).

Although outside Europe, among the recent experiences which represent the wish to rebuild a union between design and student housing is the Simmons Hall at MIT in Boston by Steven Holl (2002), a university residence that stands right in front of the Alvar Aalto's Baker House across the Briggs Field. Inside, 350 beds are distributed in rooms of various types and sizes, articulated along a linear

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corridor reminiscent of Le Corbusier, which contain modular wooden furnishings (wardrobe, stool, bookcase, desk, bed, drawers) which can be customized in their configurations according to the students' needs through autonomous actions of assembly, movement, interlocking: paradigmatic in this sense is the bed which can be raised on two pillars which are then set up as a bookcase or wardrobe in order to get the desk in the space below. All the furnishings are also characterized by perforations with variable circumference, an aesthetic motif that unites them and aesthetically integrates them with the idea of porosity that characterizes the entire construction, subverting the traditional relationship between architecture and design, becoming itself a great design object.

Simmons Hall also inherits the idea of integrating private and common spaces as well as the conception of shared areas as places of socialization where activities strictly related to study are extended to hobbies (reading rooms, meeting rooms, multipurpose rooms) and leisure (game rooms, cafes, etc.) [8].

More measured and introspective is the residence of the Disentis Monastery Boarding School (Switzerland) by Gion Caminada, a building born from a 2001 competition project and built in 2004, conceived as a place of study and relationships and not as a mere dormitory (Figure 1).

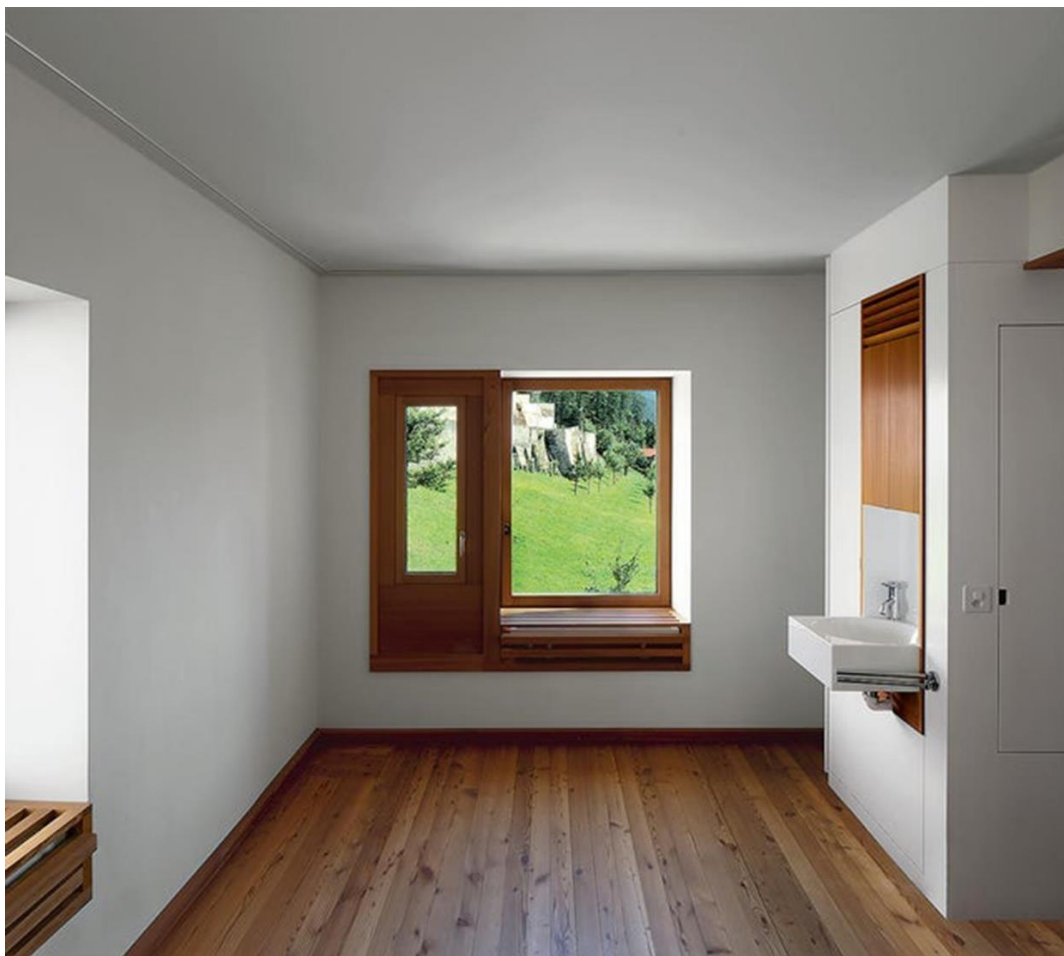


Figure 1. Gion Caminada, Disentis Monastery Building School (www.reddit.com)

The residence, located in the city center between the main square and the Monastery, contains 31 accommodations (5 accommodations on the first floor + services, 8 accommodations on the second floor and 9 on the third and fourth floors) organized in three blocks of rooms on three sides of a square plan, with the fourth side left free to accommodate collective spaces facing outwards but each floor in a different direction.

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In this case, architecture is the protagonist: rigidly respectful of the functional program and of the responsibility of its influence on the students' education, it's based on the balance between coexistence and privacy in which the rooms are conceived as small refuges while the spaces municipalities, marked by the presence of a central nucleus which, almost as if it were a large domestic hearth, is plastically articulated in such a way that it acts as a hinge between all the collective spaces on the various floors, these intended as domestic places of socialization.

The furnishing elements are integrated into the morphological plastic of architecture but still remain perfectly recognizable: the change of material, both in the accommodation and in the common spaces, underlines their presence compared to the adjacent structures but at the same time checks their adherence to the principle's formalities of the building and the idea of unity of the construction.

In more recent years, particularly interesting in terms of contribution to contemporary furniture design are the BaseCamp university residences whose interiors and furnishings are designed by the Berlin designer Werner Aisslinger in the Sølvgade (2016), Potsdam (2017), Lodz (2018), Lingby (2021) and Copenhagen-South Campus (2021) and whose furniture is produced in collaboration with companies such as Rolf Benz (tables), Cappellini (seats and armchairs), Wästberg (lamps), Kvadrat (curtains), B.Lux, Produx (furniture), Muuto (lamps) and Conmoto (stools), in addition to Thonet which produces and catalogs mod. n. 1140, an oak table with solid wood structure and veneered blockboard top.

Lingby BaseCamp is a new building designed by Lars Gitz, located within a large natural park, having an integrated structure which contains 639 student studios, 48 senior studios, 99 corporate apartments with interconnected multifunctional common spaces and shared, in which the architectural project is accompanied by a significant contribution of design both in terms of interior design and furnishing products, with an apparently radical aesthetic but in reality strongly linked to Scandinavian culture and design and with a notable typological multiplicity and variety of figurative languages (Figure 2). BaseCamp South Campus in Copenhagen is located in the old site of the Royal School of Library and Information Science of Copenhagen University; on the ground floor there are reception and access to the vertical distribution, in the basement the common areas (cinema, gym, laundry, study area and relaxation area) and on the first floor the rooms and study areas: all spaces which in the common areas present a large morphological and chromatic richness (although controlled by geometric patterns) and in the accommodation a greater sobriety and a more explicit relationship with the tradition of Danish design, especially referring to the figure of Arne Jacobsen (Figure 3).

An experience similar to that of BaseCamp, which in fact commissions designers to design the aesthetic line of all university residences, is the San Mamés University Residence in Bilbao by Greystar-Resa group, which in 2020 commissions the creative agency Masquespacio (Ana Milena Hernández Palacios and Christophe Penasse) to set up accommodation and common spaces.

In this case, the design interpretation is to create a community of spaces, enhancing the connective relationships and the environments' functional flexibility, maintaining a visual identity with a strong identifying character (through the use of materials and colors) and respecting the low-cost requirements of the furnishing elements' production (Figure 4).



Figure 2. L. Gitz, BaseCamp Lingby (2021). Common spaces (www.interni.it)



Figure 3. W. Aisslinger, BaseCamp South Copenhagen (2021). Common spaces (www.interni.it)



Figure 4. Masquespacio, San Mamés University Residence, Bilbao, 2020
(Image courtesy of Masquespacio)

4. DESIGN FOR STUDENT HOUSING AND REUSE OF EXISTING BUILDINGS

Within the more general issue of design of (and for) university residences, the specificity of interventions in existing buildings acquires a peculiar perspective in the interdisciplinary dialogue between urban planning, architectural construction and design, with all its trans-scalar connections. Much more than in the cases of new constructions, furniture design here takes on a renewed role of centrality, increasing its potential in reusing existing buildings and enhancing student spaces: small and non-modifiable spaces together with new instances linked to customization and integration are now opportunities to work with multifunctionality, transformability, adaptability and modularity so to overcome official and traditional functions and ways of use [9].

New compositions and configurations become necessary in private spaces but mainly in the collective spaces that, from being areas containing shared functions and then meeting spaces between students, they become now places of interaction between new kind of complex and heterogeneous groups of users (including people from the urban community) and between different uses no longer merely linked to university life: in relation to this, it's clear that the furnishings must necessarily acquire characteristics of flexibility, modification and configurability respecting the different socialization needs which can also change over time, as well as with respect to the opportunity of integrating the public dimension (intended as co-living, co-learning and co-working) with the private one [10].

This renewed sensibility and convergence between the issues related to the general topic of university student housing and those referring to the reuse of existing building (sometimes belonging to our historical-architectural heritage) has started producing some interesting design experiences on the international scene.

Among these, significant episodes are represented by the transformation of the former district prison of Aversa (Italy) into a student housing by Davide Vargas (2001) and the reuse of the Caserma Bligny in Savona (Italy), transformed between 2007 and 2011 into a university campus: inside of the latter,

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specifically in the space of the former military canteen, the university residence for students and young researchers designed by Alfonso Femia is a case of reconversion of a pre-existing building with high historical-architectural value within which 42 beds have been created, recreational and service spaces, all equipped with economical and easy-to-maintain furnishing elements (Figure 5).



Figure 5. Alfonso Femia, Student Housing in Caserma Bligny, Savona (Italy), 2001 (www.atelierfemia.com)

A paradigmatic example within this design field of action is represented by the student housing at the Convento dei Crociferi in Venice: designed in 2010 by RMA Studio and built in 2013, the building has a capacity of 255 beds organized in single and double rooms in two main typologies (hotel and integrated nucleus) and common spaces partly for exclusive use and partly open to the external public. The furnishings, both in the accommodation and in the common areas, are all custom-made and constitute the true protagonists of the dialogue with the pre-existing structures, in a condition of balance, harmony and aesthetic quality (Figure 5).

Another experience is the intervention called Palestro 3 in Turin (2019), designed by DAP studio, in which a historical building from the mid-century XIX located in the center of the city is converted into a university residence: the project is interesting because it represents an attempt at integration both between architecture and design and between privacy and the public dimension; the seven floors of the building (including the attic and the basement) contain 19 apartments (4 units per floor plus 3 in the attic) for 82 students and common spaces connected together by an open and flexible connective system, made up of social spaces, gyms, study rooms, relaxation areas and various service areas.



Figure 4. RMA Studio, Student Housing at Convento dei Crociferi, Venice, 2010. Common spaces (www.rmastudio.it)

5. CONCLUSIONS

Looking at the general tendencies of the contemporary approaches in designing university housing complexes, both in new constructions and already existing building, considering the characteristics of the most recent experiences in the field, we can say that the role of the furniture, whose design can no longer be borrowed from hospital or school equipment, in general shows three main important aspects: first of all, the ability to respond to various and changing needs, behaviors and rituals of students by "qualitatively" reviewing consolidated regulatory models; secondly, the capacity to recognize a value to the symbolic and figurative dimension of the spaces, as well as the character of "domesticity" in contrast with the anonymity of the standardized solutions; thirdly, the acceptance of the conditions of nomadism, people's movement and temporariness in contrast with the traditional tendencies to sedentary living [11].

More specifically, and transversally with respect to the models cited and the thematic categories identified, furnishing elements today seem to be called upon to take on common specific characteristics which mainly concern: for design and production, the processes of formal and productive simplification and cost-effectiveness; for use, reversibility, lightness, flexibility, autonomy in assembly and disassembly actions; for the life-cycle management, the easy maintainability and recyclability of materials and components [12].

But as anticipated in the introduction, there are two other dimensions which can be now considered fundamental in the new design practices: energy sustainability and social participation.

Energy sustainability expresses a renewed environmental sensibility and a new form of dialogue with construction technology, architecture and furniture: in the student housing this can be translated into a new integrated relationship between containment of construction costs and needs of energy efficiency according to the students' daily needs, balancing sociality and privacy. In the furniture, it means processes of formal and productive simplification, reversibility, lightness and flexibility of use, autonomy in assembly and disassembly actions, cost-effectiveness, easy maintainability and recyclability of materials and components.

Social participation constitutes a new aspect of the university residences, intercepted through design strategies aimed at defining composition and configuration scenarios that are always new and

transversal with respect to the official functions of the environments (whether private or public) and through self-construction experiences. Participation, social interaction, creative discussion, sharing of knowledge are elements of a new awareness of the potential of the student housing as a place of opportunity for the urban regeneration strategies, especially in a geographic context such as Italy or any other Mediterranean country where the university system still acts as a 'social lift' and where the presence of the students in the urban contexts is always the starting point for the promotion of social development, especially in peripheral and marginal neighborhoods.

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Integrated Development Strategies in Greece: Capacities, Difficulties and future Potentials.

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Extended abstract

Cohesion Policy contributes to strengthening economic, social and territorial cohesion in the European Union and it is oriented towards sectoral thematic areas and administrative borders (articles 174 to 178 of the Treaty on the Functioning of the European Union). It aims to correct imbalances between countries, regions and cities. The current paper focuses on the implementation of integrated sustainable strategies in European territories during the programming period 2014-2020. The available new mechanisms named the Integrated Territorial Investment (ITI) and the Community-Led Local Development (CLLD) for the urban, peri-urban, rural areas have been implemented also in Greek territories during the programming period 2014-2020. Selected territories used these tools in designing and implementing community-led local development strategies to meet their own needs and be implemented the selected interventions by using one Fund or by combining several funds. The proposed bottom up approach should be combined with a multilevel approach in order to gain the city the necessary technical assistance for attracting relevant funds. A multi-level governance model for the implementation of the proposed actions and local actors' involvement are essential parts of an integrated strategy and create an added value in the implemented actions. The multi-funded objective of the strategies also emphasizes the integrated value of the mechanism.

Adding to the literature overview we have conducted, we followed semi-structured interviews (n = 15) with the involved responders to be part in the designing and/or in the implementation of an ITI in the Greek territory. The involved persons are executives from local authorities, executives from managing authorities, experts. All interviews were guided by a set of questions related to themes identified through an extensive literature review. The participants contribute with their knowledge and their expertise to draw valuable conclusions about the research question we have set about the ability of Greek cities to implement integrated development plans and the possibilities for integrated planning in the future. The conclusions of this qualitative research assist us to combine its finding with the literature research we have made and to compose our findings but also our research proposals.

Keywords: *European regional policy, urban development, integrated development plan*

Navigating Sustainability: The Interplay between Universities and Cities

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Extended abstract

The role of universities in local growth and development is undeniable. In addition to being a beacon of research and education, universities contribute to the economic and social development of a city and the wider region. Moreover, universities are agents of innovation and change. It is widely accepted that universities are actors that can contribute to all the pillars of sustainable development (social, economic, environmental) and develop actions to achieve almost all the Sustainable Development Goals of the 2030 Agenda (not only Goal 4/Quality Education).

This paper examines the relationship and interconnection between a sustainable city and a sustainable university. It investigates whether a university's commitment to sustainable development and the implementation of a strategy to achieve sustainable development goals affect the sustainable development of the city.

However, the interplay between universities and cities raises complex questions: How do the sustainability strategies of universities interact with those of the surrounding urban environment? Under what conditions do collaborative efforts between universities and cities flourish, and how does the scale of the city impact this dynamic? Can universities function as catalysts for accelerating the transition towards urban sustainability?

This paper deals with the interaction between the city and the university. More specifically, it examines European cities with large percentage of student population, which in terms of population correspond to small-medium sized urban areas (e.g. Bologna, Cork, Elche). In framework, the research investigates the existence of such a dipole in Greece.

The paper offers a comprehensive exploration of the symbiotic relationship between universities and cities, shedding light on the opportunities and challenges inherent in the collaborative sustainability pathways for a more resilient and inclusive urban future.

Keywords: *green universities, sustainable university, sustainable city*

Exploring Sustainability at the Nexus of Architectural Design Education, Campus Life, and Artificial Intelligence: A Case Study of Atılım University

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Extended abstract

This study delves into the intersection of architectural design education, university campus life, and artificial intelligence within the sustainability framework. The importance of university campuses in terms of sustainability is increasingly recognized as they can serve as exemplary models and contribute to the sustainability of cities and communities. In this context, the campus of Atılım University shares many characteristics and common problems with the overall urban fabric of Ankara. Issues such as transportation to and within the campus being predominantly by private vehicles, prioritization of vehicle transportation and parking over pedestrian circulation and usage, limited social interaction spaces, restricted use of open areas, and inadequacies in the design of indoor-outdoor spatial relationships reflect the general structural challenges of Ankara. Therefore, the transformation of campuses in terms of sustainability presents not only an opportunity for campuses themselves but also for cities at large. Another focal point of this study is the analysis of university campuses by students enrolled in architectural design education from the perspective of sustainability principles. This analysis provides students with an opportunity to observe spaces with a more critical eye, thereby deepening their understanding of architectural design. To achieve this goal, an examination of a project assigned in the 3rd-year architectural studio at Atılım University will be presented. Another characteristic of this project is that students conduct their work and design processes within an artificial intelligence environment. The employment of artificial intelligence within architectural education is emerging as a significant research and discussion topic in both academic and professional spheres. Questions such as how the use of artificial intelligence can influence students' creative thinking abilities, and how design processes can evolve are central to these discussions. In architectural education, students should be equipped with the abilities to understand, utilize, and effectively integrate these new technologies into their designs, while also considering the intellectual and ethical dimensions of this field. In this project, it was important for students to endeavor to enhance sustainability in their campuses within an artificial intelligence environment, as it prompted them to begin considering the design and thinking tools of this environment. The dialogue fostered by student proposals at the nexus of architectural education, artificial intelligence, and urban design fosters innovative sustainability solutions. This exploration aims to catalyze sustainable practices in architectural design education and contribute to the shaping of the profession.

Keywords: *architectural design education, sustainable campus, artificial intelligence, Atılım University, urban design*

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The concept of carrying capacity in spatial planning and its role as an assessment tool for evaluating the sustainability level of a spatial system

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Extended abstract

This paper presents a comprehensive examination of Carrying Capacity (CC) as a vital instrument in spatial planning and sustainability assessments. It explores the evolution of the CC concept, emphasizing its crucial role in linking sustainable development with climate neutrality. Central to this study is the development of an innovative quantitative methodology that employs weighted indicators to accurately assess CC, highlighting its significance in mitigating human impacts on vulnerable island ecosystems.

The application of CC, particularly in diverse spatial systems such as regions, cities, and settlements, faces significant challenges. These include difficulties in quantitatively defining CC, the need for data often unavailable at localized spatial levels, and the reliance on statistical estimates due to the lack of comprehensive environmental data. Moreover, determining a spatial system's sustainability level requires integrating complex indicators and data across environmental, social, and economic categories. The introduced methodology advances a forward-weighted approach to indicators, facilitating the calculation of overall deviation from CC through a nuanced combination of weighted deviation percentages. This approach is complemented by the Factor Hierarchy Process, which acknowledges the structural levels of factors, enhancing the assessment's accuracy. Acknowledging that each spatial system possesses unique characteristics, the paper outlines a methodological approach structured into five stages: defining the spatial system for CC assessment, identifying critical parameters and determining necessary data, calculating weighted deviation percentages, diagnosing sustainability levels and proposing restoration actions, and prioritizing projects for sustainability transition and monitoring implementation. For effective CC assessment, the paper advocates using recent data, sourced from certified providers or based on secondary processing, ensuring that methodologies for estimating indicators and their thresholds adhere to scientifically accepted methods and relevant legislation. This ensures the reliability of the sustainability assessment process.

By integrating environmental and socio-economic dimensions, this paper proposes a holistic approach to urban planning that incorporates CC into planning and development policies. It aims to redefine the integration of sustainability and climate neutrality into spatial planning, setting a new standard for future research and policy development. This contribution significantly advances the discourse on sustainable and climate-neutral development in urban planning, offering a pragmatic framework for assessing and enhancing the sustainability of spatial systems.

Keywords: *sustainability; urban planning; climate neutrality; resilience.*

Coastal cities and marine natural and technological disasters: the role of spatial planning and the Greek experience and practice

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Abstract

Over the last decades, there has been an increased concern about the disasters caused by both natural phenomena and technological accidents occurring both in the land and in the marine space. Undoubtedly, these disasters are becoming more frequent and intense nowadays, also because of climate change, which is accelerated by the constant human pressure on the environment, implicating a higher risk for humans and especially those residing in the coastal zone.

Spatial planning is thought to be crucial to prevention management, acting as a way against uncertainty in handling dangers. The discussion of risk analysis and management integration in terrestrial spatial planning started relatively recently and has slowly been more and more considered in spatial planning processes over the years. However, it is still not consistent. This inconsistency is even more intense regarding the way that terrestrial spatial planning integrates the impacts of marine natural and technological disasters, especially affecting the coastal zone and urbanized areas. In Greece, integration of risk management and impacts deriving from marine natural and technological disasters is of major importance, given the intense coastal and insular nature of the country and extensive urbanization taking place along the coastal zone.

The research conducted for this paper, regards a literature review about the integration of prevention and management of natural/technological disasters in terrestrial spatial planning, with an emphasis on work addressing interactions from the sea and especially from marine natural and technological disasters on the land. The research includes extensive research in scientific search engines, using relevant keywords in a combined way, for more targeted results. In the second part, the paper focuses on the case of Greece and on how the Greek spatial planning system integrates risk analysis, especially for risk deriving from the sea, affecting the land and more specifically the coastal zone and cities.

The literature review reveals limited research specifically on coastal hazards and shows that spatial planning is also not extensively researched as a tool for dealing with coastal hazards. The paper further concludes that Greece's spatial planning system has significantly improved risk integration over the years and presents some proposals about its enhancement in the planning process.

Keywords: spatial planning; natural disasters; technological disasters; coastal cities; Greece

1. INTRODUCTION: THE COASTAL ZONE AND CITIES VAULNERABILITY TO HAZARDS

In the past years, the concern about disasters caused by either natural phenomena or technological accidents has been growing. In addition, climate change, being also the result of constant human pressures to the environment, implicates a higher risk of those phenomena occurring.

Natural phenomena such as earthquakes, floods, hurricanes etc. are classified as natural hazards and occur because nature tries to restore the balance. A balance that is lost not only by natural endogenous and exogenous forces but also by the increased anthropogenic pressures to the environment [1].

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Simultaneously, technological disasters are also a point of concern, especially nowadays with the accelerating advancement of technology. These disasters happen when an accident occurs in human activities and there is poor management of the technology involved (e.g. nuclear accidents, explosions etc.) [1].

The coastal zone is prone to several hazards that can trigger a disaster, mainly due to the interactions between the sea and the land and the degree of interrelation between them. Therefore, there is a very high level of influence from hazards coming from the sea alongside the coastal interface. Natural hazards events such as flooding and erosion coming from extreme weather events or sea level rise can pose a significant threat to not only the coasts but also the infrastructure and communities that have been developed along the shore. According to the United Nations [2] about half of the number of cities having a population above 1 million (513 cities in 2015), were located on or near the coast and with the expectancy of population density growth by 25% by 2050 [3]. Cities consist of complex interactions between multiple systems (e.g. housing and business infrastructures, water and energy networks and supply chains and transportation networks), agents (e.g. businesses, households and individuals) and institutes that influence the agents and systems [4, 5]. Thus, a disruption caused by the occurrence of these events imposes a significant pressure on all the aspects of the cities. Consequently, major coastal cities worldwide are emphasizing the need to make their essential infrastructure systems more resilient to disasters [6].

Coastal cities are frequently impacted by natural disasters and climate change, including storms, floods, landslides, and riverbank erosion. Urban areas, particularly those in sensitive locations, are very vulnerable, with their impact and risk varying based on their geographical location and landscape [7]. For this paper an essential note to make is about the distinction between the term “coastal hazards” and “hazards in the coastal zone”. The former refers to hazards happening at sea that affect the coast due to their interaction and the latter includes all the hazards that can affect the coastal zone regardless if they occur from its interaction with the sea (e.g. landslide, heatwave etc.) [4]. Coastal hazards can include either natural (e.g. coastal flooding, erosion, sea level rise) or technological ones (e.g. oil spill risk). As Tonmoy et al. [4] describes coastal hazards like flooding, erosion, and sea level rise have varying impacts on coastal systems. Flooding during storms or cyclones is immediate, while sea level rise has a slow onset and longer-term effects. Erosion can be rapid or moderate-term, depending on long-shore sediment transport. Seasonal erosion occurs due to sediment deficit and erosion, while long-term erosion increases with rising sea levels. These hazards propagate and have varying time scales, affecting coastal systems in different ways.

For this reason, prevention before the occurrence of a disaster as well as reaction and mitigation measures after the event is key. Spatial planning is a diverse process that: a. contains vision and as such can be used as a tool to plan for future trends and b. can mitigate effects of a disaster after the event.

Considering the above, this paper regards a literature review about the integration of prevention and management of natural/technological disasters in terrestrial spatial planning, with an emphasis on work addressing interactions from the sea and especially from marine natural and technological disasters on the land. The research includes extensive research in scientific search engines, using relevant keywords in a combined way, for more targeted results. In the second part, the paper focuses on the case of Greece and on how the Greek spatial planning system integrates risk analysis, especially for risk deriving from the sea, affecting the land and more specifically the coastal zone and cities. The paper aims to contribute to the discussion of disaster prevention and management in spatial planning, focusing in coastal cities and their protection against the impacts deriving from marine natural and technological disasters.

2. COASTAL ZONE AND CITIES VULNERABILITY TO NATURAL AND TECHNOLOGICAL DISASTERS: THE ROLE OF SPATIAL PLANNING

The discussion of risk analysis and management integration in spatial planning started relatively recently and has slowly been more and more considered in planning processes over the years. But despite extensive discussions on multi-hazard assessment and risk analysis, their inclusion in spatial planning is still inconsistent. Nevertheless, spatial planning is thought to be crucial to risk prevention/management, acting as a way against uncertainty in handling dangers.

From its nature (contains decision-making about if and how certain areas will be used and developed), spatial planning can influence the vulnerability of spaces in natural and technological hazards [8], therefore continuing efforts in integrating hazard related topics into the planning process have been discussed.

Natural hazard mitigation started being incorporated in spatial planning of developed countries from the 1980's, which led to a worldwide approach [9]. But the integration of hazards and risk mitigation in planning became more actively implemented in the mid-1990's. Around the same time, these considerations were starting to appear in several EU bodies (ESDP 1999, CEMAT 2003, SUD 2003) and the European Commission stressed that an integrated approach on risk management is required at the EU level [9, 10, 11]. Today there are several funds and policies that support the EU member-states through the EU Civil Protection Mechanism by providing knowledge and information about disaster risks (Disaster Risk Management Knowledge Centre, Union Civil Protection Knowledge Network).

With climate change affecting the frequency and magnitude of a range of climate-related hazards [12] more efforts are being made to prevent and/or mitigate their consequences. Climate change effects and the probability of different natural and technological hazards happening in an area can be predicted based on scenarios which can help the planning process [13]. But even though multi-hazard assessment and risk analysis have been broadly discussed, their presence in spatial planning is still not sufficiently considered [14, 15]. Nonetheless, spatial planning can play an important role in emergency management acting as a medium for the uncertainty in dealing with hazards or even mitigating past mistakes [16].

It is evident that it is essential for the coastal communities to become hazard-resilient by being prepared for the occurrence of these threats as well as developing the ability to withstand the impacts and recover. Spatial planning can play an important role to this and especially to the protection of coastal cities from hazards. An example of how spatial planning can contribute to the protection of coastal cities comes from a study from World Bank [17] titled "Climate change adaptation and natural disasters preparedness in the coastal cities of North Africa". This study indicates that adequate urban planning and land-use policies will be crucial in lowering Alexandria's vulnerability to risks, damages, and losses. The 2030 Greater Alexandria Master Plan, which is presently being developed, provides a great chance to incorporate the study's urban risk assessment findings and refocus the city's future expansion away from the regions identified as most at danger. The Master Plan should also guide future urban growth, set city boundaries, and provide a land-use program with standards for densities, building heights, and open space ratios that take into account future climate possibilities.

In the following section, the paper further examines the relationship between spatial planning and natural and technological disasters occurring from the sea, by performing a literature review.

3. LITERATURE REVIEW: METHODOLOGY AND RESULTS

A literature review with the goal to highlight the connection and evolution of the integration of natural and technological disasters in spatial planning was performed. The search included all literature up to April 2023 and the methodology included the search of a string that each time included the term "spatial planning" in combination with one of the terms "natural disaster", "technological disaster",

“risk management” and “risk analysis”. The search engines selected for the research were Web of Science, JSTOR, Scopus and IEEE in order for the results to be peer reviewed.

The search was done in three consecutive steps that included the identification of the literature, the screening of the results and the final selection of the literature that was eligible for the bibliometric analysis. The identification stage began with the search of the key words in the aforementioned search engines. The remaining records were screened with the intention of retaining only records that were explicitly relevant to spatial planning. In order to achieve this the literature that was kept had to fall into one of the three categories:

- Spatial planning and natural/technological disaster: records that link spatial planning with a specific disaster either in its prevention or management.
- Spatial planning and risk management/analysis tools: records that describe risk management/analysis tools that can be used in the spatial planning process.
- Spatial planning and climate change: records that link spatial planning and climate change effects were considered relevant as several disasters (e.g. flooding) could be the aftermath of the effects of climate change.

The final and total number of records that were relevant was 392. In order to uncover the connection and further data about the “coastal hazards” and spatial planning a further screening of these results was performed by keeping only the records that were referring specifically to a form of “coastal hazard”. Out of the total records, 39 of them (10% of the findings) were examining disasters that are related to the sea. Tsunamis were the most repetitive one, with sea level rise coming to a close second. There were also records about flooding and erosion as well as one about oil spill and sand extraction. The geographical scope, even though diverse, revealed a recurring country as a study case and that was Indonesia. That can be linked to the most recurring disaster (tsunami) as Indonesia, because of its place and geomorphological characteristics, is an area that has a very high risk of the specific disaster occurring.

Furthermore, the literature that was analyzed had two main themes: a. records that were focusing on risk management and prediction tools (e.g. modelling, GIS tools, quantitative vulnerability assessment) that can be used by spatial planning and b. records that presented how spatial planning was or could be used in the case of an emergency. The mass amount of records fell into the first category showing that the way that spatial planning can be used as a tool in this kind of emergencies is not fully explored.

To further examine the way disasters are being handled and incorporated into the spatial planning system of a specific country, Greece which is a highly insular and coastal country was selected.

4. THE GREEK SPATIAL PLANNING SYSTEM AND DISASTERS

4.1 The vulnerability of Greece in disasters and the existing Risk management and policy framework

The Mediterranean is affected by a number of natural hazards with the most common including forest fires, volcanic eruptions, earthquakes and landslides [8, 18]. At the same time the Mediterranean Sea is one of the busiest marine spaces (Plan Bleu), making it very susceptible to technological accidents. Greece being a part of the Mediterranean and being a highly insular and coastal country, with a strong and growing marine economy is very vulnerable to such events.

Risk management in Greece is under the authority of the Ministry of Climate Crisis and Civil Protection. The Ministry has developed a number of policy frameworks that correspond to the management of different natural and technological disasters. These frameworks are extensive documents with detailed information on how to react in each disaster in order to protect the general population in the occurrence of such events. More specifically they include guidelines that must be

followed which the Regions and the Municipalities should take into account when producing their local risk policy documents. Furthermore, they specify the role and actions of each public body (e.g. Ministries) during or after the event.

These risk policy frameworks, corresponding to either level (national, regional or local) are referring and focusing on a disaster. Specific guidelines for coastal hazards do not exist but are rather mentioned and included in one of the other categories of risks (e.g. tsunami guidelines are included in the earthquake risk policy document).

4.2 Risk management integration in the Greek local spatial plans

The extensive coastline of Greece which is more than 15,000 kilometers and makes up for over 25% of the Mediterranean's total is home to more than 70% of the country's inhabitants with an intense residential development with nine of the country's biggest cities having been built on the coast [19]. Therefore, urban development and especially alongside the coast when planned should take into consideration the appropriate measures for risk prevention/management from potential hazards.

Considering the structure of the spatial planning system of Greece, the proper planning scale to address risk prevention/management of the coastal cities from potential hazards, is the local one. At the local scale, local spatial plans constitute land-use plans. These plans are responsible for the determination of the development profile, the residential characteristics and the elements of the natural and built environment of each area. The drafting of a land-use plan is based on technical Specifications, i.e. a guiding document describing how to develop the Local Spatial Plan, (e.g. the chapters and their contents, specific elements that should be taken into account when planning etc.). The drafting is also based on another document, defining the planning standards at the urban district level.

Going back to the importance of risk prevention/management integration in spatial planning below is presented how and if this element (risk prevention/management) is incorporated in the Greek Local Spatial Plans and more specifically on the technical specifications and the planning standard documents.

Risk prevention/management reference in the technical specifications of the land use-plans

Until 2021, land use plans were drafted following the technical specifications described in the National Gazette 209/Δ/09-04-2000. In this document there are only a few and very abstract remarks about civil protection and risk management that are only referring to “data collection about potential floods, landslides and fires for the protection of the planning area”, a “geological research for earthquake prevention” and to “develop infrastructure of safety and protection”. The new technical specifications introduced in 2021 (by National Gazette 3545/B/03-08-2021) designate a specific chapter that is dedicated to “Risks and Civil Protection” as is its title. The subchapters cover a great number of hazards that need to be described and recorded depending on the risk that they bestow to the area. This also includes the designation of zones of vulnerability and zones of safety. A risk assessment for the planning of the correct designation of land uses as well as regulations for the traffic network in the event of a disaster and the protection of critical infrastructure. All the above should be accompanied by the corresponding maps and are being recorded during the analysis phase of the plan.

Risk prevention/management reference in the planning standards for the urban district units included in the land use-plans

Up to now, the urban planning standards to be adopted at the urban district level, were described in the National Gazette 285/Δ/05-03-2004. This document did not provide many guidelines in the inclusion of risk in the planning process with the only mention being about the suitability of the land (regarding its mechanical strength) for potential seismic activity. This document and standards were very recently replaced by National Gazette 200/Δ/01-04-2024.

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The new document on the urban planning standards is more comprehensive and contains a chapter dedicated to civil protection. In this chapter guidelines are being given about the standards that should be followed regarding: places of refuge (their capacity and their optimal placement), traffic regulations in case of an emergency, protection of critical infrastructure of local and European level. It is evident that the evolution of the policy documents that accompany the Local Spatial Plans in Greece is remarkable as the documents currently in place that guide the creation of these plans have an extensive reference to the potential risks and the protection of the areas that are being planned. And even though the older guidelines had some abstract references in risks like earthquakes, floods and fires, the current ones take one step further and include other types of hazards like salination, coastal erosion, sea level rise and technological accidents.

5. CONCLUSIONS

Natural hazards and technological accidents can cause a number of disasters and are occurring more frequently adding in the factor of climate change. Coastal cities are at the forefront of these risks and they need a targeted management for their protection and enhancement of their resilience.

Dealing with the immediate/rapid management of the consequences of the risks is linked to spatial predictions and adaptations. In that light spatial planning, can be used in the prevention of risks as well as means of restoration after the event.

The literature review revealed that the research being done about dealing with disasters coming directly from the sea is rather limited as it corresponds to a small percentage (10%) of the literature. Furthermore, the literature review also showed that spatial planning is not yet extensively researched as a tool in dealing with hazards coming directly from the sea. As such proposals about future research include both to turn the focus on coastal hazards (as most of the population is living alongside the coast) and how to further utilize spatial planning as a tool for the enhancement of protection and resilience of the coast and especially the coastal cities.

Regarding the case of Greece, as of now the Greek spatial planning system took a huge leap in the way that integrates risk in the planning process. The new guidelines for the development of the Local Spatial Plans take into consideration a number of disasters that include coastal hazards (e.g. salination, erosion, sea level rise) but there is still little to no mention about technological disasters coming from accidents occurring at sea.

Considering the above, it is evident that spatial planning in Greece has margins to further integrate and assist in the risk management of coastal cities. This could be achieved by:

1. Incorporating further coastal hazards, including technological ones, in both the planning standards and the technical specifications of the land-use plans.
2. Creating specifics in the planning standards when the plan is about a coastal urban district, so its special characteristics are taken into account during the process.
3. Connecting more efficiently the civil protection guidelines with the spatial planning process in order to have a more organized and cohesive approach.
4. Updating frequently the hazard studies, as well as their standards, incorporated in the land-use plans, as the rapid changes happening at the environment could make them outdated fast. This could help to ensure that the knowledge about these hazards is relevant and the planning for these areas can be adjusted accordingly and timely.

In conclusion, even though most disasters (natural or technological) are impossible to avoid and predict, it is natural that the efforts are and should be focused on the minimization of impacts and consequences especially in the coastal cities, with the adding hazards coming from the sea and the fact that the majority of the population calls them home.

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Quantifying and Visualizing Rebalancing Activity in Mobility on Demand Systems from Publicly Available Trip and Accumulation Data: The Case of Boston's Bike Sharing System

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Extended abstract

Widely considered as emerging modes of sustainable transport, bike sharing systems (BSS) utilize shared bikes, parking docks, and advanced information technology, allowing users to move from point to point on demand while cities to gain back urban land. With a global fleet of 9M bikes in more than 2K cities and a \$9B industry (2023) doubling biannually, BSS remain one of the most rapidly growing sectors of urban mobility. Despite their popularity, opinions on BSS performance, environmental impact, and costs are controversial, with some studies claiming that sharing reduces congestion and parking requirements and improves air quality while other studies showing that motorized VKT (vehicle-kilometres travelled) and carbon emissions increase due to rebalancing operations in combination with low mode substitution from private automobiles.

Quantifying rebalancing costs of BSS is essential to properly assess costs, benefits and potential of shared mobility. According to the Institute for Transportation and Development Policy (ITDP) Bikeshare Planning Guide, rebalancing costs in the BSS industry range between \$0.86-\$4.80 per bike trip while capital costs range between \$1,810-\$5,000 per infrastructure unit (one bike and two docks). While reported costs give a gross estimate of the scale of costs in BSS, they depend on context-specific factors like local labour cost, accounting practices, travel patterns, rebalancing strategies, system infrastructure, and, importantly, they include variable sunk costs of excessive unused infrastructure capacity that, collectively, make these figures lacking a common basis for comparative analysis. In order to compare cost of service between BSS objectively, rebalancing work must be computed from trip data, costs must be expressed as resources requirements rather than monetarily and normalized by the same unit of output rather than expressed as whole sums. Unfortunately, computing rebalancing costs from data has methodological challenges as operators do not publicly share rebalancing data but only user trip and station accumulation data.

In this paper, I introduce a novel method to accurately compute rebalancing work in BSS from publicly available trip and station accumulation data. The method computes departure-arrival time series data from user trip data, then it computes user accumulation data from the departure-arrival time series data, and, finally, it subtracts the resulting accumulation data from the reported accumulation data to obtain the rebalancing work from operators. The method accurately identifies concurrent arrivals and departures that often occur in the same timestep that appear as zero changes in the reported accumulation dataset. I evaluate the method with a synthetic trip dataset and demonstrate the approach in a case study of Boston's bike sharing system. I conclude with the significance of the approach, application areas for urban planners and researchers of smart urban mobility systems and future steps.

Keywords: *bike sharing systems; rebalancing work; smart mobility; cost benefit analysis; big data*

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Sustainable Heritage Preservation in Luxor: A Multi-Layered Approach through Digitization and Policy Development

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Abstract

Climate change indiscriminately damages both tangible and intangible heritage. The global lack of adequate protection for cultural heritage exacerbates this issue due to the absence of long-term strategies. This research advocates for actionable research to inform policymakers on cultural heritage management issues. The paper presents the 'Luxor Living Lab' a live project on sustainable heritage preservation in Luxor a partnership between the University of Lincoln (UK) and Ain Shams University (Egypt), funded by the British Council, offers insights into cultural heritage preservation and digital management in Luxor, Egypt. Despite Luxor's diverse and layered heritage, including Pharaonic, Roman, Coptic Christian, and early Islamic sites, the focus on Pharaonic heritage neglects other narratives, echoing international concerns. To address this, Luxor Living Lab prioritises digital preservation and community-centric policy development in multi-layered cultural heritage management. Through site analysis and qualitative surveys with the local community, this paper offers recommendations which will inform sustainable cultural heritage management and policy development. These recommendations transcend Luxor's context, offering globally relevant strategies aligned with UN Sustainable Development Goals, particularly SDG3, SDG4, SDG5, SDG 11, SDG 16, and SDG 17.

Keywords: *sustainable heritage; multi-layered heritage; digital heritage documentation; heritage preservation; living history*

1. INTRODUCTION

Within Luxor's heritage exist multiple layers of historical narratives, including Pharaonic, Coptic, Islamic, Roman, Greek, and living histories (1). Globally, there is a consensus that cultural heritage management plans should be developed using community-centric methodologies to exhibit the layered truths of the local heritage (2-4). In doing so, the cultural heritage management plans will be resilient, sustainable, and well-suited to their local context, as they consider the needs, concerns, and ideas of the local population (5). The Comprehensive Development Plan for the City of Luxor, implemented in 1996 (6), should be revised to reflect the layered heritage narratives, as currently the plans and policies are not inclusive of multi-layered heritage. This paper employs primary research through a community-centric participatory action methodology utilising a questionnaire with the local community, to collect their concerns and ideas, and an interdisciplinary co-creative workshop, to mould the community's ideas into actionable recommendations. Thus, this paper contributes to international ideas of the interconnectedness between cultural heritage management, community engagement, and sustainability (3-5), to produce transformative recommendations which are relevant not only within Luxor's specific context, but which are also adaptable to global heritage contexts.

2. LUXOR'S LAYERED HERITAGE

Luxor is home to multiple layers of heritage, including Pharaonic, Coptic, Islamic, Roman, Greek, and living histories. This layered heritage is evident in the built heritage of Luxor, as well as the cultural practices. For example, Luxor Temple, originally a place of Pharaonic worship, is also home to an Islamic Mosque, thus emphasising its enduring significance as a place of worship in multiple heritage contexts. In the Pharaonic Valley of the Kings, marks on the wall indicate Qurnawi occupation (7), highlighting the location as not only a place of rest but a place of residence.

Often, these narratives come into conflict, with some being nearly erased, as cultural heritage management systems are not reflective of the layered context in Luxor. Centrally, Pharaonic heritage is preserved above all other layers due to the associated increase in heritage tourism in Egypt nationally, as well as Luxor on a local scale. However, this cultural heritage management approach does not reflect the heritage of the community and creates a false sense of unique closeness to Pharaonic heritage by erasing other layers of heritage through targeted preservation. Pellini, Marconetto, and Ghenco (8) describe targeted preservation in the Valley of the Kings, wherein non-Pharaonic layers of heritage are

erased as if dirty, as an “illusion, a trick, that leads us to think that such a space has always been and still is exclusively a Pharaonic tomb” (8), despite evidence of use of residence for Qurnawi (7) and Jinns (9) populations, and use as a monastery (11). Hence, scholars (7-10) call for heritage professionals in Luxor, and globally, to consider heritage more critically as a social and cultural construct, and to “understand that our choices of how to approach and treat this space determine what this space will be” (8). This paper critically engages with their discussions, to provide transformative recommendations, developed through community-centric research design, to encourage critical employment of multi-layered heritage in Luxor and globally.

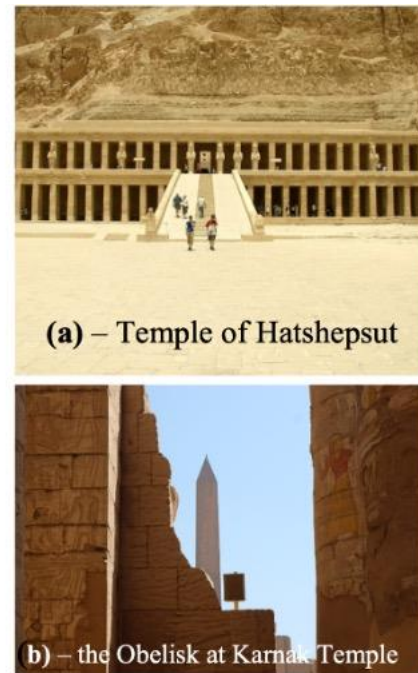


Figure 1 – Heritage sites in Luxor, source: www.luxorlivinglab.com

2.2. Sustainable Cultural Heritage: A Comprehensive Development Plan for the City of Luxor (CDCL)

Cultural heritage is widely discussed as a facilitator of sustainability (11-18). It is recognised for its ability to “shape a different future for all” (19) through emphasising unity, compassion, and understanding (15). Whilst safeguarding ‘heritage’ is emphasised as an end goal itself (20), cultural heritage’s potential contribution to all Sustainable Development Goals (16) has been noted in literature as “the only way to ensure a human-centred, inclusive and equitable development” (21).

To holistically integrate culture into sustainable development, the cultural heritage framework must be community centric (22, 23), to ensure plans fit the specific cultural context of the community to provide sustainable longevity (24). Researchers have critiqued current cultural heritage strategies in Luxor for prioritising the demands of heritage tourism over the needs of the local populace (22, 24, 25). Specifically, the Comprehensive Development Plan for the City of Luxor (CDCL), implemented in 1996 (6), has been highlighted for its failure to incorporate the perspectives and interests of the local community, instead centring on heritage tourism (22, 25). This is reflected in the market developments focusing on El Souq, the tourist market, and neglecting the Local Market where the community spend their time. Furthermore, the restoration of the Avenue of the Sphinx required the demolishing of a large

residential and commercial area, including religious buildings (25). This has resulted in practical issues for the local community who can no longer easily pass through, which negatively impacts their daily lives (25). This raises the question to ask whether the transformation to a larger 'open museum' displaying the life of the people and the community would have made a better approach for the regeneration undertaken. This exemplifies broader issues within the cultural heritage management systems in Luxor, wherein plans revolve around Pharaonic heritage narratives to meet the demands of heritage tourism, neglecting the diverse layers of heritage valued by the local community, such as Coptic, Roman, Greek, and Islamic (8). Additionally, the plans fail to capture the dynamic living histories and movements of the local community (22).

In response to these contextual challenges, and to invite critical engagement with Luxor's layered heritage, the research presented in this paper proposes a framework for community-centric cultural heritage management systems to ensure resilience and sustainability (1), as has been identified as suitable for Luxor by Amara (22). Hence, this paper aligns with literature which highlights the centrality of an integrated framework bridging sustainability and cultural heritage (26-29).

3. METHODOLOGY

This study employed an inductive mixed-methods research framework (30, 31), featuring an intensive case study analysis of Luxor's layered heritage (32), a semi-structured questionnaire (33, 34), and two co-creative workshops to gather original community-centric data. The questionnaire developed by the authors of this paper, which was distributed by a team of researchers from Ain Shams University who collected questionnaire responses at the Luxor Heritage Day and the Local Market in Arabic. There were 100 questionnaires distributed, 84 returned and 73 responses were completed, with all being valid to use in analysis, resulting in a sample of 73. The questionnaire was tailored for participatory action research, which facilitated community input on focused themes, echoing the principles of citizen science (35, 36). From the collection of these concerns and ideas of the community in Luxor, the international workshops served as platforms for co-creation of regeneration plans to develop community-centric recommendations, aligning with the methodologies employed in similar cultural heritage studies aiming to address power imbalances (37-39).

Aligned with the primary objective of developing sustainable community-centric cultural heritage management systems in Luxor, Egypt (25), the methodology facilitated community articulation of concerns and ideas and fostered solution-oriented discussions. Additionally, the Luxor case study provided contextual understanding, informing comprehensive community-centric recommendations. Grounded in the transformative research paradigm (40, 41), the methodology aimed to address power imbalances, employing a dynamic mixed methods approach responsive to community needs. The research design was guided by the United Nations' Sustainable Development Goals (SDGs) (42) specifically SDG 3 Good Health and Well-being, SDG 4 Quality Education, SDG 5 Gender Equality, SDG 11 Sustainable Cities and Communities, SDG 16 Peace, Justice and Strong Institutions, SDG 17 Partnerships for the Goals (42). This ensures the recommendations remain relevant to both local and global cultural heritage contexts. From this, the Integrated Capitals and Goals Framework for Holistic Sustainable Development (ICGF) emerged (Figure 2), which positions culture at the centre of sustainable development.



Figure 2 – the Integrated Capitals and Goals Framework for Holistic Sustainable Development (ICGF), developed by the Luxor Living Lab team (1)

The semi-structured questionnaire enabled dynamic engagement through open-ended questions, structured around key themes, and disseminated in community gathering places. Data analysis employed line-by-line coding to identify emerging themes and develop recommendations collaboratively with stakeholders. From this, the international interdisciplinary workshops generated solution-based action points.

Thus, the methodology facilitated continuous reflection on community concerns, generating actionable solutions which support sustainable cultural heritage management in line with the UN SDGs.

4. RESULTS, DISCUSSIONS, AND IMPLICATIONS

From the results of the questionnaire and case study, themes centring on the importance of involving the local community in heritage projects emerged. The results are discussed alongside relevant literature, to develop holistic recommendations which are adaptable and adoptable in global heritage contexts.

4.1. Involvement in Cultural Heritage Projects

The majority of respondents acknowledge the significant role of heritage tourism in shaping Luxor's identity and economy, citing benefits like job opportunities, economic growth, and a unified cultural identity (Figure 3a). Some of the comments of the respondents are below:

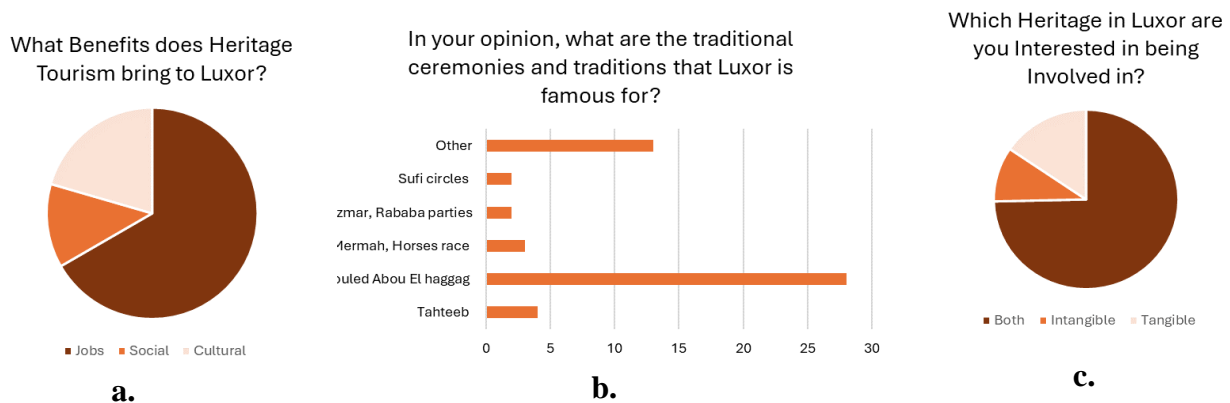


Figure 3. Questionnaire responses

“Provides them with an identity, character, and job opportunities”.

“The profession of most of the Luxor population depends mainly on the cultural heritage”.

“Economic and cultural benefits”

However, most participants expressed a desire to be more involved in cultural heritage projects, particularly those in the public sector. This aligns with existing literature emphasising community involvement in sustainable heritage management (43 - 45). The questionnaire findings highlight the community's recognition of cultural heritage's importance and their eagerness to contribute to its preservation and management for sustainable development.

4.2. Heritage Tourism Insights

The study highlighted that the respondents recognise the economic, cultural, and social benefits of heritage tourism in Luxor (Figure 3c), and comments of respondents as below:

“The presence of tourism increases financial resources, which helps the state to develop other sectors in the city”.

“It is of great benefit to them in terms of providing job opportunities and introducing the civilisation and culture of the community”.

“Multiplicity of foreign languages”

However, concerns were raised about time constraints imposed by tourism companies on visitors, affecting local businesses negatively. Scholars highlight the challenge of balancing authentic heritage experiences with tourist preferences (46). Respondents suggest improving marketing efforts to promote Luxor as a cultural destination, aligning with literature advocating for community-driven marketing to preserve authentic heritage experiences (47) which aligns with one of the respondents' comments:

"The products are of high quality and only need more local and international marketing".

4.3. Engagement with Traditional Practices

Additionally, respondents exhibit pride in various traditional practices, linking modern customs to ancient festivals and rituals (Figure 1b):

"All of them are customs and legacies that make us feel the old beautiful time".

Their appreciation reflects literature emphasising the empowering effect of authentic intangible heritage experiences on local communities (48). Engaging with traditional practices in heritage tourism in Luxor, Egypt not only preserves cultural identity but also fosters inclusivity and sustainable development, aligning with global sustainability goals (42).

4.4. Built Heritage and Layered Intangible Cultural Value

Respondents value Luxor's tangible heritage sites for their historical significance and layered cultural experiences that is reflected in comments such as:

"Carry the fragrance of the Ancient Egyptian history to this day".

The respondents recognised that the preservation of these sites as a testimony of their intangible heritage elements is crucial for maintaining the authenticity of Luxor's cultural identity:

"Both support the local community with traditional and handicraft industries. The Nubian House teaches girls these crafts".

However, challenges exist in balancing preservation efforts, particularly concerning the dominance of Pharaonic heritage over other layers (8). Addressing these challenges requires a community-centric approach to cultural heritage management (22).

4.5. The Luxor Market Area

Respondents highlighted the multi-sensory experience of the Luxor Market, emphasising its importance in creating meaningful connections with cultural heritage:

"The smell of incense"

"The smell of spices and the voice of the sellers"

"Aromatic scent"

Responses created a lively image of the market, such as:

"Some of the popular folklore songs and the old traditional songs of Luxor, the sound of sellers and tourists and the banging of dominoes on the table whilst playing, the smell of the area".

Here, findings contribute to heritage literature which suggests that enhancing multi-sensory experiences through digital technologies can improve visitor engagement and accessibility (49). While respondents appreciate recent developments in the market area:

“The path is shaded, and it gave a nice mood”.

“I became able to walk in the market; before the developments, walking was very difficult”.

they express a desire for inclusive development that extends to the local market, reflecting the importance of community-centred approaches to heritage tourism development in Luxor (45, 50):

“It has become a tourist destination, but it needs to be extended to the rest of the internal streets”.

“Developing the rest of the path (the Local Market), which is the same path, so that tourists enter the rest of the path (the Local Market) to see the way the locals live”.

This is important where the locals want to share their own personal experience with the tourists, they are not liking the divide and segregation that the planning of the Market currently provides.

5. CONCLUSIONS AND RECOMMENDATIONS

From the concerns and ideas of Luxor’s local community, which emerged from the questionnaire responses, the international interdisciplinary workshops were an opportunity for stakeholders to co-create suitable recommendations which form a framework. Stakeholders included architects, urban planners, heritage professionals, Egyptian government officials, local people, and students. Hence, the recommendations were developed from broad experiences which enhances their global adaptability and suitability. The workshop participants also had the opportunity to learn from each other and adapt their own practices and behaviours through engaging with the recommendations, to contribute to a more sustainable future for cultural heritage management within their own professional contexts. The flexibility and adaptability of the recommendations highlight the significant impact of the Luxor Living Lab (www.luxorlivinglab.com). These recommendations are suitable for various heritage contexts, supporting the global development of sustainable cultural heritage management systems that consider multi-layered heritage narratives. The recommendations include:

1. Recognising heritage as a catalyst for sustainable development and urban regeneration: this forms the initial phase of the proposed framework. Specifically, it suggests including cultural heritage into development plans to enhance sustainable development, aligning with existing global literature (14, 16, 23). This recommendation includes:
 - a. Shifting the perception of heritage as solely historical by engaging with communities to recognise their practices as valuable assets for driving sustainable development and community well-being in the present.
 - b. Promoting interdisciplinary collaboration to facilitate idea exchange and authentic policy development based on diverse experiences.
2. Engaging in community-centric heritage designs: workshop participants recognised the local community's strong interest in their cultural heritage in Luxor and emphasised the importance of community-centric cultural heritage systems for sustainable development, aligning with literature which emphasises the importance of community-centric cultural heritage design (26, 44, 45). The recommendation includes:

- a. Organising informal discussions between local communities and government bodies to foster transparent communication and prioritise the community's voice in cultural heritage management policies.
 - b. Promoting local events celebrating authentic heritage, designed by the community, to enhance social well-being and sustainable cultural heritage practices, to ensure long-term sustainability by incorporating local needs and traditions.
 - c. Continue the regeneration of the Local Market Souq to merge seamlessly with the Tourist Souq sharing the people experience.
3. Harnessing digital technologies to ensure cohesive heritage: Workshop participants suggested integrating digital technologies into cultural heritage to present layered heritage narratives from questionnaire responses. This addresses key issues in Luxor's heritage preservation highlighted by Pellini, Marconetto, and Ghenco (8), emphasising Pharaonic heritage over others, as seen in Luxor Temple's layers of Pharaonic, Coptic, and Islamic heritage. This recommendation includes:
- a. Using 3D scanning in exhibition spaces to showcase the site's original layers before conservation efforts altered them.
 - b. Building a database which the local community can engage with capturing and documenting their narratives and untold elder community stories to digitally preserve the layers of heritage they value.
 - c.

In conclusion, these recommendations are applicable to varied heritage contexts, and contribute to the development of a globally cohesive and sustainable community-centric cultural heritage management system which is reflective of distinctive layers of heritage. Hence, the study presented in this paper is not only relevant to the specific heritage context of Luxor, Egypt, and the surrounding community, but also has significance to international heritage contexts.

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Designing with Water: Harnessing Cultural Heritage for Innovative Climate Change Adaptation Strategies

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Abstract

Climate change is a global challenge, which is evidenced by increasing flooding globally. Current infrastructure techniques, that are defensive, in nature, exacerbate these issues, as they render communities unable to respond to environmental challenges. Hence, globally, communities are not resilient to climate change. This paper focuses on ‘Designing with Water’ and proposes integrating heritage water management techniques into modern infrastructure design to offer sustainable flood solutions, to not only live with water, but exist in unity. The paper is informed by the United Nation’s Sustainable Development Goals and comparative case study analysis, to generate recommendations for how to ‘Design with Water’ in the context of climate crisis, between: Hull, UK; the Historic Sukhothai Kingdom, Thailand; Wuhan, China. From this, the study advocates for an integrative community-based approach, which prioritises holistic, natural heritage solutions through understanding heritage wisdom and knowledge, to strengthen water resources and enhance urban resilience globally. The recommendations are adaptable in diverse architectural contexts, fostering an international shift towards integrating heritage management practices into modern developments.

Keywords: *heritage preservation, flood management; city resilience; community tradition; Design with Water*

1. INTRODUCTION

Water is central to human existence, it enables survival whilst also, on a global scale, being a historic place of ritual and shared community experiences [1, 2]. Despite this intrinsic connection between communities and water, the relationship is increasingly fraught with environmental disasters, such as flooding and drought [3]. As these natural disasters increase globally with climate change, cities and communities attempt to keep water out through designing defensive water infrastructure. However, this is not sustainable, and does not facilitate resilience within communities. Instead, this paper proposes that to achieve resilience, sustainability, and foster community well-being it is necessary to rethink water infrastructure by considering the heritage connection to water and learning from and adapting heritage knowledge and wisdom to modern water infrastructure [4, 5]. This project and the emerging recommendations are vital for addressing such pressing issues related to water, sustainable development, resilience, and regeneration, and is part of a wider initiative to integrate heritage into sustainable urban regeneration [5]. ‘Designing with Water’ is integral to developing innovative solutions to global issues of climate change, flooding, and drought [6], as architects, urban designers, engineers, and other stakeholders who are a part of water infrastructure design must integrate water into community lives to facilitate resilience and community wellbeing [7]. This project is a Creative Catalyst for Change (CCC), as it develops capabilities, addresses climate change challenges, broadens local community access, promotes community health and wellbeing, and fosters innovation through the project recommendations. The recommendations and guidelines outlined in this paper, informed by three comparative case studies in the UK, Thailand, and China, are adaptable to global contexts, to facilitate global resilience and climate change adaptation through ‘Designing with Water’.

2. HERITAGE WATER INFRASTRUCTURE DESIGN

In the current context of climate change causing increased flooding, drought, and issues of water access [8], it is imperative that water systems are reflective of the specific context of the community they serve to be usable [9]. To achieve this, engineers, architects, urban planners, and other stakeholders involved in water infrastructure design must conduct necessary evaluations of the local contexts, such as through case studies, interviews, and focus groups, to ensure the designs are usable and loveable for the community, as well as fitting with the local day-to-day and traditional needs [10]. In doing so, the resilience of the community will be enhanced through considered and reflective water infrastructure designs, as well as ensuring that infrastructure is suitable to its specific context to facilitate long-term sustainability [11].

Cultural heritage is discussed in literature as a vehicle in water infrastructure design for this necessary community resilience and sustainability, as, through analysing the past, designers can develop infrastructure of the future [12]. It is imperative to maintain human connection with water, by engaging heritage knowledge and infrastructure to design with water instead of against it [13]. Through engaging with heritage knowledge and analysing heritage water systems, engineers, urban planners, and architects can adapt heritage aspects to modern infrastructure designs [14, 15], thus ensuring the design is reflective of the specific heritage context and needs of the local community, whilst also exchanging knowledge between the past, present and future [16, 17]. In the Historic Town of Sukhothai, the hydraulic system, a present-day United Nations-protected heritage site, was the centre of civilisation as it worked with and adapted to the flood and drought seasons [18]. Hence, in the context of climate change, it is important to utilise heritage knowledge and designs to adapt to floods and droughts which are fitting to the local environment to ensure local resilience and sustainability by welcoming water into communities in positive ways. This approach is represented in the hydraulic system of the Historic Town of Sukhothai, which, instead of adopting a defensive global one-size fits-all approach to keep water out, integrates water into community life.

3. CULTURE'S CENTRALITY IN SUSTAINABLE INFRASTRUCTURE DESIGN

Since the adoption of the 2030 Agenda for Sustainable Development and its 17 Sustainable Development Goals (SDGs) [19] by world leaders, scholarly discourse has increasingly highlighted cultural heritage as a unifying force of these objectives [20]. Through engaging cultural heritage in design processes, infrastructure will be more sustainable as it will be reflective of the local communities' day-to-day lives and traditions, thus will be suitable and useable within its local context [21, 22]. This literature underscores the pivotal significance of culture in the pursuit of resilience and sustainability at both global and local levels [23, 24]. Notably, Bokova, a former UNESCO Director-General, states that cultural heritage embodies a "vision for peace and mutual respect" endowed with a unique "power to change the minds of women and men, and to shape a different future for all" [25]. Conceptualising heritage as a "people-centred process", Erlewein emphasises the necessity of incorporating cultural heritage into infrastructure development to ensure sustainability and useability [26]. Additionally, in 2020, the British Council commissioned a case study evaluation of its cultural heritage projects, to draw attention culture as the unifying 'missing pillar' of the SDGs [27]. By positioning culture at the heart of development policies, literature posits that infrastructure will definitively be human-centred, inclusive, resilient, and equitable [28]. Within this recent literature development, researchers highlight that whilst the safeguarding of culture is an objective itself, adopting cultural mindsets and initiatives in infrastructure development contributes directly to all the SDGs, such as safe and sustainable cities, decent work and economic growth, and reduced inequalities [29].

Despite this consensus of the unifying power of cultural heritage in sustainable infrastructure development, some researchers have stated their concerns. Centrally, their concerns lie in the degree of applicability of cultural heritage, due to its inherent ambiguity and complexity [30]. To overcome such

The DWW framework is informed by the United Nation’s Sustainable Development Goals (SDGs) [41], to further enrich the global applicability of the ‘Designing with Water’ recommendations [Figure 1]. By engaging with the ‘Designing with Water Framework’ and methodology, architects, urban planners, engineers, and other stakeholders in water infrastructure planning can ensure they integrate heritage design and community traditions into their designs, to enhance the usability, liveability, resilience, and sustainability of water infrastructure.

5. CROSS CASE STUDY ANALYSIS

This section presents three international case studies—Hull in the UK, the Sukhothai Kingdom in Thailand, and Wuhan Yangtze Riverfront Park in China—each present unique yet interconnected narratives about the importance of designing with water to achieve resilience and sustainability in the face of climate change. These cases highlight the significance of integrating cultural heritage with innovative water management strategies to enhance community resilience and well-being.

5.1 Case Study One – Hull, UK

Kingston upon Hull, known as ‘Hull’ (Figure 2), is one of the UK’s most vulnerable cities to flooding [42 – 44]. With climate change, this vulnerability has worsened; this is representative of the global situation, wherein communities are being more detrimentally impacted than ever by the effects of climate change, in droughts and floods [45]. Over 90% of the city is below high-tide level, with 95-98% of dwellings and businesses at risk of flooding [46]. Hull’s heritage and future are both centred around water, due to its proud maritime history [47]. This case study emphasises the global need to reimagine water infrastructure, due to international issues of flooding and drought due to climate change, to ‘Design with Water’ instead of developing one-size fits all defensive structures.



Figure 2. Kingston upon Hull, the city lies on the bank of the Humber Estuary (Arup, 2019).

Following the devastating floods of 2007, and the tidal surge of December 2013, a partnership between Hull City Council, Yorkshire Water, East Riding of Yorkshire Council, the Environment Agency, and the University of Hull, known as *Living with Water*, was developed to address the issue of flooding [47]. The central aim of *Living with Water* is to build community resilience through building “understanding across Hull and the East Riding about the threats and opportunities water brings to our region” [48]. As part of this, Arup completed a case study of Hull, to develop recommendations and findings to develop global resilient urban water systems through adaptation to different contexts [48]. From this, Arup identified some core findings which would guide sustainable water infrastructure development, and ensure the development of resilient communities:

1. Innovative funding and investment, targeted at local resilience measures and nature-based solutions.
2. Promoting water sensitive developments that promote health and wellbeing
3. Transparent and accountable government which engages with stakeholders and the local community.

To build upon this, in line with the ‘Designing with Water Framework’ (Figure 1), the findings of this project, developed from comparative case study analysis, integrate global heritage knowledge into these

recommendations. The recommendations presented by Arup [48], in the context of Hull, can all be enhanced through engaging with the cultural heritage of the local community and centring on the UN SDGs, to not only live with water, but to design infrastructure with flooding and drought in mind whilst maintaining quality of life. From this, the ‘Designing with Water’ recommendations present heritage knowledge and infrastructure as the unifying authority underpinning sustainable water infrastructure design, in the context of climate crisis [49]. The centrality of cultural heritage to achieving sustainability and resilience in contexts such as Hull, where flooding is a severe problem, is increasingly recognised in literature [39]. Hence, it is vital that architects, urban designers, engineers, and other stakeholders in water infrastructure design are guided by the ‘Designing with Water’ framework and recommendations presented in this paper.

5.2. Case study two – The Sukhothai Kingdom, Thailand

The Historic Town of Sukhothai is, along with its Associated Historic Towns, a protected UNESCO World Heritage Site [50]. The heritage site is home to an innovative and resilient hydraulic system which controls water resources (Figure 3), to both irrigate the fields during periods of drought and protect the community from floods [51]. The three towns which represent the site were linked by a water highway, known as the



Figure 3. The Sukhothai Kingdom water infrastructure, (a) © OUR PLACE The World Heritage Collection, (b) illustrated by W. Pittungnapoo, 2021

Thanon Phra Ruang, which emphasises the unifying nature of water within communities [52]. The water management system is visible in the Sukhothai Kingdom, and, instead of working against water in a defensive manner, the infrastructure invites water in to be used by the community. This adaptive use is central to resilience [39] and emphasises the suitability of ‘Designing with Water’ to encouraging community resilience.

The water management systems were, and continue to be, related to the rituals and wellbeing of the community [52]. Hence, this case study emphasises the importance of ‘Designing with Water’ to ensure community wellbeing when facing environmental challenges, such as the flooding and drought that Thailand has historically experienced [53]. In the 21st-century, in the context of climate change increasing floods and droughts internationally, the extensive heritage knowledge and ability to live with water evident in case studies such as the Sukhothai Kingdom must be adopted and adapted on a global scale to develop resilient and sustainable living.

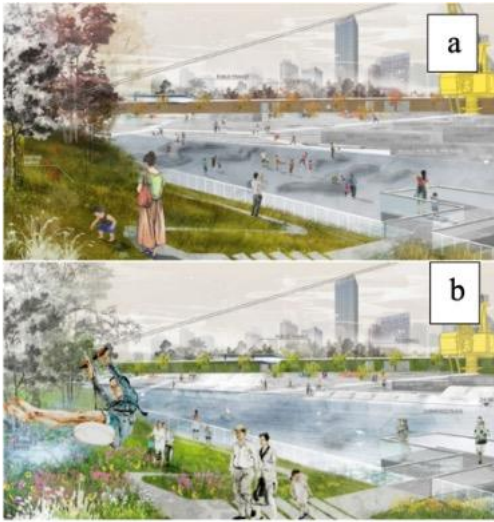


Figure 4. (a) the promenade not during a flood, (b) the promenade during a flood.

Source: <https://www.sasaki.com/projects/wuhan-yangtze-riverfront-park/>

5.3. Case Study Three – Wuhan Yangtze Riverfront Park
Sasaki is an interdisciplinary architecture, planning, and design firm located in the USA and China. They embrace the importance of learning from cultural heritage to inform future visions of sustainability and resilience [54]. This includes water infrastructure design, such as their engagement in the Wuhan Yangtze Riverfront Park [55]. Known as a ‘the city of a hundred lakes’, Wuhan has historically had flooding problems [56]. Despite this, the floods represent an important part of Wuhan’s heritage, as they created fertile land for the early settlers [57], hence, ‘Designing with Water’ is imperative to community wellbeing, resilience, and cultural heritage integration.

Sasaki has developed plans in the Wuhan Yangtze Riverfront Park to integrate water, heritage, and community living, whilst reducing the negative impacts of flooding, through uniting the river, city, and the people. As part of this, Sasaki has proposed a series of sinuous secondary streams in the mudflats, to provide safe corridors for kayaking and passages

for aquatic wildlife [55], to instil a sense of community, resilience, as well as supporting biodiversity. The promenade is also designed with floods in mind, and its connection to the park means it can remain in constant use (Figure 4a and 4b).

Sasaki’s design considers the local heritage of Wuhan, in the integration of the Yangtze River Museum (Figure 5), as well as the wellbeing of the community, to ‘Design with Water’. Furthermore, the designs are reminiscent of the irrigation systems in the Sukhothai Kingdom, as their use is adaptable through the seasons, thus enhancing community resilience. Hence, due to this resilience, sustainability, and heritage mindfulness, the Yangtze Riverfront Park meets the criteria of the ‘Designing with Water Framework’ (Figure 1). This case study is an example of sustainable water infrastructure design successes, following the guidelines of the ‘Designing with Water Framework’ (Figure 1).

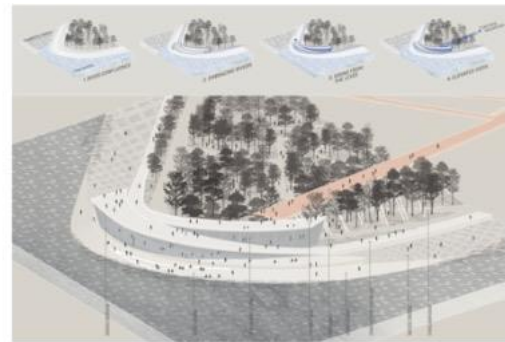


Figure 5 – the Yangtze River Museum throughout the seasons. Source:

<https://www.sasaki.com/projects/wuhan-yangtze-riverfront-park/>

▪ DISCUSSION

By drawing parallels with the Sukhothai Kingdom's irrigation systems, the Wuhan project exemplifies the principles of the "Designing with Water Framework" [Figure 1] as a response to the international issue of climate crisis-induced flooding which is evidenced in Hull. Hence, the Sasaki project in Wuhan is an example of the potential of heritage water infrastructure to act as a solution to global issues of climate change. The inclusion of the Yangtze River Museum further embeds cultural heritage into the park's design, fostering a sense of identity and continuity for the community. This project demonstrates that modern water infrastructure can be both resilient and sustainable when it respects and integrates local heritage and environmental dynamics.

6.1 Significance and Impact

Collectively, these case studies illustrate that designing with water—embracing its challenges and opportunities—is essential for building resilient and sustainable communities in the era of climate change. The integration of cultural heritage into water management not only preserves historical knowledge but also enhances community engagement and well-being. These examples (Table 1) provide a blueprint for other regions facing similar environmental challenges, emphasising that adaptive, culturally informed, and ecologically sensitive water infrastructure is crucial for future urban resilience.

Table 1: Key parameters of the three case studies, highlighting their significance, global impact, and applicability.

<i>Parameter</i>	<i>Hull, UK</i>	<i>Sukhothai Kingdom, Thailand</i>	<i>Wuhan Yangtze Riverfront Park, China</i>
<i>Climate Challenges</i>	High risk of flooding due to low elevation, tidal surges, and climate change.	Historically experienced both drought and flooding.	Frequent flooding, historically created fertile land but now poses a significant risk.
<i>Cultural Heritage Integration</i>	Maritime history central to community identity and resilience strategies.	Ancient hydraulic system integrated into cultural and ritual practices, showcasing adaptive use of water.	Design incorporates local heritage, including the Yangtze River Museum, and fosters a connection between the river, city, and people.
<i>Community Engagement</i>	"Living With Water" partnership involves local councils, water companies, the Environment Agency, and the University of Hull to build community resilience and understanding of water-related threats and opportunities.	Water management systems historically linked to community rituals and well-being, highlighting the social importance of water infrastructure.	Sasaki's design involves community spaces and recreational areas that are functional even during floods, promoting community engagement and resilience.
<i>Water Management Strategies</i>	Focus on local resilience measures, nature-based solutions, and promoting water-sensitive developments.	Adaptive hydraulic system that manages water for irrigation during droughts and protects against floods, demonstrating efficient water resource management.	Creation of sinuous secondary streams for safe recreational use and aquatic wildlife passage, along with adaptive promenades and multifunctional spaces that remain usable during floods.
<i>Sustainability Goals</i>	Recommendations align with the UN SDGs, aiming to improve quality of life while addressing flooding and drought.	Demonstrates sustainable living through historical adaptive practices, suggesting these can be adopted globally to enhance resilience.	Project meets "Designing with Water Framework" criteria, enhancing sustainability and resilience through cultural heritage integration and ecological considerations.
<i>Innovative Aspects</i>	Emphasis on innovative funding, transparent governance, and stakeholder engagement to drive sustainable water infrastructure development.	Historical example of an adaptive and resilient water management system that can inform modern practices.	Combines heritage, ecological, and community aspects to create multifunctional spaces that enhance resilience and sustainability.
<i>Key Outcomes</i>	Development of resilient communities through heritage-informed, sustainable water infrastructure design.	Highlights the global applicability of adaptive water management systems that are integrated with cultural heritage for increased resilience.	Demonstrates successful integration of water, heritage, and community living, serving as a model for other regions to follow in designing resilient and sustainable urban water infrastructure.
<i>Significance and Global Impact</i>	Emphasises the importance of community-centred approaches and heritage integration in developing global resilient urban water systems. Sets a precedent for other flood-prone areas worldwide.	Provides a historical model for sustainable water management that can be adapted globally, showing the enduring relevance of heritage knowledge in contemporary resilience strategies.	Illustrates the effective fusion of cultural heritage, ecological sensitivity, and modern urban design, offering a replicable framework for cities worldwide to enhance resilience and sustainability in the face of climate change.

By learning from these diverse contexts, urban designers, architects, and policymakers can develop water management strategies that are globally relevant yet locally appropriate. The "Designing with Water Framework" [Figure 1] offers a comprehensive approach that integrates heritage, sustainability, and community resilience, demonstrating that innovative water infrastructure design can be a powerful tool in addressing the global climate crisis.

▪ CONCLUSIONS AND RECOMMENDATIONS

This research concludes that through the ‘Designing with Water’ concept presented in this paper, communities can exist in unity with their land, traditions, and infrastructure, to ensure liveability, usability, resilience, and sustainability. By designing water infrastructure with such guidance and the application of the ‘Designing with Water Framework’ (figure 1), architects, urban planners, and engineers can improve community wellbeing whilst ensuring their designs are resilient and sustainable in the current climate crisis context. The comparative analysis presented in Table 1 not only compares the three case studies but also highlights their significance, global impact, and applicability, emphasising how each example contributes to a broader understanding of sustainable and resilient water infrastructure design. This paper emphasises, in line with current literature (18, 39), the necessity of designing with rather than against water, by integrating and adapting heritage knowledge into modern infrastructure designs. This can be achieved through the following recommendations:

1. Engage with the ‘Designing with Water Framework’ to ensure that designs are reflective of community needs in specific local contexts, as public engagement is a clear example of community enrichment and liveability.
 - a. Within this, a fundamental understanding and consideration of people, as opposed to infrastructure, is necessary to ensure that the designs are liveable and loveable for the local community.
 - b. To achieve this, a cohesive case study of local needs, heritage, and traditions must be established through questionnaires and observations to address placemaking at a deep and local level.
 - c. As part of this, project managers, engineers, architects, and urban planners involved in water infrastructure design must include local stakeholders in discussions on infrastructure changes in workshops, making sure to invite a variety of sectors and people to ensure a wide range of views and perspectives.
 - d. This connection to the local community also prevents projects from becoming obsolete in the future, as it will work more efficiently with the land as it is informed by local experts, thus ensuring that projects are sustainable in the long-term.
2. When undertaking a heritage project, it is imperative to take an interdisciplinary approach to uncover heritage practices that may apply to modern practice, such as the hydraulic systems in the Sukhothai Kingdom which can inform modern infrastructure design as a response to the worsening floods of climate change.
3. Develop resilient projects and communities which work with floods rather than focusing solely on prevention strategies, such as the stilt houses found in Thai villages.
 - a. By following the ‘Designing with Water’ framework, stakeholders in water infrastructure design can reimagine flood threats as an opportunity to improve water resources, placemaking, and community resilience in the context of global climate change.
4. When undertaking an infrastructure project, project managers, engineers, architects, and urban planners must speak to local people to gauge their cultural knowledge so that the project is suitable for their lifestyles and landscape. This also prevents projects from becoming obsolete in the future, as it will work more efficiently with the land as it is informed by local experts, thus ensuring that projects are sustainable in the long-term.

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The urban-rural distinction in the analysis of the depopulation of inner areas - The “Sicani area” in south Sicily

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Extended abstract

Italy's negative demographic balance worsened following the 2008 recession, with a discernible migration flow from the southern to the northern regions. Sicily is a representative case in this regard, but it also exhibits significant internal variation on a local and regional level that is scarcely covered in the currently accessible literature. Furthermore, most of the current analyses on depopulation in Italy are conducted at the regional or municipal level, producing intersections with other variables such as the degree of rurality, which, either using the Degurba-Eurostat typology or the Italian Rural Development Plan (PSR) one, show significant association between rurality and depopulation. This contribution seeks to complement the available analyses on depopulation by addressing the increasing urban-rural contradiction, by incorporating intra-communal demographic data to distinguish between demographic variation in small inhabited centres and in sparsely populated or uninhabited areas. The comparison will be drawn from census data from the 2011 and 2021 series. Specifically, data will be analysed for the inner area “Sicani” in the south of Sicily, part of the SNAI, which has decreased its population by 19% between 2001 and 2021.

Keywords: depopulation; inner periphery; mediterranean area; local development; rurality.

▪ INTRODUCTION

Nowadays, rural areas are a scenario of demographic processes that have triggered a rural depopulation widespread in the developed regions, which is linked to structural transformations in agricultural production and new trajectories of population distribution and urbanisation (Johnson and Lichter, 2019). More specifically, in Italy, depopulation of agricultural and mountain areas is now taking place, indeed between 2001 and 2020 the population of inner areas varied by -1.4% (ISTAT, 2022). Additionally, national demographics show a diversity between Centre-North and South: while in the Centre-North the phenomenon seems to be confined to rather restricted areas, in the South and in the Islands it still affects vast territories (Del Panta and Detti, 2019).

A second element, characteristic of inner areas, is the low population density. According to ISTAT studies (2022, 4), population density in the three categories of peripherality of the National Strategy for Internal Areas (SNAI) decreases significantly as the distance from the centres of supply of public services increases, with ‘intermediate’ areas having a density of 106.3 inhabitants/km² ‘peripheral’ areas 58.6 inhabitants/km² and ultra-peripheral areas 32.3 inhabitants/km².

Faced with this problematic scenario, in 2014 the implementation of the SNAI began, which is the Italian policy to focus resources and target actions driven by public agencies to improve the conditions of areas particularly affected by territorial marginality, which in general have low access to essential services and mobility, but which are also characterised by higher rurality levels.

This article proposes a methodology for using available census data in the analysis of the demographic trends of inner and rural areas, more specifically at an intra-municipal scale, in order to introduce the rural-urban distinction in the description of depopulation, paying particular attention to one of the inner areas prioritised by SNAI: the Sicani area in Sicily. Although most of the current analytical models use the municipal scale, it can potentially mask demographic movements within the territory, in particular

in municipalities where the inhabited area occupies only a fraction of the surface; a situation that does not occur in the case of large and intermediate cities.

For this purpose, a conceptual reflection is developed that introduces the concepts of ‘inner areas’ and ‘inner peripheries’, also in relation to rurality. The SNAI is described as the Italian policy that deals with these subjects, and then the phenomenon of depopulation and low population density that inner areas face is briefly discussed. Subsequently, some references are then exposed with regard to the criteria currently applied for measuring peripherality, rurality and depopulation, and the implications of measurement at the intramunicipal scale

The paper then conducts a quantitative descriptive analysis, taking as context the Sicilian region, and subsequently focused on the Sicani area at an intramunicipal scale. The analyses developed aim to establish the relevance of demographic studies at this scale, which consider the rural-urban distinction to adequately contextualize the urbanization processes that underlie depopulation, which may be obscured in demographic analyses at the municipal scale. This study is based on the hypothesis that, by separately analysing the inhabited areas and the rural or scattered housing areas, within each municipality, we can identify distinctive trends between these settlement types.

▪ THEORETICAL FRAMEWORK

The concept of inner periphery has gained significant attention in recent decades in both academic discourse and the field of public development policies. This contrasts with the geographical notion of the periphery, which is based on the distinction of areas far from the centres of economic activity from the centres of concentration. The characterization offered by Copus, Mantino and Noguera (2017) of peripherality as "relational", is being interpreted considering a range of social and economic processes that underpin relationships across regions that have unequal economical and power conditions. From this angle, "inner peripherality" denotes a disconnection from "external" and global networks, and this is manifested in a lower level of development, diminished access to services and lower quality of life when compared to neighbouring regions.

In Italy, the term “internal areas” refers to a specific category of internal periphery, distinguished by limited access to public services, education, health care and transportation (De Toni et al. 2020). This concept has gained significant prominence since the National Strategy for Inner Areas (SNAI) was introduced in 2014. Aligned with the European Cohesion Policy and the place-based approach, this policy seeks to intervene in peripheral areas to counter the dynamics of marginalisation that affect them and focuses its actions on groups of municipalities aiming to foster the establishment of collaborative governances at the local level and their interaction with regional and national spheres. The policy proposes a categorisation of the peripheral character of Italian municipalities into 6 categories: pole, intermunicipal pole, belt areas, intermediate, peripheral and ultraperipheral. The ultimate purpose of the SNAI is to counteract the depopulation dynamics affecting inner areas throughout the national territory and more broadly rural areas (De Rubertis, 2019). This process is characterized as "growing urban-rural polarisation", with a particular focus on the Mediterranean regions of Europe.

Currently, the main instrument used in Italy for measuring territorial marginality in relation to inner and rural areas is the SNAI peripherality level, based on the distance of each municipality from public services and mobility networks, and used in various studies to evaluate different demographic dynamics in these territories (ISTAT, 2022; Vendemmia, Pucci and Beria, 2022). On the other hand, the main instrument at European level for measuring rurality is Eurostat's Degree of urbanization (Degurba), based on population density to distinguish between ‘cities’, ‘towns and suburbs’ and ‘rural areas’. This is one of the instruments used by De Rubertis (2019) to include the dimension of rurality in the measurement of depopulation in Italy.

The two instruments mentioned use the municipal scale for their analysis, which provides a fundamental information base to distinguish between territories. However, this approach can generate some

distortions, as it incorporates inhabited areas and rural or non-inhabited areas for each unit of analysis. This scale of analysis is also not very accurate for assessing the rural-urban distinction, as there are municipalities that coincide with urban centres while in many others, urban settlements cover only a minimal part of the municipal territory. The need to develop demographic analyses at the intra-municipal scale is highlighted by Canales and Canales (2012) to study depopulation associated with deagrarianization processes in Chile at the level of ‘settlements’, and Castillo-Rivero et al. (2021), who examines rural depopulation in Mexico at the local scale, specifically at the level of ‘villages’ or settlements with fewer than 2,500 inhabitants.

▪ **METHODOLOGY**

Census localities are a territorial delimitation that groups together a specific type of space use. Indeed, the ISTAT census defines four main categories of localities, which can be distinguished within a municipal area:

1. Town centres;
2. Settlements (nucleus);
3. Productive locality;
4. Scattered buildings.

Using localities as a reference for a demographic analysis allows the observation of contrasts within municipalities, particularly between inhabited settlements and areas of scattered houses, which is useful in the study of rural and inner areas.

In the first stage of the article, the regional data for the variables ‘periphericity SNAI’ and Eurostat ‘degree of urbanization’ are analysed to provide contextual information for subsequent analyses. In a second stage, a descriptive analysis is carried out at the regional level of the behaviour of the different locality categories in relation to: population 2021, percentage variation in population 2011-2021, population density 2021 and percentage variation in population density 2011-2021.

The Sicani inner area and its municipalities is then analyzed on the basis of population dynamics and housing density but using the distinction between town centers and areas of scattered buildings, for a better understanding of the demographic dynamics within the municipalities, taking into account the differences between populated areas and rural areas.

▪ **ANALYSYS OF THE SICILIAN CASE AND THE SICANI AREA**

In the period 2011-2021 the region of Sicily experienced a population loss of 3.56%, however this dynamic is distributed with wide differences within the territory. The SNAI indicator shows that the greater the peripherality, the greater the depopulation, indeed it is the ultraperipheral municipalities that lose the most population in the period (-9.82%). Similar trends were observed in the municipalities defined as rural according to Degurba, which decreased by 10.03% in the same period. Overall, the ‘towns and suburbs’ category and the ‘intermediate’ peripherality category are comparable in terms of the level of population variation, and both are below the regional average, that is, in better condition.

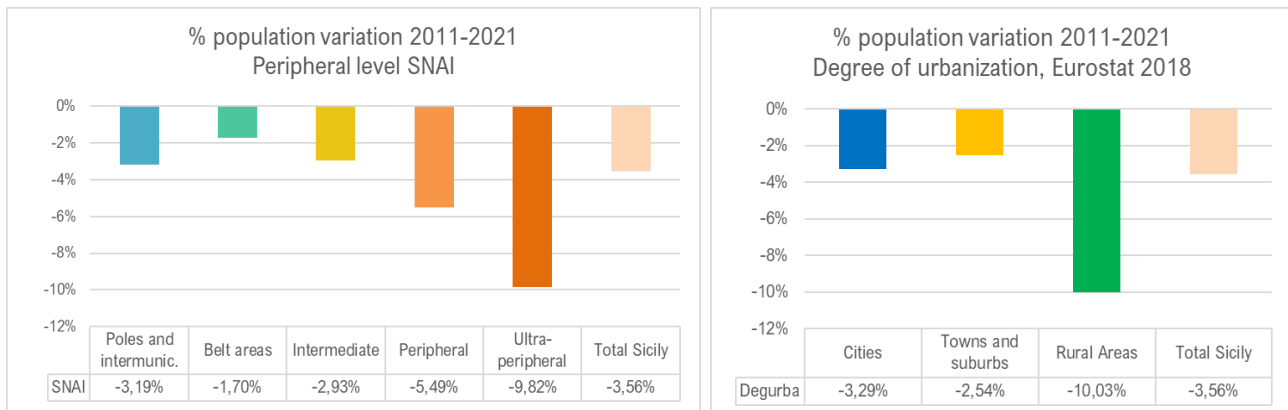


Figure 1. Graphs of percentage variation of population in the period 2011-2021 based on SNAI and Degurba peripherality levels, for the municipalities of Sicily. Prepared by the author with data from ISTAT and Eurostat 2018.

The category ‘pole and inter-communal pole’, which indicates the main cities, shows a loss of population (-3.19%) although less than the regional average. The Degurba ‘Cities’ category shows a similar situation (-3.29%). The ‘Belt areas’ category of SNAI is the one that shows the smallest demographic decrease and is related to urban and rural municipalities located in the peripheries of the main cities or service concentration centres. In this respect, the data at the municipal level show a clear relationship between a higher level of peripherality and rurality with depopulation. In other words, the municipal territories in peripheral conditions and with a rural status in terms of low population density are those that present a higher loss of population.

Nevertheless, an analysis at the intra-municipal scale can account for the urbanisation process that underlies depopulation, distinguishing this time not between municipalities, but between settlements and non-residential rural areas. By analysing data, such as population density and population growth, based on localities, it is possible to observe the rural-urban distinction from a perspective that has not been addressed very frequently.

Type of locality	Population 2021	% population variation 2011-2021	Population density 2021	% population density var. 2011-2021
Town centres	4.512.656	-4,76%	3772,2	-6,46%
Settlement (nucleus)	81.269	7,15%	645,5	-8,27%
Productive locality	1.785	23,53%	21,3	-4,99%
Scattered buildings	212.170	15,98%	8,7	16,23%
Total Sicily	4.807.880	-3,81%	186,1	-3,83%

Figure 2. Population data 2021, percentage variation of population and percentage variation of population density based on census locality types. Prepared by the author with ISTAT data.

A nivel de localidad pareciera que los datos censales se contradicen con los resultados a nivel At the locality scale, it seems that the census data contradict the results at the municipal level; in fact, it is the town centres (main and secondary) of each municipality that lose the most population in the period 2011-2021 (-4.76%), while the localities known as settlement (nucleus), which are smaller in size, increase their population (7.15%). In turn, the areas of scattered houses are those that proportionally increase their population to a greater extent (15.98%). These latter areas, which have the lowest housing density (8.7 inhabitants/km² at the regional level) are those that increase that density to the greatest extent

(16.2%), while the decrease in the density of town centres and settlements is more than double the regional decrease (-3.83).

An essential data provided by the demographic analysis of localities is related to identifying the territorial categories that increase population in a general framework of depopulation, which is relevant because the peripherality SNAI and "Degurba" urbanization indicators, when measuring Sicilian municipalities as a whole, only show categories with population decrease. This implies that, while rural and peripheral municipalities are those that predominantly lose population, the town centres within municipalities are the units that concentrate demographic decline, in favour of smaller settlements and rural areas with low population density.

The Sicani area, defined by SNAI as one of the priority areas for the implementation of this policy, and confirmed in the most recent perimeter 2021-2027, is made up of 12 municipalities belonging to the "free communal consortium of Agrigento" (former Provincia di Agrigento). As an inner SNAI area, this group of municipalities concentrates a high level of territorial marginality in the regional framework and a prevalent rural character according to Degurba, a condition to which is joined the loss of population in the period 2011-2021 (-11%) and the low population density (73 inhabitants/km²), which also decreased by 9 inhabitants/km² in the decade. The area's population loss is proportionally greater than the decline of all Sicilian municipalities in the outermost category (-9.82%) and in the "rural areas" category according to Degurba (-10.03%).

Type of locality	Town centres					Scattered buildings				
	Population density 2021	Pop. density variation 2011-2021	Population 2021	Pop. Variation 2011-2021	Variation % 2011-2021	Population density 2021	Pop. density variation 2011-2021	Population 2021	Pop. Variation 2011-2021	Variation % 2011-2021
Municipality										
Alessandria della Rocca	3491,37	-1185,2	2224	-755	-25,3%	2,03	-0,16	125	-10	-7,4%
Bivona	3222,30	-739,8	3035	-626	-17,1%	2,53	0,01	222	1	0,5%
Burgio	3128,55	-259,6	2482	-215	-8,0%	0,65	-1,35	27	-56	-67,5%
Calamonaci	3607,54	-991,1	1075	-300	-21,8%	3,34	3,34	109	109	(*)10900%
Cattolica Eraclea	3869,38	-493,3	3197	-712	-18,2%	1,79	1,08	109	66	153,5%
Cianciana	2846,45	-1064,3	2328	-1047	-31,0%	22,30	18,5	831	689	485,2%
Lucca Sicula	4483,46	-521,8	1726	-191	-10,0%	0,38	0,38	7	7	(*)700%
Montallegro	4176,26	-487,1	2132	-195	-8,4%	9,86	1,84	262	46	21,3%
Ribera (+ Secca Grande e Borgo Bonsignore)	7029,57	-1253	17168	-1253	-6,8%	6,60	0,06	756	5	0,7%
San Biagio Platani	3512,63	-824,6	2757	-613	-18,2%	3,87	0,74	162	31	23,7%
Santo Stefano Quisquina	5189,13	-595	3657	-415	-10,2%	5,92	-3,81	502	-323	-39,2%
Villafranca Sicula	5086,39	-232,8	1334	-49	-3,5%	0,63	-1,84	11	-32	-74,4%
48207 inhabitants	3925,94	-13,66%	43115	-6371	-12,9%	4,99	20,63%	3123	533	20,58%
Total population area	Average	% Total	Total	Total	% Total	Average	% Total	Total	Total	% total

* Result obtained from an initial population of zero, converted to 1

Figure 3. Demographic data and population density for the municipalities of the Sicani Inner Area, distinguishing between the category "town centres" and "scattered buildings". Prepared by the author with ISTAT 2011 and 2021 census data.

A second, more comprehensive analysis can provide further insights into the demographic framework of the Sicani Inner Area, this time using as a territorial reference the distinction between "types of localities" to differentiate between town centres localities and scattered building localities. Figure 3 compares the data for those two main categories excluding "settlements" as they are almost irrelevant in terms of population; the same for "productive localities" as they do not exist in the analysed area.

Reviewing the total results for the area, these two categories show clearly contrasting performances. For example, the average population density of the town centres of the area (3925 inhabitants/km²) is similar to the density of urban localities such as Taormina, Cefalu or Caltanissetta, and higher than the total density of urban centres in Sicily (3772 inhabitants/km²), while the areas of scattered buildings have a

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population density (4.9 inhabitants/km²) much lower than the total density of Sicilian localities in the same category (8.7 inhabitants/km²). In the analysed period, the town centres of the area decreased their population density by 13.7%, while the areas of scattered buildings increased it by 20.5%.

With regard to the demographic dynamics of the Sicani area, the scattered building areas, whose population represents 6.5% of the total population of the inner area, increase their population by 20.6%, while the town centres decrease by 12.9%. All the urban centres in the inner area lost population, with Cianciana (-31%), Alessandria della Rocca (-25.3%) and Calamonaci (-21.8%) decreasing the most. Those with the smallest decreases are Villafranca Sicula (3.5%), Ribera (6.8%) and Burgio (8%). The areas with scattered buildings, on the other hand, mostly increase in population, particularly in Cianciana (689 inhabitants), Calamonaci (109 inhabitants) and Calamonaci (109 inhabitants), although there are a few cases where the population decreases, such as Santo Stefano Quisquina (-323 inhabitants), Burgio (-56 inhabitants) and Villafranca Sicula (-32 inhabitants).

The case of Cianciana is particularly interesting because although it is the one that loses the most population in absolute terms (-1047 inhabitants) after Ribera, it is the one that increases its population the most in its localities of scattered buildings, a trend shared by Calamonaci, although to a lesser extent, as this is the municipality with the smallest population in the area (1075 inhabitants in 2021). Also to be highlighted is the case of Alessandria della Rocca, which presents a high depopulation in its town centre, but also loses population in its locality of scattered buildings.

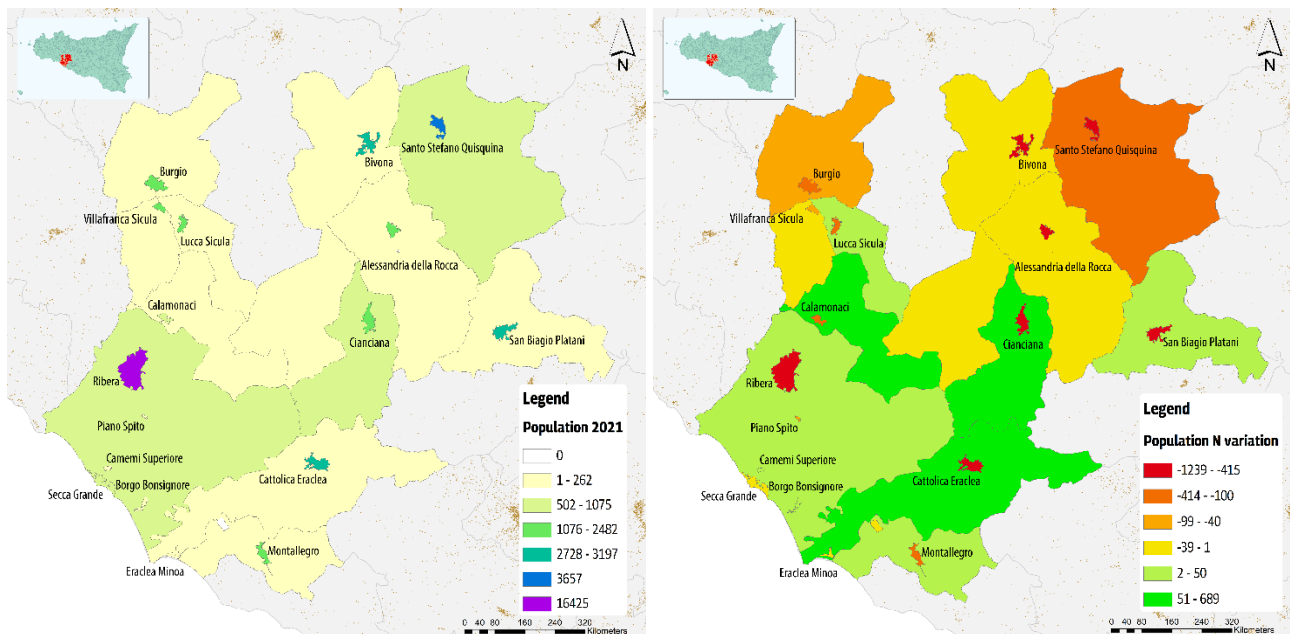


Figure 4. Maps of the internal Sicani area in Sicily. Population ranges 2021 and absolute population variation ranges 2011-2021. Prepared by the author with ISTAT census data.

The municipality of Ribera, with the largest population and population density in the area, seems to show low depopulation in its town centre and a slight increase in its area of scattered buildings, and therefore shows better demographic dynamism. Cases of relative dynamism are also Montallegro, with low depopulation and high density in its town centre, and high density together with an increase in population in its area of scattered buildings (46 inhabitants). Lucca Sicula also shows a similar trend, although with a smaller increase in its scattered buildings area. Intermediate conditions are shown by the municipalities of Bivona, San Biagio Platani and Cattolica Eraclea, which are also the most densely populated after Ribera.

The maps in Figure 4 provide an overview of the demographic dynamics described above with a territorial reference. The map on the left shows how the population is distributed in 6 groups, where it is possible to observe that the most populated areas of scattered buildings belong to the municipalities of Ribera, Cianciana and Santo Stefano Quisquina. The map on the right, which shows the absolute variation in population over the period, shows that the areas of dispersed houses closest to the coastal area are increasing in population, while those located further north and more closely linked to the "Monti Sicani" are those that are losing population. The main inhabited centres of all the municipalities lose population, although in absolute terms the areas with the lower depopulation are the north-eastern area of the hills and Montallegro, closer to the coast.

▪ CONCLUSIONS

The analysis by localities, at the intra-municipal scale, enables a different view of the demographic trends of the inner and rural areas, compared to the analysis at the municipal level. Thus, the first analysis of depopulation in the region of Sicily shows that it is the inhabited centres that are losing population in the most significant proportion, while the less inhabited rural areas with scattered buildings show a clear increase in population, at least in the last decade.

Although the data obtained seems to contradict the analyses at the communal level, which show that it is the rural and peripheral municipalities that are losing population to a greater extent, both results are rather complementary. De Rubertis (2019, 85) analyses at the municipal level showed that among the "hyper-rural" municipalities, specifically the "markedly agricultural" municipalities showed a certain dynamism, which may indicate a possible demographic recovery of certain rural fractions, possibly with higher productive activity, within a general framework of depopulation in Sicily.

The data indicate that in Sicily "belt areas", located in the peripheral rings of the main cities, that are increasing their population the most. These municipalities are not the ones that concentrate the greatest rurality, but they also face a strong functional influence from the urban areas. However, a demographic analysis at the locality scale might indicate that it is the non-urbanised areas of these municipalities that undergo the major population increase.

In the case of the Sicani area, composed mainly of rural municipalities according to Degurba, and mainly peripheral and ultra-peripheral municipalities according to SNAI, the analysis at the locality scale shows similar processes to those observed at the regional scale: the town centres are those that experience proportionally the greatest loss of population, while the areas of scattered buildings show a tendency towards population increase, even though the magnitudes are slight, given the small population of the municipalities analysed.

The proposed methodology is an interesting tool to deepen the demographic analyses of the inner areas, for a more complex understanding of population mobility trends in relation to the dimension of rurality. It can enable the development of a series of studies that cross the variables analysed here with others of a socioeconomic and employment nature, thus opening up perspectives for future research.

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The DumBO Space as an Example of a Dynamic Change and Social Innovation in Bologna

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Abstract

This contribution aims to expose the challenges and potentialities of collaborative workspaces, starting from the example of the DumBO space in Bologna which promotes local identity, celebrates the urban landscape, and engages professionals, artists, and society in a collaborative effort to regenerate abandoned spaces. The name DumBO stands for *Distretto Urbano Multifunzionale di Bologna* (Bologna Multifunctional Urban District), and it is a place where creativity, culture, and community collide. The DumBO wide area located on the old rail yard of almost 40,000 square meters is under the property of Italian State Railways, which has the task of redeveloping and enhancing infrastructures that are no longer functional for railway operations. The open areas of DumBO have been partially renovated and transformed into spaces for the cultural industry where the professionals can pay for a low-cost service to have a co-working space and use it for exhibitions and other activities. Therefore, it is a place where associations, businesses, and citizens collaborate and contaminate each other's ideas, fostering new and innovative approaches to city development. It is a meaningful example of how a collaborative working space could also integrate society and the neighborhood; in other words, it is a project made for the community by the community. One still open question is: are collaborative workspaces really open to everyone?

In the context of New European Bauhaus (NEB), the “CrAFt – Creating Actionable Futures” European project, funded by the Horizon Europe program, sees citizens as active contributors towards climate neutrality. The ongoing research of CrAFt investigates how an area of collaborative workspace close to the city centre, yet at the same time away from it, given the actual inaccessibility to the same location, could be a valuable example of a fully inclusive urban regeneration.

Furthermore, the current research analysis is based on an empirical approach, public observation of space, surveys, and public alliances for a major public engagement. To examine these data, researchers in different countries have created a tool called the “NEB Impact Model” (NEB IM), which includes diverse indicators to assess the level of compliance with the NEB requirements in several urban contexts. The NEB principles of aesthetics, sustainability and inclusion shape the idea of the DumBO project, which encourages sustainability and economic development through the inclusive and alternative approach of the community. As such, it represents a collaborative workspace representative model of co-creation and co-design experiences in everyday life practices.

Keywords: *Urban regeneration, New European Bauhaus, Collaboration, Social innovation, Community*

1. INTRODUCTION

Bologna is an example of new forms of collaborative governance models and significant participation of citizens in local initiatives. The city was selected in 2022 as one of the 100 cities in Europe with the commitment to achieve climate neutrality. Bologna was the first city to implement the “City as a Commons” approach [1] and the “co-city” protocol, articulated in the following phases: “cheap talking”

(meant as dialogue interaction), mapping, practicing, prototyping, and modelling [2]. The application of the “co-city” protocol, the elaboration and adoption of the Regulation [3], based on that protocol and the “City as a Commons” approach, together with the active role of local stakeholders such as the Municipality, foundations, and other institutions, enforced the key role for the participatory processes in the local sphere.

In this context, a particular project called “DumBO - Distretto Urbano Multifunzionale di Bologna” (Bologna Multifunctional Urban District) appeared to promote social innovation and new community business models. It presents the constructive collaboration between the public and private sectors, as the property is public, but the management of the spaces is private [4].

Through transformations still in progress, the open areas of DumBO are getting an innovative space for the cultural industry with the creation of Collaborative Working Spaces (CWS). According to Capdevila (2017) [5], four existing typologies for CWS are fab-labs, maker/hackerspaces, living labs and corporate labs based on innovative approaches (explorative practices and exploitative goals). Moreover, Montanari (2020) [6] proposes another classification in terms of “Collaborative Spaces” and identifies six different typologies, such as corporate collaborative spaces, coworking spaces, creative or cultural hubs, fablabs and makerspaces, incubators and accelerators, social spaces (cafes, libraries, etc.) by defining four common features for them including variety, flexibility, autonomy, and collaborative ethos. Also, Mariotti et al. (2021) [7] propose four types under the umbrella of “New Working Spaces”, namely collaborative and creative working spaces (coworking spaces and smart work centres), makerspaces and other technical spaces (fab-labs and open workshops), other new working spaces (hackerspaces, living lab, and corporate labs), and informal new working spaces (cafes and libraries).

Thus, DumBO space could be characterized as a multifunctional place which includes several types of CWS, as mentioned above, by embodying typical and atypical forms. According to the typologies that Mariotti refers to, DumBO includes collaborative creative working spaces, and technical spaces like fab-labs and open workshops, with a significant inclusion of citizens from the neighborhood.

Moreover, these CWS promote innovative tools and a new form of situated learning. The origins of this definition come from Lave and Wenger in 1991 [8], and it has been understood in opposition to cognitive learning. The latter was based on notions and knowledge acquired by traditional education models, while the concept of situated learning introduced a novel approach that is more inductive, starting from the idea of legitimate peripheral participation.

This kind of learning, also described as “learning by doing”, has been used to describe, for example, the learning process happening in communities of practice presented by Amin & Roberts (2008) [9], and it has also moved to distinct aspects of civil society participation in public activities, as well as to all the education and research environments. “Learning by doing” means that people can discover new potentialities for their communities through concrete examples from everyday life practices. In the perspective of situated learning, social proximity plays a key role, especially in enhancing interactive processes and allowing knowledge exchange, collective learning, and innovation [10, 11, 12]. Knowledge exchanged is not normative and cognitive but also tacit and codified. Hence, the setting is where local and traditional knowledge is exchanged and transferred through passive or active participation and presence in a real (and not simulated) environment. With the growth of trans-local relations, the discourse around learning also englobes the need for connection and networking among people and places: a research stream also introduced “networked learning” as a subgroup of situated learning [13]. In another case, the term “knowing in action” means overcoming the “limits” of learning through spatial proximity, introducing relational proximity [9].

DumBO space could be a valuable paradigm for situated learning through interactive engagement of the community with different practices and tools. For instance, educational programs for young people with cultural and art aspects, continuous festivals, and alliances for specific topics exist. The actions and the

activities held there are a means to know the communities better and ensure that the citizens can be part of a new policymaking process. The sharing of knowledge is the key point for the involvement of people so they can produce more knowledge and transfer it to other users/active contributors. DumBO is a place where sociability meets sustainability and beauty with the presence of many cultural aspects such as *graffiti*, murals, and the reuse of abandoned buildings. The project has a valuable character as it involves a strategic area of the city, and it has an experimental role as an example of the temporary use of spaces open to the territory and citizens' participation. DumBO is a project in transition as space is a sphere of continuous changes, and everything is possible to happen [14]. In fact, the New European Bauhaus principles of "sustainable, beautiful, together" form the DumBO project, which encourages sustainability and economic development through the inclusive and alternative approach of the community. The result is a unique urban space that embodies the spirit of collaboration, creativity, and renewal. Thus, it is not just about another CWS but something more: a space of urban regeneration that sees and understands the citizens as active contributors.

2. URBAN REGENERATION AND CITIZENS' PARTICIPATION: NEW FORMS OF CIVIC ENGAGEMENT

It is heartening to see that DumBO's design process is open and inclusive, thanks to the co-creative and co-collaborative approach. The "City as a Commons" approach is deeply interconnected with the concept of collaborative governance and democracy. Additionally, it is based on participatory processes in which co-creation and living labs are valuable tools. In the planning literature, the term collaborative is linked to "communicative action" and is recognized as a theory of practice. It considers why urban regions are important to social, economic, and environmental policy and how the communities have the possibility and tools to organize to improve the quality of their places and living conditions [15].

Also, the concept of co-creation is a "mosaic" of ideas and norms from varied research traditions and activities, as well as sectors such as urban planning, design, innovation, marketing, and management. In urban development, co-creating partly builds on knowledge and experience from processes in the private sector, which are applied to public service delivery [16].

This term refers to the general knowledge about citizens and their experience with public services. Citizens can actively contribute through their knowledge and ideas to create new collaborations and include different participants, starting from the third sector to the local economy actors, in the entire process. In DumBO, different communities coexist, introducing an alternative approach of collaboration between diverse parts of the society: from the professionals of the cultural sector to community managers and young people who work as freelancers for the creative economy. Activities are organized for each target who lives and works in the area by including many types of actions and events like sustainable mobility, such as "cicloturismo", film festivals, and other initiatives of cultural and artistic interest.

One of the most nominated realities in DumBO space is the association "Bologna Attiva", a concrete example of public engagement through the active role of diverse stakeholders. Located within DumBO, it is a human, urban, and social regeneration project that aims to experiment with new responses to the challenges posed by the changing world of work [17]. At "Bologna Attiva" [18], a considerable number of co-working spaces, study rooms, proximity services for students, professional accompaniment paths, mutualism, and cultural and community activities have been created. Its objectives are to redefine the spaces of DumBO in line with the needs expressed by the city and the neighbourhood, favouring a civic re-appropriation of the area.

Furthermore, Bologna is a city that actively involves the civic society, so in DumBO space, another initiative that takes place is the "Assemblea Cittadina per il Clima" [19] (Citizens' Alliance for Climate): the citizens, together with other stakeholders, share their thoughts, and they contribute with recommendations to the public dialogue for the implementation of the "Climate City Contract" (CCC) in Bologna. Climate City Contracts (CCCs) are part of a multi-level co-creation process to support cities

in transitioning to climate neutrality within the framework of the NetZerocities [20] platform and the Cities Mission.

The main purposes of CCCs are the identification of the policy and gaps to steer the transition; the coordination of a network of stakeholders, national and EU authorities to deliver the conditions necessary to achieve climate neutrality; the creation of a one-stop-shop for multi-level negotiations to facilitate city activities. The CCCs support new inclusive and participatory forms of governance, circular and accessible economic and funding models, and new integrated urban planning strategies with increasing implementation of digital technologies and innovative management; they are signed by the Mayor, European Commission, and national or regional authorities. The CCCs include, amongst others, an innovative form of civic engagement through “living labs,” which include spontaneous and inclusive experimental activities. This process is interconnected with the Municipality of Bologna to ensure new forms of civic engagement and provide solutions to local problems and challenges. The examples mentioned above promote new forms of co-creation as the public space changes.

3. THE CONNECTION WITH THE NEW EUROPEAN BAUHAUS PRINCIPLES

The European Commission states that the mission of the New European Bauhaus (NEB) is an initiative connecting the European Green Deal to our daily lives and living spaces. It refers to creativity and interdisciplinarity as a movement in continuous change.

The main key points of New European Bauhaus are the following [21]:

4. it is a bridge between the world of science and technology, art, and culture;
5. it is about leveraging our green and digital challenges to transform our lives for the better;
6. it is an invitation to address complex societal problems together through co-creation;
7. by creating bridges between different backgrounds, cutting across disciplines and building on participation at all levels, the New European Bauhaus inspires a movement to facilitate and steer the transformation of our societies along three inseparable values: sustainability, from climate goals to circularity, zero pollution, and biodiversity; aesthetics in terms of quality of experience and style, beyond functionality; inclusion, from valuing diversity to securing accessibility and affordability.

One of the main goals of NEB is to connect different realities from the citizens to experts, researchers, businesses, institutions, and creative and cultural industries to share new perspectives for the future and co-create and co-design actionable spaces and communities.

From the first steps, the DumBO space is a project which engaged the NEB principles, as sustainability, beauty and inclusiveness are well presented around the area through temporary interventions. In this context, it accommodates and encourages innovative ideas and artistic and creative expressions by bringing together social integration,

entertainment, culture, experimentation, sustainability, and collaboration between different realities.

DumBO offers multi-purpose spaces for rent to host many events such as conferences, public alliances, workshops, live concerts, and exhibitions (Figure 1). Specifically, the venues are the following:

- “Binario Centrale” mostly hosts multiple events;
- “Baia” is an open venue adaptable for concerts and public alliances;
- “Blocco 19” hosts several types of creative businesses, coworking, meeting rooms and training courses;
- “Emme300” situated in the central part of “Piazza Ravone” is ideal for storage functions but also permits to use it for alternative activities thanks to the small and flexible spaces;
- “Piazza Ravone” is the central square of the district and “Le Piazzole” corresponds to the long canopy, divided into sections across the square. They can host exhibitions and other events;
- “Interrail” is the last large building that makes up DumBO district, it is used as offices;

- “Maia store” is a new entry for the district, it is sales point and promotes local products;
- “Officina” consists of community space, coworking, study room and *bistrot*. The latter is in the central body of the “Officina” and develops on two levels;
- “Spazio Bianco” is suitable for multiple events such as small exhibitions, workshops, and private events thanks to its flexible structure;
- “Temporanea” is the building that recalls more than the others a station, with the idea of “temporary station”. It is well preserved, and it hosts temporary installations, concerts, exhibitions;
- “Vascello” is a large single nave-pavilion built with exposed bricks that gives an industrial charm sensation. It is perfect for activities that require something unique, like shootings and exhibitions.

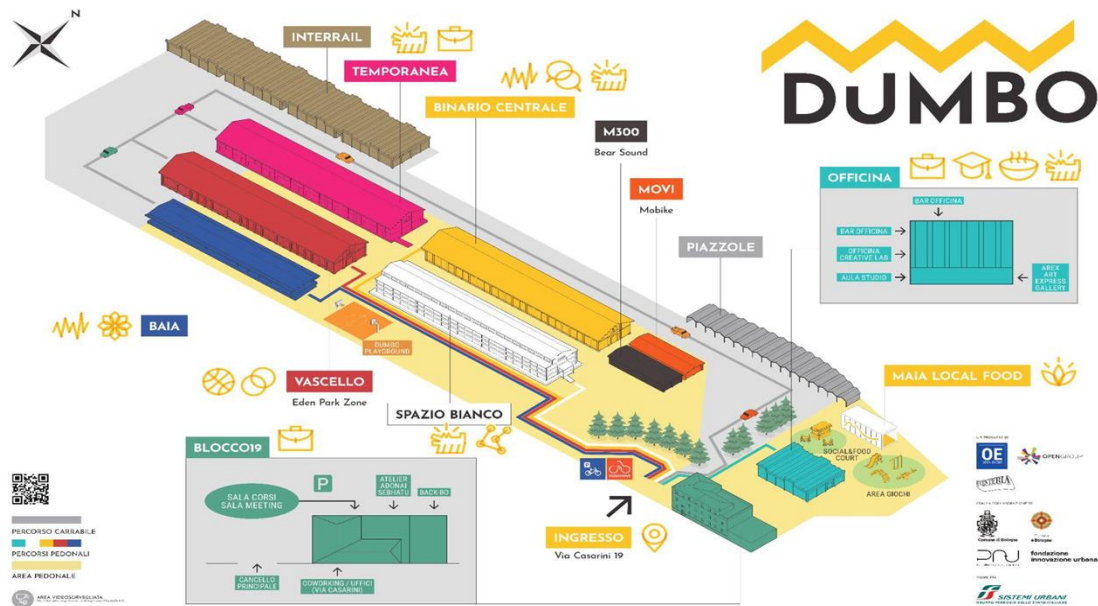


Figure 1 Map of DumBO spaces in Bologna (Source: <https://dumbospace.it/about-us/?lang=en>)

3.1 The methodological approach: NEB Impact Model as a tool to discuss and regenerate

The New European Bauhaus principles are present in the space, which faces different challenges, from climate change to social poverty, housing issues and inequalities, so the local authorities and communities need to understand how to improve their everyday life practices and create active public spaces. In this perspective, the “CrAft – Creating Actionable Futures” European project, funded by the Horizon Europe program [22], includes all the NEB principles of sustainability, beauty, and inclusiveness, and it refers to the urban and social change through the citizens’ participation, by creating a tool to talk and engage different actors in the urban context. This tool, called the “NEB Impact Model” (IM), is a set of indicators addressing technical/environmental aspects, architectural/artistic quality, and social and governance ones. It is a guidance instrument that provides data and, eventually, solutions to be applied in a complex urban environment.

The contribution of the IM is to identify crucial points for systemic change towards climate neutrality and resilience by including various aspects, starting from sustainability (ecological, infrastructural, social, cultural, economic, aesthetic, legal, etc.) into innovative models for local collaborative governance and enrich the dialogue with the local stakeholders. The IM comprises 5 pillars, 17 impact categories and 46 suggested indicators (Figure 2) [23].

A brief description of the 5 pillars is the following:

- “The environmental performance” concerns all energy material and water streams to assess the energy used in buildings, infrastructures, and transport;
- “Healthy living” reflects how a physical environment provides the basic quality of life functions for its users and inhabitants;
- “Social-cultural performance” relates to the functional mix, diversity and accessibility of services and amenities for a particular location;
- “Economic performance” examines how an investment or project inscribes itself meaningfully in the local economic tissue;
- “Governance” measures the effectiveness of the process and the involvement of stakeholders as fundamental aspects of a project.



Figure 2. The current visualization of the NEB Impact Model (Source: D1.1: NEB Impact Model-update; version 14.07.2023, <https://craft-cities.eu/results/> - Last accessed 29 February 2024).

In the framework of the “CrAft” project, DumBO is a case study for implementing and testing the IM in Bologna. Corresponding to it, two other sandbox cities, Amsterdam, and Prague, are testing collaborative governance models influenced by the NEB approach to city transformation. In Amsterdam, the action areas are economic performance, governance, healthy environment, quality of life, and technical and environmental performance. Different pilot cases exist instead of Bologna, such as the Marineterrein Park [24] and Green Mile [25]. On the other hand, Prague focuses on integrating beauty towards the climate neutrality through many cultural events [26] in the city and reports the lessons learnt from the experience.

From April 2022, since the “CrAft” project started, the University of Bologna, in collaboration with the Municipality and “Fondazione Innovazione Urbana” (FIU - Foundation for Urban Innovation), including young researchers as well, started to implement some key actions and activities to understand how the NEB principles influence the public-hybrid space. Moreover, they investigated how degraded and abandoned areas can be renewed without losing their identity and carrying capacity.

In this context, DumBO is a space in transition, a temporary place for urban creativity with continuous engagement of local communities and is considered a sandbox city landscape where experimentation meets innovation. The term “urban sandboxing” refers to: “creating temporary, low--cost, and adaptable interventions in public spaces within a city, typically to test new ideas, designs, or policies before committing to permanent changes. The term ‘sandbox’ is based on the idea of a playground where children are encouraged to experiment and test their ideas without fear of failure” [17].

Urban sandboxing can take many forms, including pop-up parks, temporary bike lanes, community gardens and public art installations. By providing a platform for experimentation and collaboration, this approach can help cities to become more resilient, sustainable, and responsive to the needs of their residents.

Some tests related to the IM’s specific categories (environmental and technical performance, sociability and culture, governance) are under development and implemented in the DumBO area. Particularly, the current research is focused on the following aspects: sustainable mobility, healthy living, cultural heritage, artistic and spatial quality, arts mobilization, sociability, and economic performance. Thus, several indicators (that are included in the main impact categories such as governance, economic performance, social-cultural performance, healthy living, and environmental performance) help to measure and quantify data, which are useful in monitoring the status of the space and providing novel solutions where it is essential. As complex research, cooperation between stakeholders and expertise is fundamental.

In DumBO, many realities coexist, and cooperation between different pacts is mandatory to implement the Model. As the place includes multiple cultural and artistic aspects, a specific focus on the indicators that try to understand the peoples’ perceptions in similar spaces like DumBO is essential. Related to the main impact categories mentioned above, DumBO gathers many social aspects through collective activities that remind the citizens to be active in the space: it is an interesting experiment to see and understand how the different realities react and shape new forms of collaboration in diverse layers. Additionally, it is a place of urban creativity that uses artistic tools to regenerate the area and engage the local community of artists. Thus, the research is inspired by the methodology of social sciences, which includes the empirical approach and both qualitative and quantitative data. Both are crucial elements in studying and observing the space and, first, reflecting on how different elements are significantly involved in the urban regeneration of abandoned areas.

4. CONCLUSIONS

The CrAft research investigates how an area of collaborative workspace could be a valuable example of a fully inclusive urban regeneration notwithstanding the people perception of inaccessibility, given

by the structural urban origin of the area, of an area which is close to the centre, yet at the same time away from it, given its actual isolation.

To attempt at responding to the initial question “are collaborative workspaces really open to everyone?” we might certainly say that DumBO is an inclusive and open space for the community, which is conceived considering the different perspectives of people who live this urban space through everyday life practices.

However, as the challenges are many, there is a major necessity to include the NEB principles of sustainability, beauty, and inclusiveness for a more affordable environment towards climate neutrality. It is fundamental, in fact, to create inclusive spaces, not just to provide a whole package of services but also a quality life experience through creative and cultural aspects. DumBO is as well a place where people can understand the space and their needs in an emblematic way and be part of the changes. For example, the activities co-organized by different actors provide an alternative way to produce and share knowledge across the community, in other words, another perspective of “learning by doing.”

The CWS are places of social life, too, and are a point of reference for the digital nomad community and the citizens. Temporary residents, mostly digital nomads or employees in the gig economy and/or cultural industry, could eventually be active contributors by being included in local activities and initiatives. Thus, they live the whole urban experience through the engagement of other local citizens’ networks, so inhabitants, freelancer workers of the creative industry and digital nomads are connected to the local context by sharing knowledge and collective experience. The city is not just a transit place but a space of continuous changes. The CWS could be a significant economic resource for cities by considering a sustainable way of presence. Moreover, this could be an alternative and sustainable tourism model for contemporary cities with respect to identity and morphological characteristics. Places like DumBO do not offer just a co-working and co-living experience but a space for co-creation and co-design approaches, a new ecosystem of participation which promotes different forms of social actions. Also, in terms of sandboxing cities, DumBO is related to experimentation and creativity and introduces a new lifestyle for young people, as well as for other target groups with different activities and design perspectives.

The NEB IM, through its implementation in different urban contexts, is a potential tool for discussing current challenges with various stakeholders based on the territory. In addition, it helps to underline the peculiarities of contemporary cities and provide valuable data to the local authorities to use and deliver more sustainable, beautiful, and inclusive solutions towards climate neutrality. The NEB IM is applied to DumBO as a case study with the prospect of a more actionable future for the citizens, a new form of local collaborative governance model, in other words, to promote a new urban movement.

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Identity and regenerated landscape - An opportunity for the 'new' paper mill-museum in Tivoli.

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Abstract

The former Amicucci-Parmegiani paper mill in Tivoli, Italy, has been abandoned for a long time but is now the focus of a design competition for its restoration. This mill is part of a larger network of disused industrial paper mill settlements along the Aniene river, which reflect the area's history of production. The New European Bauhaus [1] strategy seeks to revitalize old structures by incorporating new approaches. In this case, a Sapienza startup has developed a remarkable example of renovating, repairing, and reconstructing the modern built heritage. Rather than discarding the past, it is important to work with the history of buildings and adapt them to current needs. This requires understanding and respecting the materiality and history of inherited structures. The proposed intervention strategy for the Amicucci-Parmegiani paper mill aims to preserve its industrial identity while incorporating a functional program that engages the community and showcases the building's history [2]. By following these principles, the renovation project will ensure the building's significance is maintained while meeting contemporary requirements [3].

Keywords: *building rehabilitation; urban upgrading; landscape redevelopment; retrofitting of built heritage.*

1. INTRODUCTION: VOIDS TO BE RETURNED TO THE CITY

The area in question has a long history of industrial activity, which has left its mark on the edge of the medieval urban fabric of Tivoli downstream [4]. Since the end of the nineteenth century, new construction and production technologies have been prominent in this fringe of the city. The massive industrial constructions have left a new margin of construction that has decisively questioned the ancient landscape relationships between city, land and river (Figure 1). It is evident that Tivoli requires regeneration, with the recognition of the values observed in the oldest and most recent forms of urbanisation. This should inform an overarching rethinking of the territory.

The Municipality of Tivoli, the proprietor of the building, has initiated a design competition with the objective of transforming the current industrial ruin, which has a significant negative perceptual-functional impact on the city, into an important and strategic opportunity for urban transformation. The former Amicucci-Parmegiani paper mill represents a waiting space, an urban void, so defined not because it lacks volumes but because it has lost its original functions and its meaning within the fabric of the city. The redevelopment of the area occupied by the building and its functional rethinking aim to generate a process of urban regeneration through the improvement of aspects such as the architectural perception of the context. This is to be achieved, in particular, through the redesign of the downstream façade, the attractiveness towards the city centre, mobility, the environment and integration with the surrounding landscape, sociality and economy. This is to be achieved, in particular, through the possibility of creating new public spaces and/or municipalities as closely as possible in connection with

the existing urban fabric. The area is of considerable scenic importance, given its position in close proximity to the historic centre and a number of important landmarks, including the Cathedral to the south and the valley formed by the course of the Aniene river, the waterfalls and the church of S.M. di Quintiliolo on the opposite side to the north, and the Sanctuary of Hercules the Victor [5].

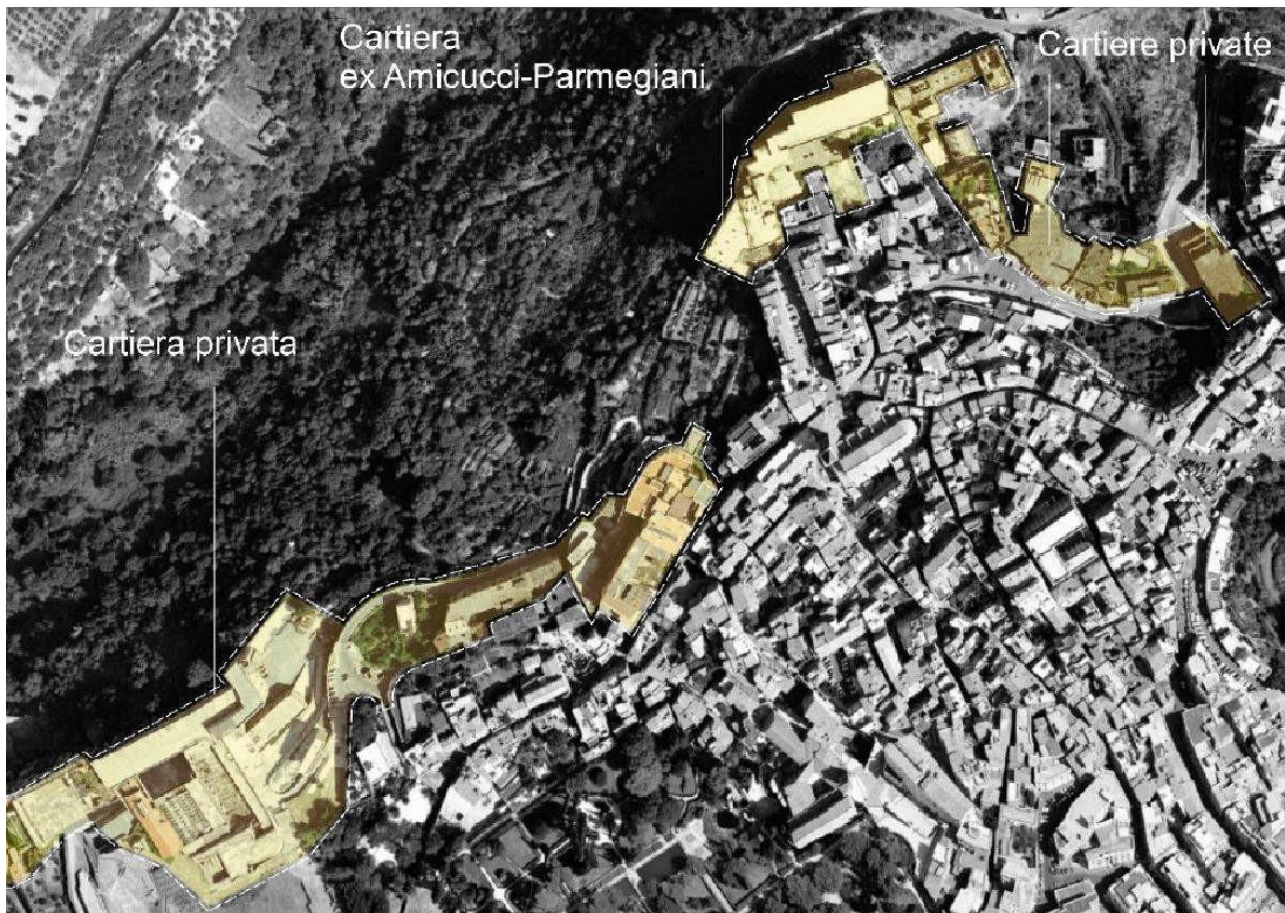


Figure 1. Map of the ex-industrial areas born during the end of the nineteenth century (from the Technical-illustrative report of the “Design Competition for the construction of the auditorium and car park in the area of the former Amicucci Parmegiani paper mill” - source: Municipality of Tivoli)

2. THE FORMER AMICUCCI-PARMEGIANI PAPER MILL: ROOTS, TRANSFORMATIONS AND DECLINE

2.1. Industrial archaeology in tivoli: the values of a fertile territory

The medieval urban fabric of Tivoli is characterised by numerous ancient and modern canals. Since at least the 16th century, there have been numerous paper mills, ironworks and tanneries in the area, which were moved by water. From the beginning of the 20th century, structures were installed that had been in place since the previous century. These were fed by the waters of the Aniene, which were exploited through a system of underground canals. This enabled numerous paper mills, mills and factories to be fed [6]. As a consequence of these natural and industrial factors, the region became the site of the first hydroelectric power development and utilisation in Italy. Tivoli was the first city to benefit from electric lighting, produced by hydraulic motors in 1886 [7][8]. Huge industrial structures, predominantly constructed from reinforced concrete, are being erected on previously occupied sites, with the construction of new structures replacing and expanding upon existing ones. The context is that

of a medieval city with a walled edge comprising historic industrial concrete structures, including the former Amicucci-Parmegiani paper mill.

Some of these structures serve only to preserve the values of work and the memories of intangible data. Others stand out as involuntary monuments with the intriguing shapes of reinforced concrete, a material that has become a defining feature of industrial architecture. Finally, there are those that contain some technological or scientific innovation, such as power plants or avant-garde architectural construction solutions. The concept of heredity encompasses many elements, including environmental and conservation issues. The consequences of neglect have manifested in the form of collapses and serious deterioration. However, despite the laudable intentions of some renovation operations, they have already resulted in the loss of architectural elements of considerable value. One such example is the metal vaults designed by Gino Covre for the Tiburtina paper mill¹ [9].

Historically, the area was characterised by an organic connection between the building fabric and the naturalistic emergencies, with the presence of cultivated terraces.

The relationship between the buildings used for productive activities, the city and the residences of the occupants of the sector in Tivoli was somewhat unconventional. Despite the industrial development, there were no workers' quarters. This immediately highlights how the phenomenon of urbanisation, which was typical of the period of the Industrial Revolution, did not occur here. This is evidenced by the fact that the city did not experience the "evils" of many cities.

The causes of this positive development can be attributed to two factors. Firstly, there was a gradual process of growth over time, during which the search for spaces and functions took place within existing buildings. Secondly, the historic centre represented the residential district of reference, thus generating a balance between home and workplace, between living and working. Conversely, since the paper mills and other industrial plants were abandoned, there has also been a gradual exodus of inhabitants from the medieval quarter.

In the ancient industrial area of Tivoli, therefore, important remains of the classical age coexist with paper mills, factories and related infrastructures, including, in particular, canals. The heterogeneous and overlapping elements make it challenging to identify the historical character of each individual part.

2.2. Historical evolution of the paper mill

The Amicucci-Parmegiani paper mill is characterized by a continuous evolutionary development over time that began around the '20s and ended during the '60s. (Figure 2)

Phase 1: In the early 1920s, construction began on the first building, replacing an old barn. In 1925, the mill expanded eastward, adding a new section towards a nearby alley.

Phase 2: Between 1934 and 1938, a driveway courtyard with concierge and loading floor was built on the north side of Tani Square. In addition, a boiler room and a new building for staging were built in the eastern part of the courtyard.

Phase 3: From 1940 to 1946 there was a significant northward expansion of existing structures. The buildings were used for both main and ancillary functions, including technical rooms and production facilities.

Phase 4: In 1947, the downstream building was expanded eastward to accommodate the first line of paper machines. Another smaller building was added for processing with a Dutch beater. In 1949, further extensions of the central building and boiler room were carried out.

Phase 5: In 1951, the original building was expanded with a large canopy and the courtyard was rearranged for the unloading of raw materials. The boiler room was extended to the west and a new warehouse was built to the northwest, partly on ancient Roman ruins.

Phase 6: In 1952 a significant expansion occurred, expanding the continuous machine building to install a second line with a

Workshop attached. The extension also included two upper floors for the storage of straw.

Phase 7: In the early 1960s, the mill expanded further with the construction of a new production line in the Northwest, which involved the demolition of existing structures. At the same time, the offices adjacent to Piazza Tani were demolished and rebuilt to improve the unloading of raw materials.

The former paper mill is situated on a steep slope, connecting a high summit elevation with a lower valley floor elevation. The slope has a sharp inclination ranging from 80° to 90° and is divided into two sub-vertical sections, separated by a narrow terrace that accommodates “Via degli Stabilimenti”, a partially disused roadway. On 9 April 2009, a part of the paper mill collapsed, resulting in the immediate collapse of a section of “Via degli Stabilimenti” that passes through a tunnel. The collapse was likely caused by aftershocks from the L'Aquila earthquake. The slope is presently affected by two active landslide escarpments, as identified in the hydrogeological plan of the Central Apennine basins. However, these escarpments are only partially protected by deteriorating masonry support structures.



Figure 2. Present day situation: in the image (2020), we can see the actual state caused by the 2009 massive collapse, immediately upstream of a section of “Via degli Stabilimenti” that runs through a tunnel. (from the Technical-illustrative report of the “Design Competition for the construction of the auditorium and car park in the area of the former Amicucci Parmegiani paper mill” - source: Municipality of Tivoli)

3. THE 'NEW' PAPER MILL-MUSEUM: AN EXAMPLE OF RESILIENT URBAN REGENERATION

3.1. Methodology

The subject of this analysis is a section of the former paper mill complex, which is located in a strategic position overlooking the valley in which the Aniene flows. The mill has been decommissioned from all operational activities and is now in a state of complete disuse and deterioration. It is accessed via two main entrances: one on the north side of Piazza Tani and one from ‘Via degli Stabilimenti’. The factory, comprising five levels, reaches a maximum height of 30 metres on the north elevation and has a linear development of approximately 160 metres. The surface area of the interior spaces of the current building is approximately 20,000 square metres, for a total volume of approximately 92,000 cubic metres. In addition, there are a series of external spaces adjacent and functionally connected to the Paper Mill, with a total area of approximately 2,400 square metres included within the perimeter of the Amicucci-Parmegiani complex. In order to ascertain the surface area, the central portion of the building, which had collapsed since 2009, had to be taken into account. This had created a generally dangerous

specific plant, spatial and service equipment. This is represented by a very complex building programme, which can only be fulfilled if conceived in a way that is consistent with the existing object, albeit with different degrees of interaction with the architectural object and the context. The reference model of musealisation is that of alternative spaces, which are designed to facilitate rethinking the relationship between the observer and the work of art. These spaces emphasise the relationships that can be established between the visitor, the work of art, the document on display and the industrial structure. An essential aspect of the project is the integration of the existing listed buildings (the artifacts at the entrance of the former paper mill and the wall along Vicolo del Riserraglio) with the new redevelopment work through an overwriting operation. Additionally, the project encompasses the recuperation and renovation of the minor artefacts located at an altitude of 208.00, in addition to the maintenance and restoration of the wall along “Vicolo del Riserraglio”. This wall is characterised by a lower height than the existing wall and a similar horizontal profile to that of the new designed building, which defines the altimetric limit of the new building.

From the outset, the museum project sought to identify potential risks and elements that could oppose the decision to repurpose the property. This was done with the understanding that there was a risk of falling back into the practice of *damnatio memoriae*, which is the destruction of historical or architectural testimonies of strong interest. The provisions of the commissioning administration are equally stringent. In fact, the administration has expressed its personal interest in demolishing the ground floor, with access from Piazza Tani, in order to give the city a suggestive panoramic view of the valley. Furthermore, numerous studies have demonstrated that demolition activities result in significant CO₂ emissions into the environment. In order to address these concerns, it will be necessary to implement selective demolition operations, focusing on the non-constrained areas, with the aim of reconnecting with the historic centre and extending Piazza Tani. This will enable the full enjoyment of the admirable and evocative views. Additionally, it may be possible to highlight historical and cultural aspects of relevance related to industrial archaeology, such as the processing chain of the former paper mill. The relationship with the landscape of great value for the view of the valley below and the opening towards the countryside, as well as the opening on the ground floor to ensure visual integration with the Tower of Santa Caterina located in the western area of the complex, which represents a distinctive architectural and geometric sign, will be sensitive issues. However, they are not only of the immediate context, but also of the entire skyline of the historic centre of Tivoli.

European policies are becoming increasingly rigorous in supporting and promoting recycling and reusing construction materials. The Municipality of Tivoli, as the client for the musealization project, shares this perspective and has requested particular attention to the reuse of materials resulting from demolitions. Various techniques and strategies for reuse exist, but they can primarily be categorized into two approaches: the first involves disassembly, particularly for finished elements such as fixtures, structural metal elements, and prefabricated components. The second approach involves the demolition of components, such as concrete elements, followed by controlled crushing to separate materials. In this case, the materials are concrete and steel, which are then recycled and reused. This practice of recycling elements from demolitions or decommissioning is commonly known as upcycling. The term upcycling is based on the principle of giving a second chance to elements that are capable of serving new functions and being part of new contexts. Given the proven scarcity of available resources and the primary necessity to recover and reuse materials with this potential, the ongoing project aligns with this recycling logic. It envisages on-site storage of discarded materials and their reuse or sale to third parties as raw materials.

4. THE ADAPTIVE REUSE PROJECT

The proposal for the restoration and reactivation of the historic building that forms part of the former paper mill complex in Tivoli aims to establish a Paper Museum that serves as both a cultural hub and a historical testament to the role that paper mills have played in the city's industrial and economic history. This intervention is of great importance for the city and represents a significant urban regeneration project. Its aim is to create a cultural structure of high architectural quality that will perform the function of a catalyst for cultural and relational activities, capable of revitalising the entire urban area of reference [12]. Initially, the option of demolishing the entire building was considered in order to facilitate the design of the museum settlement from scratch. However, this was rejected due to the potential for the work to be redeemed and the substantial economic and environmental sustainability of the redevelopment and regeneration of the asset [13].

The project proposal entails the demolition of the existing volumes at the height of "Piazza Tani" (altitude +208.77 m), which are not subject to protection, and the construction of a new belvedere square, which will serve as a new equipped public space that connects the historic centre with the natural landscape. While prioritising the conservation of the perimeter of the paper mill complex, the project identifies three significant urban themes. The first of these is the landscaping of the north and north-west fronts along "Via degli Stabilimenti".

1. The project also proposes the development of urban connections between Piazza Tani and an elevated area, which could potentially accommodate a future auditorium or belvedere square.
2. A fundamental limitation of the project is that the maximum height of the summit must not exceed the level of Piazza Tani, which allows for an extension of the square and panoramic views of the valley and the Roman countryside.

The redevelopment project aims to optimise the panoramic views of the area while enhancing the urban fabric and architectural features. The functional reorganization of the paper mill ensures the preservation of significant elements while incorporating contemporary needs. This process involves the selective preservation and demolition of non-essential parts, with a particular emphasis on the preservation of historically significant elements. In accordance with the stipulated constraints, the project provides for the maintenance and restoration of the existing volumes that allow access from Piazza Tani. These volumes will house spaces for catering, information points and bookshops to the east.

Two distinct connection systems are proposed for consideration:

- a. An external public path is proposed to be constructed along the Vicolo del Riserraglio, which will lead to a new public terrace at a level of +204.00 m. This terrace will connect to a future "belvedere basso" square at a level of +199.00 m.
- b. An internal system within the building complex that provides vertical connections between the various levels.

The construction of a new connecting 'plug' is proposed as an extension of the portion of the old control space at the entrance, which is a constrained part of the existing structure. This extension will also include the lift area and a small linear extension. The new spine, which is aligned with the medieval tower of the convent of Santa Caterina, houses the entrance to the service rooms of the museum complex and the vertical connection systems, including the elevator block and new staircase, between the two main levels of the museum building, which are located at 209.00 m. The two aforementioned levels, 204 and 201.00 m.a.s.l., are in direct relation to the new 'low' square.

The functional organisation of the interior spaces is designed to define a promenade, as far as possible in relation to the residual fragment of the Paper Mill complex, in a manner consistent with the narrative of the production process. Nevertheless, the decision to establish, through the binding decree, the portion of the pre-existing building to be preserved, favouring the landscape aspects, prevents the definition of a route adhering to the original production process, as it provides for the demolition of

the eastern part of the complex. In this regard, the proposal entails the delineation of a principal exhibition area at an altitude of 204.00, which will serve as a venue for temporary exhibitions and multimedia installations pertaining to contemporary art and the memory of the paper supply chain. The objective is to establish a malleable space characterised by temporary installations with a fluid layout and a pronounced visual impact. Additionally, an annular path encircling the aisles of the boilers provides a view of both the external landscape and the extraordinary double-height spaces of the former paper mill (mill area and kiln area). This is achieved through a system of walkways.

On level 3, at a height of approximately 197.05, a multifunctional space is planned for educational workshops, events and public demonstrations. This will be created by the construction of an equipped area located below the 'kettle lane'. This is a longitudinal space of remarkable quality that, through the addition of simple furnishing elements and the implementation of an adequate system (lighting and air conditioning), can host permanent exhibitions, events and collective activities for approximately 100 people.



Figure 4. Render of the new entrance of belvedere square. Level at +208.77 m. (source: BEST Design)



Figure 5. Render of the new belvedere square. Level at +208.77 m. (source: BEST Design)

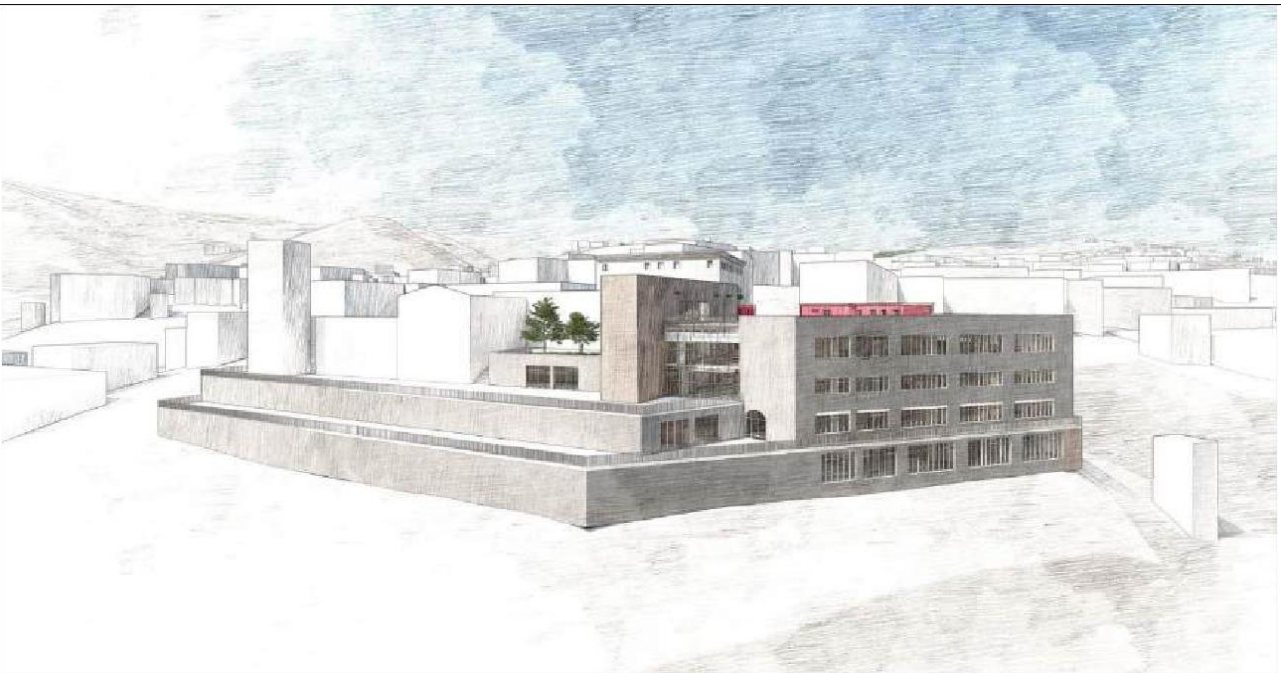


Figure 6. Render of the connection of Piazza Tani to the future "belvedere basso" square at a level of +199.00 m. and the vertical insert to connect the various levels. (source: BEST Design)

5. CONCLUSION

It is important to highlight how the heritage value recognised in the buildings gives priority to the location within the urban and territorial context, opting for selective protection in favour of the value of the surrounding landscape. Emphasis is therefore placed on the integration of the site into its valuable landscape context, rather than opting for a more conservative approach, focusing on the specific

conservation of the buildings. The case study reveals an intriguing positive anomaly pertaining to the safeguarding of an edifice of historical and artistic merit [14]. This situation has significantly impacted the redevelopment of an abandoned industrial site and the integration of a public construction value chain, thereby enhancing urban quality of life. The anomaly is linked to the protection measures imposed by the Italian authority responsible for the safeguarding of cultural heritage, which stipulate a gradual transformation process for different parts of the building complex. This has resulted in the partial demolition of certain structures, a practice that is relatively uncommon in the context of the protection of cultural assets. This selective protection is derived from a specific hierarchy of values attributed to the paper mill complex, with the original building core being accorded the greatest significance. This is situated in a valuable landscape context overlooking the Aniene River and the Sanctuary of SS. Maria di Quintiliolo. This landscape value was deemed to be of greater importance than the preservation of industrial buildings, reflecting a shift in the recognition of the significance of the landscape [15]. The approach is based on the integration of the site into its natural surroundings, rather than solely on the preservation of industrial history. This is achieved by reducing and demolishing parts of the modern factory in order to partially restore the original landscape. The podium opens towards the scenery, framed by the remnants of the former convent of Santa Caterina.

These principles have informed the criteria for the transformation and revitalisation of the area, as outlined in the Design Competition guidelines for the construction of the auditorium and parking area in the former Amicucci Parmeggiani paper mill. In addition to defining the utilisation programme and identifying areas for demolition versus preservation, the competition objectives placed significant emphasis on the landscape integration of the complex. This entailed considering the visual connections between the valley system of the former paper mills and the Sanctuary of Hercules Victor, as well as between the Sanctuary of SS. Maria di Quintiliolo and the opposite side. Maria di Quintiliolo is situated. At the urban level, the project for the recovery of the former paper mill included the creation of three new public spaces at different heights, with the intention of revitalising the urban significance of this landmark in the city of Tivoli. The ambitious project is currently underway and its impact will be assessed in the coming years to evaluate its effectiveness in transforming disused industrial assets into lasting public values and integrating them with historical heritage. In essence, the collective endeavour is not merely to conserve the vestiges of the past; rather, it is to imbue them with new life, transforming industrial heritage sites into catalysts for sustainable development and cultural enrichment. By demonstrating unwavering dedication, ingenuity, and a shared commitment to our cultural heritage, we pave the way for a more resilient and inclusive future, where the echoes of the past resonate vibrantly in the tapestry of our collective identity. As we chart a path forward, we envisage a future that embraces adaptive reuse, cultural tourism initiatives, and community-led empowerment strategies. By capitalising on the inherent resilience and cultural capital of sites such as the former Amicucci Parmeggiani Paper Mill, we seek to foster vibrant ecosystems where heritage conservation coexists harmoniously with economic revitalisation and social cohesion.

Notes

¹ Edoardo Currà et al., “Autarky Metal Roofing at the Mecenate Paper Mill in Tivoli, an Unseen Application of Gino Covre’s Patents,” *TEMA: Technologies Engineering Materials Architecture* 9, no. 2 (2023): 19–32, <https://doi.org/10.30682/tema0902>.

² Extract of the constraint of historical-artistic interest placed on the building complex by Ministerial Decree no. 104 of 30/07/2020:

As can be read in the excerpt, the part of the complex located above a height significant for landscape perception and the most recent portion of the building, built in front of the ancient complex of the Convent of St. Catherine, are excluded from the constraint

(...) In the part of the complex to the west, accessible from the square facing Piazza Tani:

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1. *the part identified by red shading in the drawings on the various levels, which preserves legibly the chain of workings in its vertical development, is subject to protection:*

2. *the part of the building set at the height of Piazza Domenico Tani (elevation +208) is not subject to protection - due to the poor architectural quality, the degraded state of the structures (mostly cement), and not preserving significant elements of the chain of workings - in order to restore the view towards the picturesque river valley below; and the Quintiliolo hill, which has always constituted, until before the raising of the paper mill, the main attraction of the square itself.*

(...) Of the remaining part of the industrial complex, located to the east and of the forecourt towards Piazza Tani:

3. *the buildings are not subject to protection, as they are post-1950 and of no historical, architectural or cultural interest.*

All demolitions shall be carried out with due caution so as not to cause damage to adjacent parts and with the involvement of an archaeologist for the part at the lower level.

³ Extract from the ‘Design Competition for the construction of the auditorium and car park in the area of the former Amicucci Parmegiani paper mill’. , Municipality of Tivoli, 2020: (...) The current building, with its massive out-of-scale volume of the former paper mill, obscures the Tower of Santa Caterina located in the western area of the complex, which represents a distinctive architectural and geometric sign, not only of the immediate context, but of the entire skyline of Tivoli's historic centre. The tower, in addition to requiring urgent consolidation works, constitutes an element with which every design intervention will have to integrate and relate

⁴ Spartaco Paris, “Riflessioni Sul Progetto Di Riqualificazione Del Costruito Moderno: Esigenza, Necessità e/o Opportunità per Ripensare per Ripensare e Rinnovare l’abitare,” in *Ri-Abitare Il Moderno*, ed. Spartaco Paris and Roberto Bianchi (Quodlibet, 2018), 19–51.

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Multicriteria analysis as a decision-making tool for urban regeneration and urban resilience in Greek cities

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Abstract

After a significant period of economic and pandemic crisis, the challenge of climate neutrality is at the top of the new urban agenda and urban politics. The urgent need to implement policies to strengthen urban resilience (to any natural or technological disaster) is emphasized to achieve urban sustainable development. In addition, the European Green Deal promotes the acceleration of significant interventions in cities. Urban regeneration practices have been established to meet these challenges by offering effective solutions. In this frame, European urban authorities are promoting large constructions in buildings and public spaces as well as large-scale urban regeneration projects, capitalizing on valuable experience from the past. In Greek cities, so far, there have been no significant urban regeneration interventions driving notable changes, due to the cities' timeless issues compared to the ones confronted in Central Europe. Small land ownership, problematic urban planning, and weak public housing policy have driven to unregulated urban sprawl and residential expansion on agricultural land. All the above resulted in vulnerable cities with a low-quality urban environment. The consistently low role of urban regeneration in national spatial planning practices and the piecemeal and in some cases 'empirical' projects have not improved the built environment. The building stock is old and energy inefficient while open public spaces are few and far between. After years of specific spatial policies, combined with the new conditions determined by the climate crisis, the framework of the national urban regeneration policy is considered incomplete and problematic. In contrast to modern approaches that recognize the multidisciplinary nature of urban issues by proposing holistic interventions capable of dealing with the climate crisis, projects in Greece are usually limited to the beautification of external public spaces. In addition, the main problem of Greek cities, that is the imbalance between built and unbuilt space and the aging building stock, is not addressed. In this context, a series of questions are raised regarding the factors that determine and guide urban regeneration projects in Greece, so that a holistic policy and intervention framework can be developed. Therefore, a multi-criteria assessment and calibration methodology is required to guide urban planning decisions. This paper investigates the effectiveness of implementing a scientific tool that (a) collects data (b) evaluates and scores them using multiple criteria and (c) based on the conclusions acts as a decision-making system. The proposed methodology is deemed to become a tool of modern spatial policy. It can guide urban planning decisions aligned with the principles of the Green Deal and ultimately serve as an urban regeneration, resilience, and green development tool particularly useful for urban authorities.

Keywords: urban regeneration; urban resilience; new urban agenda; multicriteria analysis; Green Deal

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1. INTRODUCTION

1.1. Urban regeneration: context and challenges, concepts, and strategies

In the history of cities, urban planning, and major urban renewal projects appear as consequence of their economic development. Urban regeneration and resilience present a complex interplay of challenges and opportunities in contemporary urban development. As cities evolve and face various socio-economic, environmental, and infrastructural pressures, the need for revitalization becomes imperative. Urban regeneration and resilience demand holistic approaches that address the intricate nexus of social, economic, and environmental challenges [1]. The challenges and requirements for interventions vary significantly from one country to another and are influenced by the prevailing social, economic, and political conditions, alongside physical design considerations. In addition to these, embracing community participation, sustainable practices, and innovative solutions is crucial for cities to successfully transform blighted areas into vibrant, resilient urban landscapes. This approach not only addresses the specific needs of local communities but also fosters inclusivity, environmental stewardship, and long-term viability, ultimately enhancing the quality of life for all residents. In this complex context, many challenges need to be solved through urban regeneration. Among these, the most important are the following: social inequality, environmental degradation, economic decline, and historical preservation. Addressing the above challenges is achieved through the utilization of a series of opportunities, such as community engagement, green infrastructure, mixed-use development, and innovative technologies.

All of the above are addressed through specific measures. The two main categories of measures, institutional and infrastructural, play crucial roles in achieving the goals of urban revitalization. Institutional measures, such as enacting laws and regulations, provide the necessary framework to support city policy objectives, while infrastructure projects directly contribute to enhancing residents' well-being and attracting investment. These measures are typically overseen by various levels of government authorities. To ensure their effectiveness, relevant agencies need to devise comprehensive strategies that tackle the multifaceted challenges of urban areas, encompassing socio-economic, environmental, and cultural aspects. This holistic approach is key to fostering sustainable and inclusive urban development [2]. Key strategies include:

- Place-based approach, as a strategy recognizes the unique characteristics, strengths, and challenges of each region, tailoring interventions to its unique context.
- Mixed-use development, such as residential, commercial, recreational, and cultural activities, in a single area to encourage vibrant, walkable neighborhoods reduces car dependency and enhances urban vitality.
- Sustainable Planning and Design including optimizing land use, minimizing environmental impacts, promoting energy efficiency, and prioritizing green infrastructure to create resilient, environmentally friendly urban spaces.
- Heritage conservation including adaptive reuse of historic buildings, revitalization of heritage sites, and promotion of cultural tourism, contributing to local identity and economic development.
- Community involvement and participation, which enhances ownership and social cohesion and ensures that regeneration initiatives are aligned with community needs and aspirations.
- Public-private partnerships (PPPs), which leverage the strengths and resources of various stakeholders to finance, plan, and effectively implement regeneration initiatives.
- Inclusive development and social equity which entails providing affordable housing, equal access to services and amenities, and opportunities for economic empowerment and social mobility.
- Smart city technologies such as data analytics, IoT sensors, and digital platforms that enable real-time monitoring, optimization of urban systems, and informed decision-making.

Contemporary regeneration policy indeed encompasses a range of urban planning interventions aimed at spatial reorganization within settlements or cities. Rooted in the principles of sustainable development, these interventions seek to revitalize existing built environments and may also entail the creation of new urban areas. The primary objective is to facilitate sustainable urban development that improves residents' quality of life and advances economic, social, and environmental well-being [3,4]. In summary, contemporary regeneration policy represents a comprehensive approach to urban development that prioritizes sustainability, inclusivity, and resilience. By addressing the spatial, economic, social, and environmental dimensions of urban change, these policies aim to create cities and settlements that are more livable, equitable, and environmentally sustainable for present and future generations.

Shifting policy toward integrated solutions that serve multiple objectives is crucial in contemporary physical planning. This necessitates a systematic evaluation process based on scientific criteria to inform decision-making. Then, by adopting innovative strategies, engaging stakeholders, and fostering collaboration, cities can revitalize their urban fabric, promote sustainable development, and improve the quality of life for residents.

1.2. Greek spatial planning and regeneration practices

In recent years, in Greece, spatial planning practices were initially introduced at the level of the urban planning scale to deal with issues related mainly to the organization of the development of urban centres and the problems that arise [5]. Already, since the 1980s, there has been a systematic effort for the country to acquire urban plans. At the end of the 1990s, the country acquired a new legal framework for urban planning (Law 2508/97, Official Gazette 124/A) and spatial planning (Law 2742/99, Official Gazette 207/A). Through the above laws, it is the first time that "urban regeneration" is included in the field of urban planning regulation [3], it is institutionalized as a distinct process and is strengthened with tools and financial mechanisms. Indeed, until the passing of the new housing law, regeneration did not exist as an independent tool within the spatial planning system. Law 2508/97, among others, introduced a strategic-type tool for interventions in the already-formed urban landscape of cities. It even became known that he gave the greatest weight, in terms of urban planning tools, to city regeneration, to which a whole chapter and enough articles and pages are devoted.

Although Law 2508 was passed by the Hellenic Parliament on May 22, 1997, it has been little used to date. The off-plan building and expansions of cities and settlements in the off-plan area prevented the application of the regeneration tools, as the regenerations referred to in Law 2508 are limited only to regions of approved city plans or demarcated settlements [6]. In addition, the procedures established by the specific law are complex and time-consuming, especially in matters concerning the formation and operation of the redevelopment body. The provisions of the law offer the municipalities a variety of options, however, the implementation of the articles concerning the areas and redevelopment agencies, seems utopian.

During the 2010s, it was sought to redefine how plans are harmonized at each planning level, to soften their hierarchical structure and promote the mutual feeding of planning levels. The institutional framework underwent successive changes, which were characterized in many cases by ambiguity - which possibly expresses the upheavals in Greek society during the 2010s following the financial crisis [7]. After 2010, the institutional framework of spatial planning in Greece is being reshaped considering the effects of the preceding financial crisis. In 2014, Law 4269 "Spatial and Urban Planning Reform - Sustainable Development" was passed (Government Gazette 142/A). Among other things, the new framework specializes in [6,8]:

- Avoiding conflicts and overlaps of planning levels that, as noted, were observed in the previous law.

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- The clear distinction between planning levels at strategic (national and regional) and regulatory (local) levels.

Subsequently, with the law on spatial planning (N 4269/2014 "Spatial and urban planning reform - sustainable development") which was replaced by N 4447/2016, "Spatial planning - Sustainable development and other provisions", several issues were promoted, among which is the attempt to reduce planning levels by adopting Local Spatial Plans, to address issues related to overlaps, contradictions and contrasts between spatial and urban planning plans of different levels [4].

The main spatial planning system of the country (see L. 4447/2016, as amended by L. 4957/2020) includes a set of spatial frameworks and urban plans, which are prioritized in levels based on the geographical scale, their content, and the wider objectives they serve in the implementation of spatial policy. These tools are referred to as sets of texts, maps, and/or diagrams and are distinguished in strategic and regulatory nature [9]. Undoubtedly, the institutional framework is old and there is a need to reform it as it is rigid radically, it does not correspond to the Greek reality, especially concerning small ownership, and is focused only on planning. Small land ownership, problematic urban planning, and weak public housing policy have driven unregulated urban sprawl and residential expansion on agricultural land. [10]. Indeed, the particularity of the Greek space in matters of organization and comprehensive treatment is a given, as although it is a naturally heterogeneous environment, its acquired characteristics, and man-made interventions in it have intensified the problems and created a multitude of difficulties [11]. In addition to the above, it is noteworthy that no institutional framework nowadays has highlighted the need for a systematic collection and analysis of data to select the appropriate strategic decisions in urban regeneration. All the above resulted in vulnerable cities with a low-quality urban environment.

Due to all the weaknesses above, the practice of urban interventions in Greece has been limited almost exclusively to structural interventions in the free public (shared) space with a beautification character and the main goal of improving its quality and function in terms of aesthetics and urban equipment. Until recently, implemented interventions with an integrated approach, development directions were absent, and competent financing tools [8,12]. The consistently low role of urban regeneration in national spatial planning practices and the piecemeal and in some cases 'empirical' projects have not improved the built environment. The building stock is old and energy inefficient while open public spaces are few and far between. After years of specific spatial policies, combined with the new conditions determined by the climate crisis, the framework of the national urban regeneration policy is considered incomplete and problematic. In contrast to modern approaches that recognize the multidisciplinary nature of urban issues by proposing holistic interventions capable of dealing with the climate crisis, projects in Greece are usually limited to the beautification of external public spaces. In addition, the main problem of Greek cities, that is the imbalance between built and unbuilt space and the aging building stock, is not addressed.

2. MULTICRITERIA ANALYSIS (MCA) AS A USEFUL TOOL FOR URBAN REGENERATION PROJECTS

Urban regeneration and resilience have become critical agendas in contemporary urban planning and management due to the increasing challenges posed by rapid urbanization, climate change, and socio-economic disparities. Decision-making in these contexts demands a comprehensive approach that considers multiple criteria and stakeholders' perspectives. The most suitable urban transformation project always depends on many elements influencing each other. Therefore, different alternatives should be provided already during the ex-ante evaluation. Traditional methods of economic and financial feasibility, such as cost-benefit and cost-benefit analysis (CBA), are not suitable enough to understand complex cases. Multicriteria analysis (MCA) emerges as a promising tool to address these complexities by facilitating systematic evaluation, prioritization, and selection among diverse

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regeneration and resilience strategies [13]. The review underscores the importance of MCA as a decision-making tool for enhancing the sustainability, inclusivity, and effectiveness of urban regeneration and resilience initiatives. Moreover, the paper discusses the challenges and limitations associated with the application of MCA in urban regeneration contexts and proposes avenues for future research and improvement. Finally, this paper investigates the effectiveness of implementing a scientific tool that (a) collects data (b) evaluates and scores them using multiple criteria and (c) based on the conclusions acts as a decision-making system. The proposed methodology is deemed to become a tool of modern spatial policy. It can guide urban planning decisions aligned with the principles of the Green Deal and ultimately serve as an urban regeneration, resilience, and green development tool particularly useful for urban authorities.

It is noticed that, in recent decades, many studies and research have been carried out trying to find the best solutions for successful urban regeneration interventions. In addition, the analytical literature has grown significantly with studies conducted using different approaches, as well as different variations of urban planning techniques (using different methodologies, methods, and data). In this context, the multicriteria analysis is useful in any urban regeneration program, because of the following advantages [14]:

- Allows identification of critical variables to be considered for the system under study.
- Enables expert judgment to be considered during the design process.
- Encourages a deep analysis of system variables.
- Allows for the comparability and structuring of multiple variables in order of importance.
- Allows indirect classifications to show the significance of many variables that, at first, and through direct classification, were not obvious.

Starting from qualitative and quantitative analysis, the purpose of the present contribution is to show the different steps to get to the most suitable project for the regeneration of degraded urban areas with a priority scale for the interventions proposed [13]. Generally, the objective of developing a methodology for creating a decision-making tool using public data, as outlined by Chatziioannou and Álvarez-Icaza (2017), is to establish a specific set of indicators. Indicators may be used for preliminary investigation, ongoing monitoring, or evaluation of final performance. Indicators can be used for ex-ante, in-itinere, or ex-post evaluations. The importance of indicators as tools for knowledge and analysis, design, and monitoring has already been stressed in several areas. These indicators can guide government public policies in the planning of urban revitalization projects. The aim is to design indicators that support the paradigm of sustainable urban revitalization and resilience by effectively covering and operationalizing diverse elements of the urban environment [14,15]. These indicators should encompass various aspects such as urban microclimate, public space, urban greenery, energy efficiency of buildings, mixed land uses, and more. By utilizing public data and integrating these indicators into a comprehensive framework, decision-makers can make informed choices that prioritize sustainable development and enhance the resilience of urban areas. Additionally, the development of a synthetic indicator derived from these specific indicators can offer a consolidated measure to guide future policy interventions and urban planning efforts effectively.

2.1. Materials & methods

A decision support system should make clear the objectives it should achieve, but also help achieve them [16]. This, according to Anagnostopoulos and Vavatsikos (2007), can be carried out in four interactive stages with the possibility of redefinition [17]:

1. Study and define the environment of the problem.
2. Search and design alternative ways of approach.
3. Choose the one that looks best.

4. Implementation and evaluation.

2.2. Stage 1: establishing the inventory of variables.

This stage considers the production of Table 1, which contains all the established sectors linked to the system under study to strengthen the effort of each urban area to revitalize and be resilient. Creating Table 1, which outlines the sectors linked to the system under study, is indeed a crucial step in the process of urban revitalization and resilience [14]. The final aims should be pursued without unnecessarily increasing the burden of information. Consequently, it is necessary to avoid all those confusing phenomena, such as redundancy, excessive generality, or lack of specific relevance of the information collected, which would be detrimental to effectiveness and efficiency [18]. This table serves as a comprehensive overview of the intervention area and helps in selecting appropriate indicators to measure progress toward the desired redevelopment goals. To begin this process, stakeholders must thoroughly understand the character of the intervention area [19]. This involves assessing its current state, identifying existing strengths and weaknesses, and understanding the dynamics of the local community and economy. Additionally, it's essential to evaluate the vision of the redevelopment agency for the area's future form post-intervention [19,20]. This vision should articulate the desired outcomes, objectives, and priorities for revitalization and resilience efforts. Indicatively, Table 1 can have the following format:

ID	Nomenclature of the Plan's Critical Sectors Against Urban Regeneration and Urban Resilience	Symbolization of the Established Critical Sectors for the Mitigation of Urban Regeneration and Urban Resilience within the Software MICMAC
1	Spatial Rejuvenation	Spatial_Re
2	Community Engagement	Com_Eng
3	Economic Viability	Econ_Viab
4	Environmental Sustainability	Env_Sust
5	Risk Awareness and Assessment	Risk_Awar_Ass
6	Adaptive Capacity	Adj_Cap
7	Infrastructure Robustness	Inf_Rob
8	High Population Density	High_PD
9	Mixed Land Use	MixedLU
10	Efficient Transportation	Eff_Trsp
11	Accessible Public Spaces	Access_PS
12	Urban Greenery	UG
13	Mixed Housing Types	M_HT
14	Compact Urban Form	CU_form

Figure 1. The established variables of the thematic study

Once the character of the intervention area and the regeneration vision are clear, stakeholders can proceed to select indicators that align with these goals. These indicators should cover various aspects related to urban revitalization and resilience, such as socio-economic development, environmental sustainability, infrastructure quality, community well-being, and others. By carefully selecting indicators that reflect the unique needs and aspirations of the intervention area, stakeholders can effectively monitor progress and guide decision-making toward achieving desired regeneration outcomes.

2.3. Stage 2: specification of the variables relations

Stage 2 associates the variables considered through a dual-input matrix. This matrix exposes, at a column level, the degree of dependence that each variable experience from the rest of the considered variables, as determined through the opinion of experts [21]. The latter exposes at a column level, and through the opinion of experts, the rate of dependence that a variable experience from the rest of the considered variables.

The first step is to identify the relevant variables considered important for the analysis or evaluation. These variables could be factors influencing a particular outcome, elements of a system, or indicators of performance. A dual-input matrix is then constructed, with variables listed along both the rows and columns. Each cell in the matrix represents the relationship between the variable in the row and the variable in the column. In the following, opinions are presented regarding the degree of dependence between the variables [22]. This could include assessing the strength of the relationship, such as high, medium, or low dependence, or assigning numerical scores or weights. Factors such as causality, interdependencies, feedback loops, and direct or indirect effects are considered. The typical structural analysis matrix includes values equal to “0” when there is no relation between the variables, “1” when there is a weak relationship, “2” when there is a moderate relationship, and “3” when there is a relation of high intensity [14,15]. For the sake of simplicity, only two values, zero (“0”) and (“1”) can be used interchangeably to indicate the absence and presence of relationships between variables. In this way, the determination of the connections between the variables of the thematic study will be possible without considering the intensity of the relationships. Therefore, the reliability of the results in qualitative terms will be intact [14]. This table provides a visual representation of the complex network of relationships between variables. Once the matrix is populated with dependence ratings, further analysis can be conducted to identify patterns, clusters, or outliers. The assessment dependency process can be iterative, involving multiple rounds of expert input, review, and refinement to ensure accuracy and consistency. Using a double-entry matrix and expert opinions to assess the dependence between variables, Stage 2 of the process allows for a systematic and structured approach to understanding the complex relationships within a system or context. This information serves as valuable information for subsequent stages of analysis, planning, or decision-making.

2.4. Stage 3: recognition of the key variables

In Stage 3 of the process, variables are classified based on their rates of dependence and influence, allowing for the calculation of direct interlinks within the variables along with indirect relations [14]. Each variable's components of its column and row in the dual-input matrix are summed. This involves adding up the ratings or scores assigned to the variable about all other variables, both as a dependent variable and as an influencing variable. The summation of components provides insights into each variable's direct and indirect relations within the system. Direct relations represent the immediate influence or dependence between variables, while indirect relations capture the secondary or mediated effects through other variables. Based on the calculated sums of components, variables are classified according to their levels of influence and dependence. Variables with high sums of components indicate strong influence or dependence, while those with lower sums indicate weaker relationships. A diagrammatic illustration is then generated to depict the location and classification of each variable based on the intensity of direct relations between them. The illustration typically consists of two axes: the Y axis represents the level of influence, while the X axis represents the level of dependence [14,23]. After achieving the tabular stabilization results, the diagrammatic representation shows the direct relationships between the variables but the resulting indirect ones. In addition, another Table can be created that will contain the justification of the relationships between the areas of the plan by conducting a literature review, to enrich the experimental-empirical results extracted by the group of experts with theoretical elements [15].

2.5. Results and decisions

After the problem is structured, alternatives are measured according to the above, and the next phase involved in the chosen procedure concerns the derivation of criteria weights. To give weight to the defined criteria and sub-criteria, a round of questionnaires can be created for a selected group of experts. The selection of experts is usually based on their previous experiences on the proposed topic. Experts with relevant experience and expertise in urban regeneration, urban planning, sustainable development, or related fields are identified and invited to participate in the weighting exercise. The selection criteria may include professional background, knowledge of the project context, and previous experience with similar projects.

Once the decision network consisting of the sub-networks benefits, opportunities, costs, and risks has been defined, the interdependence relationships between clusters and nodes are established. The alternatives cluster is related to all other clusters, while the other clusters may or may not be related to each other. Then, a pairwise comparison is carried out by answering a questionnaire to identify which of the two examined alternatives is of greater relevance.

Conduct a thorough assessment of all variables relevant to the urban regeneration project, including socio-economic factors, environmental considerations, infrastructure needs, community dynamics, and stakeholder interests. This assessment should consider both direct and indirect relationships between variables and their potential impacts on the regeneration process. Define specific lines of action or interventions that address key issues and contribute to the overall objectives of the urban regeneration project. These lines of action may include physical improvements, policy interventions, community engagement initiatives, economic development strategies, and environmental sustainability measures. Ensure that all lines of action are integrated and aligned with the broader goals and vision of the urban regeneration project. Each line of action should contribute to the achievement of specific objectives within the overall plan, while also complementing and reinforcing other interventions. Determine whether lines of action will be implemented sequentially or in parallel based on project timelines, resource availability, and logistical considerations. Some interventions may need to be implemented sequentially to build upon each other, while others can be carried out concurrently to maximize efficiency and impact. Develop a comprehensive, long-term plan for the urban regeneration project with defined timelines and periodic milestones. This plan should outline the sequence of actions, resource allocations, responsibilities, and monitoring mechanisms to ensure effective implementation and ongoing progress. Establish mechanisms for periodic review and adjustment of the urban regeneration plan to account for changing circumstances, emerging challenges, and evolving stakeholder priorities. Regular monitoring and evaluation will help identify successes, challenges, and areas for improvement, enabling timely adjustments and course corrections as needed.

3. CONCLUSION

Urban regeneration aims to transform cities into spaces that offer high-quality urban environments and improved daily living conditions. Successful urban regeneration efforts focus on revitalizing cities to make them attractive, livable, and sustainable. This includes creating visible and accessible areas for parks, open spaces, green corridors, social infrastructure, urban facilities, and affordable housing. To achieve these goals, urban regeneration interventions must be guided by scientific decision-making methods. One such method is multi-criteria analysis (MCA), which can play a crucial role in ensuring the success, sustainability, and social acceptance of urban regeneration projects. Key aspects of scientific decision-making include data driven planning, stakeholder involvement and sustainability considerations.

The benefits of using MCA in urban regeneration include, at least, comprehensive evaluation, transparency, flexibility, and enhanced social acceptance. MCA ensures that urban regeneration projects are successful, sustainable, and socially accepted by evaluating multiple factors and

involving stakeholders in the decision-making process. By adopting MCA, cities can ensure that their regeneration efforts are aligned with their core vision and goals, leading to vibrant, inclusive, and resilient urban environments.

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Redeveloping military brownfields in Greece: searching and evaluating of good practices in European case studies and their applicability

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Extended abstract

Military brownfields, a variety of disused sites of defense forces, is a specific category within all brownfields. Common for military brownfields is their particular location and infrastructure in respect of the surrounding environment. Redeveloping these sites and disposing them for civilian use is a quite complex and multidisciplinary process. It is a planning challenge, differing from ordinary changes of use because of the unusually wide range of interested stakeholders and their expectations. Military brownfields are made up of large and small sites, urban or remote, and can include an extraordinary range of functional specialist buildings that can be recognized as heritage as they are a specific feature of wars, conflicts, and their aftermaths. As urban sites are a particular part of the city, that for a long time has been excluded from the active life of the city, and for this reason it is considered necessary to adopt new strategies for their re-appropriation.

The challenge in military base redevelopment, like other brownfield sites, will be to guarantee competitive advantages through revenue-generating activities that can transform these sites into reliable economic opportunities requiring clear and viable land-use strategies and investment while looking after the interests of all the parties involved. They are also affected of the new dynamics of real estate development and investment that now comes with a host of economic, social, environmental and ethical ‘baggage’ and the view that property markets should be viewed as “cultural entities, shaped as much by tradition, taste, technological and social innovation as by immediate levels of availability and demand”. Like all other brownfield sites, military ones are not solely discussed in technical terms anymore (e.g. contamination), but as an opportunity for saving resources and delivering sustainable urban development.

What is studied in this paper is the strong system of policy and funding frameworks of European Union that work synergistically to support brownfields redevelopment across the region as well as European projects and programs related to the enhancement, reuse, and regeneration of former military sites. One of this programs was the “2015–2018 MAPS-Military Assets as Public Spaces” initiative that has involved mostly former military barracks across nine European cities to provide feasible solutions aimed at the preservation and enhancement of tangible and intangible values. This program appears to be a remarkable reference that extracted key drivers for innovative reuses integrating collaborative practices such as: the involvement of local and state stakeholders, both public and private, to identify feasible reuse solutions of buildings and open spaces; the temporary reuse to experiment unexpected short-term and cheap functions and activities to enable the reuse in the medium and long term and the identification of former military barracks’ tangible and intangible values.

The conclusions of this study are used to create a framework for evaluation and assessment of the redevelopment of the military brownfields in Greece to date, taking into account the special legal status governing these sites.

Keywords: *military brownfields; sustainable urban redevelopment; brownfield policies; Greece*

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Urban Regeneration In A Low Income Neighborhood. A Case Study In Lima, Peru

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Extended abstract

The Santa Cruz neighborhood is composed of about 30 blocks of historically low-income residents located within a wealthy Miraflores district in the Mega City of Lima, Peru. This neighborhood was created when the walls of Lima were demolished and the city started its modern urbanization. In the early 1900 the former Hacienda Santa Cruz, west-south of downtown Lima became accessible due to new avenues built connecting it with downtown. This coastal area became attractive to mostly high-income Lima residents who wanted to get away from the too-congested downtown. The big Hacienda Santa Cruz was partitioned following a grid pattern, and a very small portion of it was sold to a few families of former slaves. With time, this small partition was subdivided into smaller lots, evolving into cheap housing, concentrating woodshops, car mechanics, plumbers, carpenters, and alike, with cheap land and property values. This low-income “enclave” evolved in an otherwise high-income district that benefited from having cheap labor nearby, while Santa Cruz residents benefited from having access to nearby city’s services and infrastructure, not a rare phenomenon in South American cities. This worked for about 100 years.

However, the growth of Metropolitan Lima, and the fact that Peru was becoming a gastronomic world attraction, pushed for expanding the supply of high-end restaurants since the early 2000’s. The availability of relatively cheap land in an otherwise wealthy district, attracted new investors who looked to city officials for support to claim this relatively cheap land, ensuring not only more businesses but also larger city incomes. What was a “low-income enclave” is nowadays a focus of growth: restaurants, cafes, and high-end stores are replacing car-repair, or carpenter shops; and new condo buildings are being built targeting high-income residents. With new investment, land prices increased, resulting in forced displacement of the local population; legal actions for evictions, repossessing of land, and active protests are now happening.

This process of urban regeneration is creating serious problems for former residents who are being mostly evicted. And we question: What is the role of the City in protecting business? Or former residents? Or new residents? This could be perceived as a typical case of gentrification. At the same time, local residents are reacting claiming their right to the city. What should City officials do to protect the neighborhood identity? Using city and press documents and our fieldwork in the area, we analyze the response of the City and its involvement in this process. We expect to shed light on what (not)to do when re-developing a place. At the end, who does the City work for?

Keywords: *urban redevelopment, land use, city identity*

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Investigating the relationship of energy retrofitting of buildings with the real estate market in degraded urban areas.

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Extended abstract

Buildings are one of the largest sources of energy consumption. Consequently, adaptation to climate change depends mainly on actions undertaken in urban areas, cities being simultaneously part of the problem and its solution. The European Union and states establish ambitious policies and measures to achieve targets for the energy upgrade of buildings. New technologies are developing rapidly, but important barriers prevent their implementation in space. In this work, this issue is investigated and connected with the functioning of the real estate market in vulnerable urban areas. It is argued that to take decisions on the energy upgrading of buildings, both by the owners and investors, in addition to the profit from reducing the energy costs, there needs to be tangible benefits from the increase of the market value of the buildings and the generation of capital gains. Surplus values can arise through urban regeneration interventions. Energy upgrade of a building is a financial investment in a capital asset, and energy policies are most effective when tangible benefits are made significant, using market forces; higher prices of energy retrofitted properties can motivate owners. For a property investor, the value increase of the asset is an important driver for energy investment, and decisions are primarily based on the property market fundamentals, the quality of the area in which it is located, as well as their expectations for it, and secondarily on the energy performance of the buildings, the impact of which is incorporated in their market value. This fact implies that the energy market is subordinated to the real estate market.

A deprived area of central Athens serves as a case study. Based on field research data, cases of energy renovation of buildings through a public-private partnership scheme are analysed. Urban regeneration initiatives are not mandatory for cities and states, unlike building energy upgrades, but they can organise energy-efficient and sustainable future smart cities and improve the functioning of the local real estate market by attracting private investment. The European targets for the energy upgrading of buildings can be the vehicle to promote urban regeneration to achieve significant multiplier benefits, combat urban decay, alleviate energy poverty and remodel the city, as the New European Bauhaus initiative targets.

Keywords: *energy retrofitting, real estate market, urban regeneration, Greece.*

Public Spaces, Public Streets, and the Right to Work

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Extended abstract

This paper focuses on the use of public space in a developing country. Guatemala is one of the poorest countries in Latin America, with a high concentration of so called “informal” markets. The use of public space by street vendors, or informal vendors, is a common trend in many Latin American cities and its presence has shaped the debate of planning in the global south. This paper discusses one extreme case called “El Amate” Market in downtown Guatemala City, the capital of the country. Unlike other failing cases, El Amate exemplifies one innovative example of a planned re-location intervention within the city and may shed lessons for other cities in Latin America and beyond. The main downtown street, 6th Avenue, was, during the 1980’s and 1990’s, occupied by street vendors with negative consequences on city’s public health, high crime, and devaluation of downtown properties. The city, for about 10 years, tried to “clean” the streets expelling vendors, only to realize that them were re-occupied the streets soon after; this situation persisted until a more comprehensive solution was pursued with financial and professional support from the InterAmerican Development Bank.

After a detailed study of the rationale of the street vendors, and with a lengthy and comprehensive negotiation with them, authorities and vendors arrived to an agreement; vendors were to be relocated in a nearby ad-hoc location built for them called El Amate market. This meant that 677 informal vendors peacefully left the 6th Avenue and took all their belongings to the newly created market.

This paper engages the views of local authorities -planning and executing this re-location- as well as the views of those who went through the process. This is accomplished through interviews with relocated vendors, local retailers, city authorities, and through the use of local and national data on population, property prices and field observations.

Three immediate effects were observed: the city recovered its public space (that used to be occupied by the vendors); downtown absorbed new investment mainly in retail; and the new location for the street vendors is, still, accepted by the vendors and by customers. At the same time, vendors are still “informal” in the sense that they are still trading similar merchandise, meaning goods that are not complying with branding trade requirements, and many are not registered within social security requirements. We may call them “quasi-formals” as they are registered within the local municipality. The strict dichotomy of informal vs formal may be blurred and may not be a useful theoretical concept. At the same time, we discuss who has the right to occupy public streets. These themes are at the core of this study.

Keywords: *crowdsourcing; participatory mapping; open data; building attributes; Athens*

Shaping Smart Neighbourhoods: An overview of inspiring Digital Tools for Holistic Building Stock upgrades

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Abstract

As cities worldwide grapple with the challenges of urbanization and environmental sustainability, the need to work with the transformation of building stock seems fundamental, as it promises a profound impact on the well-being and daily experiences of residents [1]. This sector has emerged in the last few years and methodologically, it is being approached through experiments mainly concerned with energy performance. However, the various examples do not yet provide a strong input to the field of architecture and urban planning [2]. As such, innovation in this area remains scarce for holistic upgrades to enhance sustainability.

In this framework, the specific research aims to affront this gap and elucidate the specific domains within which we propose enhancements, by drawing information and knowledge from three different fields: urban policy frameworks, digital technologies for the built environment and architecture. Specifically, it aims at highlighting the transformative potential of digital tools in upgrading the architectural landscape of existing buildings as a unit and as part of a neighbourhood cluster. It is expected that analysing the synergies between these areas can be a valuable resource for policy makers, urban planners, and researchers.

For this paper, the methodology chosen is dual: on the one hand, it is offered a review of contemporary technologies such as for example Building Information Modelling (BIM), Internet of Things (IoT), and Artificial Intelligence (AI) among others, that have the potential to support architects and urban planners in their goal of improving the building stock. Through the use of a matrix, all benefits and goals of these technologies are being illustrated and further discussed. On the other hand, case studies of initiatives that demonstrate how existing and innovative tools can be used in a variety of contexts to improve building stock at both the individual and neighbourhood scales. The selected case studies cover a range of topics, such as occupant engagement, adaptive reuse, improving green spaces, and reconfiguring city blocks. etc. and will be analysed to identify best practices and present innovative design and planning solutions across a spectrum of parameters, offering valuable insights for practitioners and decision makers alike.

As a conclusion of the two methodological directions, the authors summarise the key findings and emerging trends, and provide an initial assessment of how this process enables change and allows the transition of any traditional neighbourhood into a smart neighbourhood.

Keywords: *holistic building upgrade, old building stock, digital technologies, smart neighbourhood*

1. INTRODUCTION

As urbanisation accelerates and 68% of the world is expected to live in urban areas by 2050 (UNPD, 2018), the demand for suitable and efficient housing, infrastructure, and amenities is rising. This swift urban expansion highlights the critical need to upgrade and optimise current buildings to support population growth, bolster urban resilience, improve energy efficiency, and develop livable, sustainable cities for future generations. Though, many existing buildings face obsolescence, where they no longer meet current standards, performance requirements, or user needs due to ageing, technological advancements, or changes in regulations [3]. Concerned with current standards, performance requirements, or user needs due to ageing, technological advancements, or changes in

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regulations. Obsolescence can lead to decreased functionality, increased maintenance costs, higher energy consumption, and reduced occupant comfort and safety [4]. Addressing building obsolescence requires strategic interventions to meet the evolving needs of urban communities while minimising environmental impact and maximising resource efficiency. Sustainable approaches to building upgrades aim to maximise the lifespan and value of existing assets while supporting the goals of urban development and environmental stewardship.

In the global literature, case studies of building stock upgrade encompass a range of methods to improve sustainability and functionality. These methods include rehabilitation, where buildings are restored to a functional state while retaining their historical and architectural significance. Reuse and adaptive reuse strategies focus on repurposing existing structures for new functions, minimising waste and resource consumption [5], [6]. Reinforcement techniques strengthen building structures to meet modern safety standards and extend their lifespan [7], [8]. Restoration emphasises returning buildings to their original condition, often through meticulous repair and conservation efforts [9]. Maintenance practices ensure ongoing upkeep and performance optimization. Additionally, repurposing and part-demolition strategies selectively modify or remove sections of buildings to accommodate new uses or design concepts [10], [11], [12]. Energy efficiency measures [13], [14] and green rooftop installations further contribute to reducing environmental impact and improving overall building performance [9], [15]. Capacity Improvement methods are also integral, aiming to enhance the building's capability to meet contemporary demands while preserving its structural integrity [16]. Collectively, these methods represent a comprehensive toolkit for upgrading existing building stocks while promoting sustainability and resilience in the built environment.

It seems that the use of digital tools is an important opening in this new sector of architecture, and they strengthen and enrich it with very important consequences in politics, the built environment. The trajectory between digital tools, building stock upgrades shows an interest in how we can do future design at neighbourhood level.

2. RESEARCH PROJECT

In this paper the authors focus on residential areas, and they have 2 parallel goals. First, to see which technologies are used today in the transformation of building stock and second, to get to what transformative potential is. The authors' general research question is: If digital tools have transformative potential in upgrading the architectural landscape of existing buildings, in which areas is this more obvious? And where tools seem to better support this objective? Through a comprehensive analysis of technological applications and their outcomes, the research aims to contribute valuable knowledge to the field of urban development and architecture, informing future practices and policies aimed at fostering transformative change in residential building stock.

3. METHODOLOGY

The methodology is developed in two phases. The first phase is about documenting which digital tools are used in upgrading architectural landscape and have better potential to support architects and urban planners in their goal of improving the building stock. For this step, a review of literature is realised in scientific journals and in international conferences of the last 10 years. Then an identification process identified the main types of technology that have been mainly reported in the literature. A third search was then carried out combining the technology types with different design fields: e.g. "Virtual reality in the upgrade process of existing buildings" etc. Finally, using a matrix in which digital tools were categorised and grouped based on their specific applications, all benefits and goals of these technologies are being illustrated and further discussed.

Based on this database, the second step revolves around which of the tools presented has transformative potential. The transformative potential of upgrading the architectural landscape lies in its ability to reshape urban environments, enhance quality of life, and address contemporary

challenges through innovative design interventions. By reimagining existing buildings and urban spaces, architectural upgrades can catalyse positive social, economic, and environmental impacts. This potential is particularly evident in projects that integrate digital technologies, sustainable practices, and community engagement. Architectural upgrades can breathe new life into neglected or underutilised areas, fostering vibrant neighbourhoods and cultural hubs (design). They can also promote sustainability by incorporating energy-efficient systems, green technologies, and adaptive reuse strategies that minimise environmental impact (zero energy). Furthermore, upgrading the architectural landscape can stimulate economic development by attracting investment, tourism, and creative industries to revitalised areas (urban regeneration). Ultimately, the transformative power of architectural upgrades lies in their capacity to shape the built environment into more resilient, inclusive, and inspiring spaces that meet the evolving needs of communities and contribute to a more sustainable future.

3.2 Review of Technology

Research across approximately 30 papers has identified several key technologies prevalent in upgrading residential neighbourhoods today, categorised and grouped based on their specific applications (Figure 1). These digital tools play crucial roles in enhancing the existing building stock within neighbourhoods. Design and modelling tools, exemplified by Building Information Modeling (BIM) software, empower architects and engineers to develop intricate 3D models of buildings, laying the groundwork for neighbourhood-wide upgrade planning. Analysis tools, such as Geographic Information Systems (GIS), facilitate comprehensive assessments of building performance and environmental factors to inform retrofit strategies on a larger scale. Data visualisation tools aid in communicating complex information to stakeholders, fostering better understanding and engagement in neighbourhood upgrade projects [17]. Management tools streamline maintenance activities and resource allocation, ensuring efficient implementation of upgrades across multiple buildings. Highlighting technologies enhance stakeholder engagement by visualising proposed design changes in real-world contexts, making it easier to understand the impact on the neighbourhood. Optimization tools help identify cost-effective and energy-efficient upgrade strategies through rigorous performance analysis, ensuring sustainable development at the neighbourhood level.

Moreover, laser scanning / photogrammetry is a versatile tool in upgrading existing building stock, fitting into multiple categories (Figure 2). As a design and modelling tool, it creates precise digital models of entire neighbourhoods for comprehensive transformation planning. As an analysis tool, it identifies structural weaknesses and areas needing repair, while in data visualisation, it provides visual representations of neighbourhood conditions, aiding in understanding complex spatial relationships. As a highlighting technology, it pinpoints specific areas for renovation or repair, enhancing the overall neighbourhood upgrade process.

This categorization provides a structured framework for understanding and leveraging these technologies to enhance research and planning efforts within residential communities.

Category	Digital Tool	Types	Citation	Application	Key-findings
Design - Modelling	Building Information Modelling (BIM)	ArchiCAD, Autodesk Revit & Navisworks	[5], [18]	parametric BIM models by using Visual Programming Language, reinforcement of existing building	improves work efficiency, optimizes design and construction, enhances information management, and boosts project communication and collaboration

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	Computer-aided design (CAD)	Autocad, Rhino	[19]	create construction documentation	enabling precise digital models, efficient design iteration
	Parametric design Tool	Revit Dynamo, Grasshopper	[20], [21]	improve seismic vulnerability, parametric characteristics	enable designers to explore multiple design iterations and optimize building performance parameters
Analysis	Geographic Information Systems (GIS)	OpenStreetMap, CadMapper, Grasshopper: Elk, Meerkat GIS, Urbano, ArcGIS	[22], [23], [21]	create a fast city model, map the energy efficiency of buildings for retrofitting	aids in spatial analysis, helping identify areas of intervention and assess the environmental impact of upgrades
	Energy Modelling software	EnergyPlus	[24], [15]	models both energy demand and water use, energy saving strategies (cool /green roofs),	allows for the simulation of energy performance improvements and helps prioritize energy efficiency measures
Data Visualization	Data visualization platforms	Tableau et.	[25], [26]	graphical representation of information	assist in communicating complex information to stakeholders, facilitating decision-making and buy-in for proposed upgrades
	3D visualization and rendering software	V-Ray, Lumion et.	[27]	high-quality, realistic visuals, textures, materials, shadows, and lighting in fast rendering speed	enable realistic visualizations of proposed upgrades, aiding in understanding and visualization
Management	Computerized maintenance management system (CMMS)	IBM maximo (asset)	[28], [12]	improve the overall building maintenance process, SMARTS-based decision support model for CMMS	cost reduction, increased productivity, better planning can be achieved by using data to detect patterns in building utilization, maintenance costs, preventive maintenance, and energy consumption
Highlighting	Internet of Things (IoT) devices and sensors		[29], [30]	energy efficiency	provide real-time data on building performance, enabling continuous monitoring and optimization post-upgrade
	Digital Twin platforms		[31], [32]	renovation approach, thermal comfort and energy consumption	better understand existing conditions, optimize designs, and reduce construction errors and material waste
	Augmented Reality (AR), Virtual Reality (VR) and Mixed Reality (MR) applications	Unity, Unreal	[33]	complementary tools to BIM models, design, and construction process	visualize the proposed alterations in the context of the existing building, facilitating informed decision-making
Optimization	Simulation software	Grasshopper: Ladybag, Honeybee, Butterfly	[34]	graphical multi-objective performance evaluation method	design performance testing under real condition, help identify cost-effective and energy-efficient building upgrade strategies
	Genetic Algorithms for design optimization	Grasshopper: Galapagos, Wallacei	[16]	capacity improvement and solar constraint	help find optimal design solutions by iteratively exploring design space and identifying the most efficient configurations

Figure 1. Matrix of digital tools are used in upgrading architectural landscape.

Design - Modelling Analysis Data Visualization Highlighting	Laser Scanning and Photogrammetry	LiDAR 3D laser scanning	[35], [3], [36], [21]	Favelas 4D MIT Senseable City Lab, built environment and/or material flows in cities, Virtual London	calculate embodied materials stock, model building heights
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Figure 2. Laser Scanning, a versatile tool in upgrading existing building stock.

3.3 Case studies of holistic building stock upgrades

Successful implementations of digital technologies for holistic building stock upgrades were examined. Concerning Modelling and Design Tools, computer-aided design is the standard for creating construction documentation, while its limitations can be effectively addressed by implementing Building Information Modeling (BIM) systems [19]. Triantafyllidis & Huang, (2023) noted that creating BIM models for existing buildings is a time-consuming task, but with the workflow they developed, demonstrated that generating parametric BIM models using Visual Programming Language is feasible. Tang, (2023) used BIM technology to simulate and assess various reinforcement schemes, optimising design, evaluating structural performance and aesthetics, and establishing a collaborative digital workflow for enhanced project cooperation for Chinese construction. Additionally, parametric design Tools create and manipulate complex geometric forms and designs through algorithms and mathematical functions. d’Urso & Cicero, (2019) proposed a parametric model to examine and renovate alternatives of a typical earthquake-prone apartment block in Italy by improving the existing building stock in terms of seismic vulnerability in combination with its architectural image.

For spatial analysis, Péter Fejes & András Horkai, (2020) suggested in order to create a fast city model in the ArchiCAD software environment, Grasshopper plus Meerkat was the most expedient and simplest solution when data is available in a GIS format, while when an accurate model is not needed online CADMAPPER interface, is proposed as fastest and easiest method. On the other hand, Ahmed et al., (2024) revealed that the GIS-based model is validated as effective for energy-use mapping and data collection at the neighbourhood scale, aiding municipalities in developing energy-efficient, smart neighbourhood policies based on recommended energy-saving retrofit measures.

Data visualisation platforms are extremely useful for assisting in the communication of complex information to stakeholders, facilitating decision-making and securing buy-in for proposed upgrades [26]. Visual analytics techniques for comparing building performance under different scenarios and designs are presented in graphical representation of information [25]. On the other hand, 3D visualization and rendering software such as, V-Ray, Lumion et., enable realistic visualizations of proposed upgrades, aiding in understanding and visualization, by producing high-quality, realistic visuals, textures, materials, shadows, and lighting at fast rendering speed [27].

The study of Adeyemi, Rahman, et al., (2022), identified maintenance analytics methods for data-driven decision-making, finding data type influenced techniques, with a focus on building performance, maintenance work orders, operations, and end-user complaints. Rodrigues et al., (2023) created a SMARTS-based decision support model for CMMS to optimise building maintenance processes. Both studies indicated that new technological trends, such as Building information modelling (BIM), Virtual Reality (VR), Augmented Reality (AR), and Internet of Things (IoT) need to be combined.

Metallidou et al., (2020) proposed a smart building template that uses IoT technology to manage technical systems for energy efficiency and an automated remote-control method, supported by a cloud interface, to improve the energy performance certification of existing buildings. On the other hand, Digital Twins can be especially transformative for renovations, where integrating new designs

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with existing structures often necessitates multiple adjustments, but still there is a need for further research to develop workflows into the digitalised renovation process [37]. According to Schwartz, D. and Bill, B. (2024) digital twins revolutionise facility renovation and design by enhancing visualisation, planning, and precision. Generated through tools like laser scanners and drones, these detailed models help engineers better understand existing conditions, optimise designs, and reduce construction errors and material waste. Moreover, Arowoia et al., (2024) studied DT in the field of thermal comfort and energy consumption of built assets. VR / AR technologies are still under research concerning the upgrade process. However, during the design and construction process, improved stakeholder communication, project understanding, decision reliability, error anticipation, and reduced iterations and delays from poor visualisation, can be achieved.

In the field of optimization, Huang et al., (2021) proposed a graphical multi-objective performance evaluation method with a developed plugin for Grasshopper, aiding designers in exploring thermal and visual comfort through interactive, performance-informed feedback on various design options. Li et al., (2022) utilized automated workflows and integrated multi-objective optimization using the Wallacei plug-in within Grasshopper to improve solar radiation exposure, maximize solar hours, and enhance block capacity, providing valuable guidelines for renewing residential blocks, addressing floor area ratio constraints, and promoting urban vitality.

As we mentioned before, Laser Scanning is a versatile tool. Confronted with the intricate and multi-faceted environments inherent in unplanned urbanisation, Salazar Miranda et al., (2021) generated detailed morphological maps using LiDAR data. These maps serve to inform urban planning evaluations regarding issues such as overcrowding, structural integrity, air quality, and accessibility within Rocinha, the largest favela in Rio de Janeiro, Brazil. Steadman et al., (2014) constructed the "Virtual London" model by using building footprint data from Ordnance Survey maps combined with height information obtained through LiDAR 3D scanning methods, while the CIRCUIIT project [3] suggested that using 3D building data and LIDAR can help calculate embodied materials stock by determining the built volume and surface area of walls, roofs, and floors. Lastly, the research project "MANSION AR tX Morphological, Architectural & coNSTRUCTION InFormatioN with Augmented Reality in Touring Experience," which involved contributions from the National Technical University of Athens, the Technical University of Crete, the University of the Aegean, and the company Senseworks, focused on the creation of a digital repository featuring 3D models of selected buildings, generated using laser scanners, drones, and digital photography. This repository allows users to access detailed architectural information through a virtual reality web application and a mobile application with augmented reality (AR) capacities. These technologies enable virtual tours and on-site exploration, offering a comprehensive and interactive educational experience by integrating historical data and architectural features into an immersive digital format.

4. CONCLUSION

In the realm of upgrading existing building stock at the neighbourhood scale, digital tools are categorised into seven distinct categories, each offering transformative potential. Design and Modelling tools enable architects and designers to breathe new life into neglected areas by exploring innovative design concepts. Analysis tools empower decision-makers to implement sustainable practices by providing insights into building performance metrics. Data Visualization tools effectively communicate the benefits of architectural upgrades to stakeholders, fostering inclusive decision-making processes. Management tools streamline project execution, maximising economic benefits and stimulating development. Highlighting tools emphasise the cultural significance of upgraded spaces, fostering vibrant communities. Optimization tools promote sustainability by integrating energy-efficient systems and materials. Collaboration tools facilitate interdisciplinary

cooperation, leading to more holistic and community-driven outcomes. Together, these tools offer a comprehensive toolkit for neighbourhood-scale upgrades, driving sustainable development and revitalization efforts.

The trajectory between digital tools and building stock upgrades in global literature reflects a growing interest in how future design at the neighbourhood level can be enhanced. Digital technologies enable more efficient data collection, analysis, and simulation, leading to optimised building designs and upgrades. This can result in improved energy performance, cost savings, and enhanced user comfort. Additionally, digital tools facilitate collaborative processes among stakeholders and enable better visualisation of design concepts. However, challenges such as the initial cost of implementing technology, data security issues, and the need for specialised skills can also arise.

These advancements have significant direct consequences on policies and the built environment. Policymakers are increasingly recognizing the potential of digital tools to support sustainability goals and drive innovation in building stock upgrades. Digital technologies can inform evidence-based policy decisions, streamline regulatory processes, and foster greater transparency in the construction and renovation of buildings. Furthermore, the integration of digital tools has the potential to reshape the built environment by promoting smarter, more adaptable neighbourhoods that prioritise sustainability and resilience.

In summary, the intersection of digital tools and building stock upgrades represents a critical opening for advancing future design practices at the neighbourhood level. The literature underscores the transformative impact of digital technologies on this industry, emphasising both opportunities and challenges that must be navigated to realise sustainable and innovative built environments.

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Regenerative tourism – Shaping the future of the cities

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Abstract

Though mankind has once considered itself as part of nature and its cycles, we live currently in a time of merciless and selfish exploitation of planet Earth's resources. Climate change, exploitation and destruction of natural resources, mass tourism before the COVID-19 pandemic, and other social and economic crises enticed many experts and scientists to start thinking of new, sustainable paradigms and solutions. As a result, a new regenerative paradigm that clearly indicates and warns of the fact that sustainability is no longer enough, since the concept of sustainability is considered to be a slower way of dying, is created. The regenerative paradigm encourages mankind to think of relations and recognizes the need for the development of human consciousness. It includes a new system of values and holistic perspective and emphasizes an inextricable connection between man and nature. Due to its adaptable character, with an indispensable positive action on all participants, the regenerative paradigm has and an all-inclusive potential to implement itself in a broader economy. Subsequently, from which its functional purpose arises – creating and encouraging changes in the social and economic sectors and as such is applicable, and is implemented, in many sectors. The regenerative paradigm represents a foundation of developmental regenerative tourism, a new scientific topic, for which progression, important Indigenous, cultural and traditional values of a local community, are especially important. The task of regenerative tourism is to encourage the realization of the potential of a space, as well as create net-positive benefits for all participants. As a unique multidisciplinary phenomenon, it has the broadness and the possibility to touch all spheres of society and reach all points of the world. Therefore, this paper presents an advanced assumption of the transformative power of regenerative tourism and the developmental potential of regenerating urban spaces. Within this context, by understanding regenerative tourism and using its transformative capabilities, it is possible to activate positive changes in space, economies and society generally. Thus, it represents the purpose and goal of this paper – to explain the meaning of regenerative tourism, show its transformative role through developmental potential in shaping and revitalization of spaces, observe it as an important tool in activating positive social and economic as well as spatial changes. Since it is vital today to create communities in harmonious coexistence with nature, it can be concluded that the transformative character of regenerative tourism can present the key potential of developmental potential for regeneration and shaping of future cities.

Keywords: regenerative paradigm; regenerative tourism, urban development.

1. INTRODUCTION

Uncontrollable technological development, which is the result of an industrial (degenerative) paradigm, distanced man from nature and the (re)connection to the natural world, with which man had lived once in synergy. As we feel the consequences of such views and decisions that were made, we are deeply aware of the seriousness of the situation we find ourselves, new ways of regeneration of mankind and the planet are generally sought.

To find novel solutions, many scientists and experts indicate that it is necessary to look deeply at the root of the problem, including each of us individually. Jaworski [1] says that attitudes and ways of thinking about the world and the way it functions must change, turning it from a defined machine-like world to a space that is open, dynamic, interconnected, and full of personal life qualities. In

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addition, to create new ways of thinking and new models, Ghisi [2] points to responsibility and believes that we are all a connected whole, one system, which makes us interdependent, and vulnerable, but also responsible for Earth as one inseparable community. Similarly, Capra and Jakobsen [3] state that to solve certain situations, it is not enough to make changes within the established systems of the economy in general. Fundamental changes in written theories and practices are needed. Instead of developing and living the economy on knowledge aimed at conquering nature, they believe that the greatest challenge of our time is building and nurturing communities designed in harmony with nature.

The process of searching for new methods and solutions indicates that the present concept of sustainable development, which aims to mitigate the damage done, is no longer sufficient and, as such, is considered inadequate [4; 5]. Following this, Daniel Wahl [6] calls for the transformation of tourism because he believes that tourism can become a catalyst and a carrier of change. The regenerative paradigm ‘a new lighthouse for a better future of humanity’ [7] represents the basis of the development of regenerative tourism, a new scientific topic, which is also accompanied by the development of higher human consciousness.

This paper explains the term regenerative paradigm and its all-inclusive ways of regenerative action in the economy, with special emphasis on regenerative tourism, since tourism as an industry can connect every corner of the world and have a global and local impact on ecological, social, and economic renewal and regeneration of all communities. Considering that regenerative tourism is primarily characterized by local activities, and consequently globally, this paper particularly emphasizes the necessity of ‘localizing everything’ and the importance of local needs. In this paper, the progressive assumption of the transformative potential of regenerative tourism is presented. It also explains the role of regenerative tourism in renewing local resources, and consequently regeneration of other sectors.

Consequently, three key goals arise in this paper: first, explain the concept of regenerative tourism with an emphasis on the renewal of local resources and achieving positive changes on local and global level; second, show the developmental potential of regenerative tourism as an activator and initiator of changes; and third, show the significance of observing the broader concept of regenerative tourism as the new developmental dimension in the context of regenerative urban development, observing regenerative tourism as a tool that brings back the identity to the place and becomes an ‘expert’ for urban transformation and planning ‘new’ cities.

2. REGENERATIVE PARADIGM AND REGENERATIVE TOURISM

This chapter describes the concept of the regenerative paradigm, with the goal of deeper understanding of regenerative ways of thinking. Conceptual foundations will be described, while a special emphasis will be placed on the benefits that the regenerative paradigm brings with its implementation in different sectors of society, especially in tourism which is the focus of this paper.

2.1. Regenerative paradigm: definition and significance

All life on Earth occurs in harmony with nature and its cycles, which indicates mutual connection, but also interdependence. Nature represents a complete system in which man is integrated and, as such, they represent a part of that whole. Although there is awareness of the outlined facts, we are currently living in a time of ruthless exploitation of natural resources, when man is faced with the consequences of unsustainable, careless, and selfish decisions based on the thoughts and attitudes of the industrial paradigm.

To better understand the basic settings of the scientific and industrial revolution, and the beginning of their development, it is important to connect it with Sir Francis Bacon (1561-1626), a key person in the history of scientific philosophy, who made an exceptional contribution to the empirical research

development. His theory was based on the thinking that scientific knowledge must come from close observation of nature, filtered through inductive reasoning. He pointed out that man must 'torture nature and its secrets' to achieve a more rational order. His role as 'the father of the scientific revolution' is still felt today as we can see that nature is still treated as a 'resource' for excessive exploitation.

Since the industrial paradigm distanced man from nature, man 'forgot' to live in harmony with nature. Aware of the seriousness of the situation in which mankind finds itself, attitudes and thoughts about the world and nature around us, and the ways it functions, indicate that urgent action must be taken that will change the situation radically. It is necessary to refresh and renew knowledge that take us back to nature and therefore, different models and solutions that will help solving ubiquitous social and economic crises and soften the arisen consequences. Also, it is necessary to bring awareness of the subject for long-term changes and more responsible decisions.

To achieve these needs, recent discoveries in natural sciences like quantum physics and geophysics help us in this endeavour. Famous scientist, James E. Lovelock with his Gaia hypothesis opens a completely new look at the planet Earth. He shows that it represents a holistic system in which all its ecosystems (sea, rivers, mountains, glaciers, etc.) function interdependently, and all living organisms on the planet, that are interacting with the surrounding inorganic environments, form a synergistic and self-regulating system that has created and now maintains climatic and bio-chemical conditions that make living on Earth possible [8]. Inspired by this new perspective of a whole system of the planet Earth, Ghisi [9] translated it into the social and political context, indicating that we need to create new ways of thinking and managing models that recognize the fact that we are a connected whole, which makes us interdependent, vulnerable, but also responsible for Earth as an inseparable community.

In this process of search, based on new values, the regenerative paradigm arises, which brings new ways of thinking and deliberations, including holistic perspectives and practices, as it recognizes the need to develop human individual and collective consciousness, and contributes to a positive view of the future [10]. This way encourages changes overall, and for which, as Pollock [11] says, a change in human consciousness is needed. With a deliberate and conscious changing of personal perception of reality, people change the world around them. Considering that the regenerative paradigm recognizes the need to develop human consciousness and influences the change of the value system, it consequently acts on the social and economic sectors, and represents one of its key tasks. Therefore, it can be said that the regenerative paradigm is a worldview, by which we are reshaping the world for the benefit of all participants. A great challenge and task of the times in which we live is the construction and development of communities designed in accordance with nature [12]. According to the exceptionally pronounced flexible character of operations, the regenerative paradigm is offered as a correct solution for mankind. The regenerative way of thinking connects and brings awareness in the moment one lives and calls for cooperation and making decisions to raise the quality of life, as well as developing the local economy. Glusac [13] describes regeneration as renewal and regenerating as the ability to live in a new relationship in a lasting way. Given the meaning of the regenerative paradigm, which Chrisna du Plessis [14] defines as a 'co-creative partnership with nature, based on the strategy of adjustment, resilience and regeneration', her adjusting character of operations and positive action on all participants indicates the all-inclusive possibility of implementation in the economy generally. Following this, its functional purpose is visible – create and encourage changes in the social and economic sectors. For its efficacy and acceptable concept, it is recognized and implemented in many sectors, for example, in regenerative agriculture [15], urbanism and urban planning [16], as well as regenerative economy [17; 18].

Developing regenerative paradigm and regenerative economy, 'new beacons', for a better future of mankind [19], regenerative tourism is developed, a new scientific topic. Regenerative tourism, as Wahl [6] describes and sees, represents a 'multidisciplinary phenomenon', to whom all spheres of

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society and points of the world are accessible, and which can be the carrier and catalyst of the regeneration of the whole system. By the above mentioned, regenerative tourism will be described further as a broader concept of a new developmental and regenerative impact on other sectors and the system as a whole.

2.2 Regenerative tourism and its transformative character

Regenerative tourism represents a broader concept of developmental and regenerative changes, both in the tourist sector and in the socio-economic systems, which combines distinct aspects of society in a joint effort towards transformation and regeneration.

The call of the United Nations World Tourist Organization [20] to a shared, planetary vision of responsible recovery of the tourist sector. It indicates the necessity of development, but also understanding regenerative tourism, since tourism, as a catalyst for positive changes and regeneration [6] is the key ally in achieving changes that are necessary to transform the world.

In its foundations, regenerative tourism questions the dominating paradigm of industrial tourism, focusing on the regeneration of all systems, while economic growth is put as the last priority point [21; 22]. It is thought that regenerative tourism is not against growth, but demands and implies development, which is useful to the whole system, and never acts as a detriment to others. Therefore, it can be said that regenerative tourism ‘generates a positive net-impact to all participants.

According to Ateljevic and Sheldon [23], the purpose of regenerative tourism is to operate in service of broader systems in which it operates. They consider tourism to be regenerative when it regenerates more from itself alone, which would mean that regenerative tourism means returning more than it was taken. As regenerative deliberation is taking us back to the principles of nature, regenerative tourism is not an industrial work line, but a living, networked system built in the natural system, which is called ‘nature’ and as such it is subjected to natural rules and principles [24]. Since tourism has a great global reach and above all the ability to act locally, it impacts creation but also accelerates innovation by incorporating tourist practices in local communities and ecological processes which raise well-being in general [25].

Developing from the regenerative concept, which relies on indigenous perspective and knowledge, regenerative tourism aims at improving and transforming the social and ecological system in which tourist practices take place [26]. Consequently, the Indigenous, cultural, and traditional values of the local community are markedly important for developing regenerative tourism, which gives a uniquely characteristic and recognizable space through its distinctive coexistence and symbiosis, making it attractive to tourists.

Regenerative tourism represents a holistic approach that encourages developmental and regenerative changes in the tourist sector and social and economic sectors, connecting different aspects and needs of society, and operates first locally, and then globally. This way it is an important part of the local and national economic community.

The perspective of regenerative tourism is not imaginable without the support of local economies by which the self-sustainability of the local community is encouraged but also enriches the tourist experience developing economic benefits for local communities.

3. REGENERATIVE TOURISM: THE KEY FOR URBAN TRANSFORMATION OF THE CITY

Starting from a progressive assumption that regenerative tourism can be a fundamental activator of change and transformation of the local community generally, the term regenerative urban development is further below explained, and the way regenerative tourism can take the role of an active tool in reshaping the urban spaces.

3.1 Regenerative urban development

Most currently present methods of urban intervention represent sustainable, ‘green’, passive models and ways, which are foremost focused more on implementing technologies, and less on long-term quality, regenerative operations. Taking into account fundamental settings of the regenerative paradigm, and all that has the prefix ‘regenerative’, it is clearly visible that the characteristics of regenerative thinking should be implemented in spatial intervention and decisions. Long-term cooperation and connection to the environment is necessary as well.

The Regenesi Group first proposed the term regenerative development in 1995. It describes an approach that is about enhancing the ability of living beings to co-evolve so that our planet continues to express its potential for diversity, complexity, and creativity. The Regenesi Group proposed that the core issue was cultural and psychological, and only secondary technological [27].

One of the initiators of regenerative urban thinking, Bill Reed talks of the necessity of transitioning from sustainable development to regenerative as far back as 2007 and indicates that the regenerative design process begins by attempting to understand how the systems of life work in each unique place. The role of designers and stakeholders is to create a whole system of mutually beneficial relationships. By doing so, the potential for green design moves beyond sustaining the environment to one that can regenerate its health – as well as our own [28].

To better understand the term regenerative urban development, Bill Reed’s graph image “Trajectory of Environmentally Responsible Design” [28] from 2008 (Figure 1) is shown below. It illustrates different developmental phases of the responsible design; from the basic approach to the advanced, emphasizing the importance of recognizing and including ecological and social factors in all phases of development.

The first phase, conventional practice, includes standard methods without a special focus on sustainability. Green design, which introduces basic ecological practices to lessen the negative impact on the environment follows. Sustainable design integrates additionally sustainable practices, balancing economic, ecological, and social factors. The most advanced phase, regenerative design, creates systems that improve natural and social ecosystems, emphasizing the holistic approach and interdependence of humans and nature.

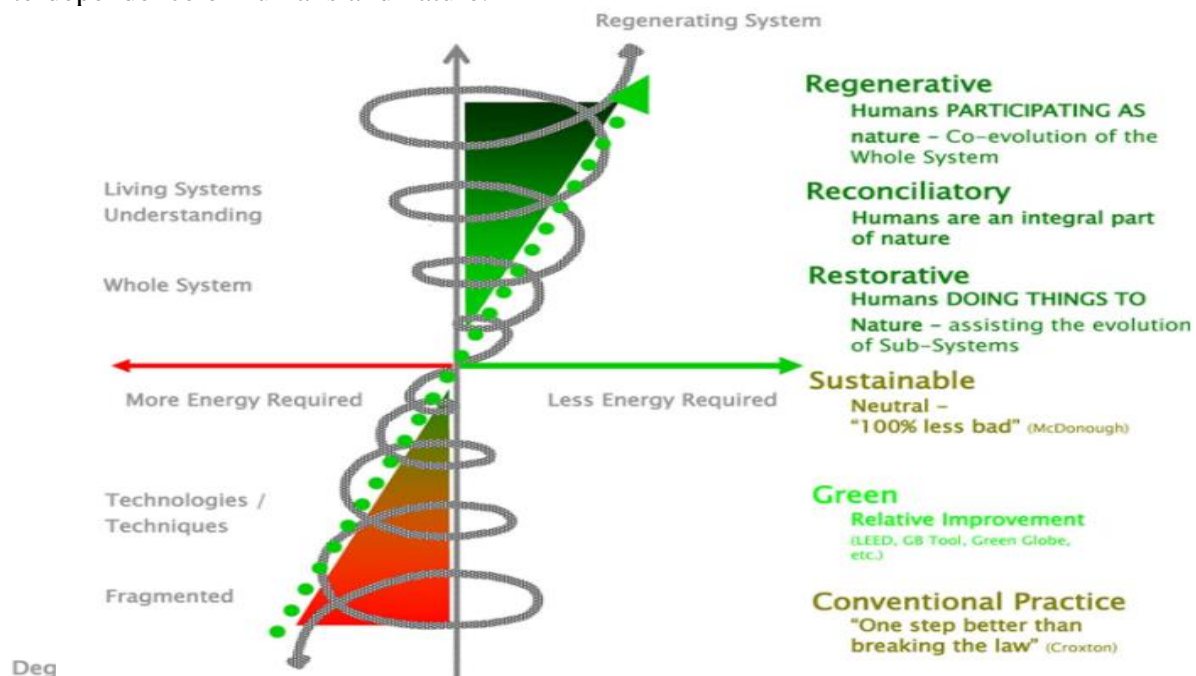


Figure I. Trajectory of Environmentally Responsible Design [28]

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The vision of regenerative cities and communities was first developed by the International Expert Commission on Cities and Climate Change, convened by the World Future Council jointly with HafenCity University in 2008. WFC Report [29] from 2014 indicates that the road to regenerative urban development begins with a switch in our thinking so that by-products conventionally considered 'waste' can be reframed and reused as resource inputs. Regenerative cities are productive centres that help to regenerate the materials and resources they use and foster a mutually beneficial relationship between urban areas and their surrounding territories. Although a regenerative city in its entirety still does not exist, many cities and urban units show the use of different elements of regenerative urban development in certain sectors and areas. Considering the complexity of the process of regeneration, since it represents a practice philosophy and process success in regeneration means to evolve, and continually develop new potential. Its dictionary definition addresses both the action and the source of this new potential: to create a new and to be born of a new spirit. [30].

Following the above, one can say that regenerative development is a transformational approach that tends to use the maximal potential of a place so that it would encourage and achieve an optimal realization of inhabitants through interdependence and the intertwined nature of man and space, its resources, and the possibilities of that space. Thus, reconnecting man (community) with the place. Regenerative urban development is tasked to create added value in all living systems, of which we are an inseparable part, and it has an all-inclusive role in encouraging innovative practices of regeneration of the city development adapted to the needs of the local community, but also the protection of the environment primarily.

3.2 Integration of regenerative tourism and regenerative urban development

Regenerative tourism represents a holistic approach that encourages developmental and regenerative changes in the tourist sector and social and economic systems, connecting different aspects and needs of society in joint efforts for transformation and renewal, acting primarily within a community (locally), and expanding globally.

Cooperation and joint creation, justice, and inclusion are important and recognizable characteristics of regenerative tourism. Therefore, it can be said that regenerative tourism is aligned with the process of regeneration with cultural and natural patterns and is integrated into local development [31], and as such it has a role in creating the identity of the space, shaping the space, local food production, i.e. regenerative agriculture and other present sectors of the local community.

The characteristics of regenerative tourism, especially its adaptable character and its power to operate on broader systems, give it the possibility to become an important element in reshaping the urban space, i.e. in the process of regenerative urban development, and also urban development generally. Planning and managing new cities, as well as renewal and reconstruction of existing ones should go through a deep change paradigm, i.e. fundamental settings. WFC Report [32] indicates that the urban metabolism must transform from its current, inefficient and extravagant work defined as a linear system, into a resourcefully effective and circular, regenerative system. Integration into regenerative urban development represents a synergistic approach that combines principles and fundamental characteristics of regenerative tourism in the process of urban development. Regenerative tourism contributes to the revitalization of city spaces through initiatives that include the renewal of natural resources, the strengthening and renewal of local, cultural customs and communities, and the promotion of indigenous practices. Regenerative tourism can serve as a tool for creating main guidelines of urban planning, but also as an initiator and regenerator of local the economy in which it is being implemented. It is also important to point up that regenerative urban development, defined by rules and development guidelines supports and encourages the regeneration of regenerative tourism, which ultimately confirms that regenerative tourism can regenerate other sectors.

Taking in account one of the key goals of regenerative tourism, which is to discover the potential of places and communities by developing a deep understanding of their unique features and histories

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[33] a clear link with urban planning for which the potential of places is extremely important. Also, Regenerative tourism uses place-based processes which reflect, honour and enhance their unique social-ecological systems [34]. Subsequently, regenerative projects focus on identifying and progressing what places and communities can uniquely become rather than identifying problems and assigning universal solutions [35; 36]. By understanding the unique potential of a place, tourism stakeholders can develop reciprocal relationships with living entities and discover ways to align with and build the capacity of related social-ecological systems, which directly contribute to the development of regenerative urban interventions.

Furthermore, regenerative tourism enables net-positive impacts and effects on ecosystems by contributing to the conditions that restore systems and support them to self-generate continually [37; 38]. People, governments and enterprises all work in line to serve the broader systems that tourism affects and is affected by [37; 34]. In this way, tourism engenders net-positive effects and improved capacity for places and communities to flourish by adopting regenerative approaches. All aforesaid has an impact on the urban image of the city as well as the possibilities of urban planning.

Since this paper presents the progressive assumption that regenerative tourism represents a key to the urban transformation of a city, it is important to mention that the regenerative process leads humanity to thought-out relations of all living systems and encourages awareness. Reed [28] in his research points out that regeneration is not only creating surroundings and encouraging local habitats to become productive and healthier, but that effective regeneration demands inclusion of all that makes one place healthy. It can be our local community or families, a bit of land or a building itself. Any of these elements can be a starting point to understanding the whole system and have a key role in a living system, in the process of making a conscientious engagement.

4. CONCLUSION

The purpose of regenerative tourism is to act in the service of broader systems. Tourism is regenerative when it regenerates more than itself alone, which gives it a 'task' to include itself in shaping the space and communities it operates. In this paper, it is shown how regenerative tourism expands its role outside traditional borders of tourism, becoming an important tool in restoring the identity of urban spaces. It recognizes the need to develop human awareness and impacts the change of the system of values which consequently acts on social and economic sectors. The accent is on its all-inclusive role to encourage innovative practices of urban planning, as well as creating new, sustainable models of development of cities that are tailored to the needs of the local community and the environment. Guided by the thought of Watzlawick [39] there are two different types of changes, one that happens within the given system when it remains unchanged and one whose phenomenon changes the system. It clearly indicates that the quality of regenerative changes since its implementation creates permanent positive changes.

This paper gives a review of the literature to explain terms and advanced assumptions that regenerative tourism can be key for developing urban spaces. The increase in research on this topic indicates that there is a greater need and interest in regenerative approaches and practices. The recommendation for future research is to include fundamental settings of regenerative tourism in spatial planning by defining the needs of spaces, especially through engagement and cooperation with local communities and inhabitants. Through case studies in different contexts, given assumptions can be researched and identify the implementation of current inclusions and real needs of regenerative elements.

So, regenerative tourism, as a holistic approach can be key to reaching regenerative urban development. Its integration into local communities enables creation and the identity of the space, encourages shaping the space according to local needs and renews local food production, like regenerative agriculture, and other sectors. The characteristic of regenerative tourism is a key factor in transforming urban areas. Integration of regenerative tourism in regenerative urban development

enables creation of sustainable, resilient, and picturesque urban centres that promote the prosperity of local communities and environmental conservation.

Finally, all above can be concluded with a statement by Jane Jacobs [40], an American activist, author, and urban theorist, who says the following:

“Dull, inert cities, it is true, do contain the seeds of their own destruction and little else.
But lively, diverse, intense cities contain the seeds of their own regeneration,
with energy enough to carry over for problems and needs outside themselves.”

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The spatial and social transformation of central residential areas by the Impact of tourism: the case of Koukaki in Athens, Greece

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Extended abstract

This paper investigates the socio-spatial impacts of short-term housing rental addressed to tourists in the area of Koukaki, a central middle-class residential district of Athens. Koukaki is located next to key archaeological sites of Athens, and the Acropolis, creating favourable conditions for short-term rentals by tourists. The complex phenomenon of online platforms of short-let rooms and flats, like Airbnb has developed rapidly all-over European cities in recent years; and recent research shows that it has been a critical factor for the transformation of urban space and the socio-economic profile of central residential areas. In Koukaki, Athens, our research shows that due to the rapid expansion of short-term renting, even fewer properties are available in the conventional long-term rental market. Land-uses shifted from ordinary commercial and service economic activities in a residential district to tourism-oriented commercial and service economic activities. Under such new conditions, the local population in Koukaki also changes rapidly, and this middle-class neighborhood is getting transformed into an international tourists' neighbourhood. In a more general context, the development of Airbnb phenomenon, a new and profitable activity of 'sharing economy' in Koukaki, Athens, is directly linked to the significant growth of cultural tourism in the last two decades and a change in the tourist identity of Athens which, in recent years, has become a 'city break' destination.

Keywords: *Airbnb, tourism, city break, urban transformation, Koukaki, Athens, Greece*

15-minute city; Can it be implemented in Greek cities, and how?

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Extended abstract

The '15-minute city' model seeks through appropriate urban planning and design strategies to improve everyday life of citizens on a neighborhood scale. The main conditions contributing to the transformation of urban area into 15-minutes urban unit are as follows:

Sustainable mobility: Transportation on foot, bicycle and scooter is enhanced while public transports are also playing a significant part. On the contrary, the use of private cars is discouraged and operate complementary.

Urban Regeneration and Resilience: The survey of existing underused or/and abandoned buildings in the area, and their renewal and reuse according to the specific socio-spatial needs of the area are fundamental in the transformation of the area.

Lively public open spaces: Underused outdoor public spaces, and especially unlandscaped public spaces, are redesigned so that they are addressed to and accessible by all residents and visitors without exclusion; thus, the neighbourhood is capable to keep and develop permanent residents and attract visitors.

Dynamic local economy: In general, the neighborhood provides with the spatial terrain for flourishing new economic activities, especially for young people, boosting the local economy.

This paper is part of a doctoral research. As typical research cases, two neighbourhoods located in Greater Thessaloniki Area, have been selected: (a) the area around Myloi Allatini, an abandoned heritage industrial complex in the Municipality of Thessaloniki, requiring urban renewal; and (b) Elaiones Pilaias, a peripheral new residential neighbourhood now being under processes of planning in the Municipality of Pilea-Hortiatis. The research investigates how urban policies for the 15-minute city model can be implemented in these two categories of residential urban areas; old neighbourhoods under processes of urban renewal and regeneration, and new peripheral neighbourhoods under planning and design processes for the city's expansion. The doctoral research aspires to draw conclusions on planning and design guidelines for Greek cities willing to adopt the 15-minutes city model.

Keywords: 15-minutes city model, urban regeneration, sustainability, neighbourhood, Thessaloniki, Greece, Myloi Allatini, Elaiones Pilaias

Revitalizing Urban Voids through Community Engagement

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Extended abstract

Urban voids, often found as vacant lots, abandoned buildings, or derelict public spaces, present a unique challenge in the urban landscape. These neglected areas, which can arise from economic shifts, urban decay, or planning oversights, detract from the vibrancy and functionality of cities. Contemporary urban challenges, such as climate crisis, rapid population growth, housing shortages, transformation of work models and the need for sustainable development, highlight the importance of transition of urban voids as fundamental elements in pursuing more adaptable and sustainable urban environments.

This paper explores the role of community engagement in revitalizing these neglected spaces, emphasizing the importance of "bottom-up" methods of city planning where local residents are actively involved in the planning and implementation processes. Community engagement is critical for the successful transformation of urban voids, as it ensures that redevelopment efforts are aligned with the needs and aspirations of those directly impacted. This paper discusses various techniques for engaging communities in the planning process, including participatory planning workshops, surveys, focus groups, digital engagement platforms, placemaking activities, and temporary urbanism. Each method offers unique benefits, from fostering a sense of ownership among residents to facilitating inclusive, data-driven decision-making.

The methodology of this research combines theoretical analysis with an examination of good practices in successful case studies that elucidates the key principles, processes, and implications of adopting participatory planning approaches for urban void revitalization projects. Several examples are analyzed to illustrate community-driven revitalization projects, highlighting how collaborative efforts and extensive public consultations can transform neglected spaces into vibrant public areas that foster community spirit and economic activity.

The expected results of this research include a detailed understanding of effective community engagement techniques and their impact on revitalizing urban voids. By applying these methods, cities can transform neighborhoods into adaptive ecosystems, capable of rapidly responding to contemporary urban challenges and reshaping according to emerging realities and residents' needs. Community engagement is part of an ongoing process in planning strategies for urban regeneration and renewal of urban voids.

Keywords: *urban voids; neighborhoods; urban regeneration; participatory planning; community engagement; decision-making.*

URBAN CULTURES & PUBLIC OPEN SPACES

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Traditional cultural events in contexts of depopulation - Carnival in the Sicani inner area in Sicily

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Extended abstract

Rural areas and small urban centers in southern Italy are currently experiencing demographic loss, which has significant effects on the social viability of these communities, specifically affecting the local cultural and identity dynamics. These structural processes of population decline, which have been observed throughout the national territory, show even more significant impacts on territories with limited access to public services and undergoing transformations of the local economies, which have changed from traditional agricultural and craft-based production to technified agricultural production and the expansion of the third sector, specifically tourism. These processes must be interpreted within the present context of transformation and polarisation between urban and rural areas.

The cultural expressions historically rooted in the communities of the small villages in the Sicani area of Sicily are currently facing a decline in their social foundations that have sustained them for decades, particularly due to the increasing percentage of young population who are migrating to bigger cities. Consequently, traditional cultural events and festive manifestations, such as carnivals, secular expressions deeply felt by the inhabitants, which were once involved in widespread participation, are now at risk of lacking the necessary community organisation and audience engagement to make the festivity an instance for broad active participation. Despite these limitations, carnivals in the Sicani area continue to be integral to the local identity and are crucial in the collective memory of different generations.

Interviews conducted in these territories with carnival organisers and artists, specifically in the villages of Santo Stefano Quisquina, Bivona and Alessandria della Rocca, bear witness to the significance of this activity as a culturally rooted social event. The interviews reveal the active participation and artistic contributions of citizens, as well as the involvement of local collectives and associations. The content collected constitutes a firsthand narrative of the challenges encountered by carnival, along with other cultural events in the current context of depopulation of the so-called inner areas. The literature debate on the contradiction of public and private space in the performance of festive and performing events includes a brief historical analysis of the cultural practices surrounding carnival in these three villages. Additionally, analyses the role and content of ritual and creative elements present in these carnivals: the allegory, the float, the costumes and the anthem. These elements are instruments of critical and artistic reflection for the youth groups in these villages, where they express their concerns, rationales and expectations regarding the subject of depopulation.

Keywords: *carnival; cultural events; inner areas; public space; depopulation*

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A holistic approach to the Historic Urban Landscape of Athens. Focusing on the Interwar apartment buildings of the Fokionos Negri Street linear park

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Extended abstract

The historicity of the urban center, and thus its potential to evoke memories, is something that fascinates us, as the city has something to say to us through its structure and buildings. The urban landscape contains all the tangible and intangible elements inherited from history, human creation, and tradition, as well as those from the current urban reality. It represents a carrier that humanity is obligated to preserve without interfering with the invincible force of change that is the city itself. UNESCO's approach to managing historic urban landscapes is holistic, integrating the goals of urban heritage preservation and economic and social development. Such a holistic approach to the historic urban landscape is needed in Athens, where the classical past often obfuscate people's perceptions of recent architectural and social history, but also of the way in which that history is relevant to them. In Athens, the legal framework protecting the architectural heritage of the city center promotes, for historical and political reasons, the archaeological richness and its neoclassical interpretation, neglecting the protection and promotion of important buildings and open spaces of the 20th century. These buildings complete the image and identity of the city as modern monuments, interpreting the mechanisms of its evolution and how people accept it in their daily lives. The research project "The Interwar Urban Landscape of Fokionos Negri Street: Documentation, analysis, interpretation" aims to study the historic urban landscape of the linear open space of Fokionos Negri, an area formed in the first half of the 20th century and hosts many buildings characteristic of "Athenian Modernism" and also, a very important area for the social and functional evolution of the Kypseli district and the Athenian center. The research objectives have a triple nature: architecture, landscape and society. One of the main aims is to identify and study buildings of particular architectural/historical/cultural value, which contribute in a specific way to the composition of the urban landscape, highlighting the overlapping layers of the city's history. These buildings relate to the spatial mechanisms of the urban production, applicable in each era and way of life, as well as the values and social background of the time. Such buildings are the interwar residential buildings, which are in no case protected and, also, threatened by modern building activity. In this presentation, we focus on interwar apartment buildings located along the Fokionos Negri Street through maps, archival research, personal observations, interviews of the owners and the patrons of the linear park, films and photo reports when the park was the central leisure pillar in Athens. By documenting, interpreting, and evaluating the architectural, natural, and cultural heritage of the early 20th century in relation to recent elements of the perceptual and functional whole of the urban landscape of central Athens, the research project aims to contribute to research and evaluation methods for the historic urban landscape of Greek cities that can be used to implement more sensitive and comprehensive protection and management policies.

Keywords: *historic urban landscape; interwar urban heritage; Kypseli; Fokionos Negri Street; Athenian modernism*

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AdjustABLE thresholds: reframing accessibility through traditional liminal spaces

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Extended abstract

This research reports on the reuse and reformation of thresholds in the traditional settlements of the Dodecanese, in order to establish inclusive public spaces. Today, although accessibility for people with disabilities is mostly improving in urban centers, rural areas have been overlooked. Greek traditional island settlements are directly related to tourism revenues and sustainability, as the focus turns towards the adaptive reuse of their cultural and historic centers. However, due to their unwelcoming terrain, as well as the lack of necessary infrastructures and policy provisions for people with disabilities, they still remain exclusive destinations.

The island of Symi, in the Dodecanese, is an important example of social exclusion for people with disabilities. In the past, many inhabitants were diagnosed with the diver's disease caused by the intense sponge fishing commerce. Characteristic elements that formed Symi's identity are the public stairways as main mobility arteries, the large landings as pauses for rest, as well as the private thresholds, testaments of the neoclassical influence in the local manors. These morphological elements became integral parts of the daily life of local women enabling social interaction. However, today they are not used anymore. Although thresholds and landings once were a practical solution to the local unfavorable topography and important locations of collective participation and memory, today they hinder social interaction and accessibility. In this framework, this research analyses in situ Symi's thresholds and landings, which are irrevocably correlated with the identity of the place. Furthermore, it comments on the oxymoron of inclusivity and inaccessibility that can be detected in the built fabric of the traditional settlements. For example, it is astonishing how a construction that once played a major role in the social life, as a place of gathering and decision-making, has now become the problem itself.

Up to date, the traditional settlements in the Aegean Sea are considered to be important examples of organic evolution, resilience and sustainable design. In an effort to demonstrate the need to handle disability as an integral aspect of both cultural and architectural heritage, rather than a technical problem to be solved, this research and its findings aim to be a stimulus for further investigation regarding the identity of traditional-historic settlements, spatial inclusion and urban design. In this framework, a typology of existing thresholds is presented and new design approaches are proposed, in order to ensure in the future inclusive historic and traditional built environments for all.

Keywords: *thresholds; traditional settlements; heritage; accessibility; adaptable architecture;*

Places of worship and memory: the case of Greek-Orthodox refugees in Athens

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Extended abstract

The Lausanne Peace Treaty of 1923, which ended the Greek-Turkish war in Asia Minor, called for the first obligatory exchange of populations in world history. It was based exclusively on the criterion of religion. As a result, almost 1.3 million Christian refugees were settled in Greece. This study will examine how memory and Christian belief informed the settlements of the Asia Minor refugees who were settled in Athens after 1922. It will analyse if and why religion was important to the social and spiritual life of these people. It will shed light on how religion informed the memory and produced urban landscapes after their establishment in Greece. Considering memory as a very selective process that produces new space, it will investigate how the Greek city was shaped or how memory was projected in the new urban landscape, not only by its policy-makers through their plans and decisions, but also at the local level through the actions, memories and experiences of the people who were settled there. The focus will be on the interplay between state planners, who sought spaces for the settlement, the Greek-Orthodox church that wanted to incorporate those people as new congregations and the refugees who transformed the space into place. This process of negotiating space between different communities will be concerned with the development of new spatial identities at communal or individual level through religious narratives and beliefs, imaginary and ideological formations, and collective memories.

The research will use the archives of the Leagues of Nations in Geneva, the archives of the Public Record Office in London as well as various Greek archives (the archive of the Centre of Asia Minor Studies in Athens, Venizelos' Archive, etc.).

Keywords: *Athens, Asia Minor refugees, Greek-Orthodox church, religion, worship, urban landscape*

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Challenging Intermittent Approaches in Cities – Impacts on Public Space

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Extended abstract

Along with the political, socio-economic and technological changes that emerged in the new millennium, cities have been under significant changes. Values of temporariness and sharing have appeared in different dimensions of the public life, driving spatial transformations, disrupting conventional relations between space, time, and use. New expressions of housing; co-working spaces; shared mobility; multiple forms of trade; sharing of goods and services; improvised uses in anonymous spaces;... all these urban dynamics that enable and empower temporariness and sharing in the urban spaces -termed Intermittent Practices (IP)- are the scope of the proposed presentation.

The IP are generating significant changes on the urban context and new challenges to policy, planning, and governance. Addressing this, the presentation aims to explore the impacts of the IP, particularly in the field of public space. Conducting focus groups with some of the key stakeholders in those processes, it will be analysed a set of dynamics and initiatives in the last decade in Lisbon, Portugal. The cases explored – most of them small and bottom-up initiatives, carried out by networks of people with similar motivations – demonstrated the ability to promote changes in the places where they occur and to multiply by other contexts, in a domino effect. Thus, it is hypothesized that despite their small initiative character, many of them achieve broader impacts, at an urban level. They also can produce changes at the public space level and in the way people use their cities. It is therefore important to follow their track, to take advantage of its potential and to consider them in future planning, but also to anticipate their risks. This exercise may allow anticipating urban transformations resulting from the development of IP, with the objective of encouraging more flexible architectures and a city that is more adaptable to the contemporary societal and urban dynamics.

Keywords: *innovative planning, intermittent practices, public space, Lisbon*

The University Library and the City Museum of Volos as Cultural Spaces and Public Spaces.

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Abstract

Public spaces have always served as meeting places and communication places in the city, and they are open and constantly evolving. Public spaces, among other things, contribute to improving the quality of life and the social cohesion. Through appropriate design and active community participation, municipalities can create vibrant and accessible public spaces that increase the quality of life and the well-being of residents. The spaces in Volos that are related to public space are the City Museum and the University Library, which essentially plays the role of a Public Library but remains closed after the severe storms Daniel and Elias that hit the city of Volos on September. In this article, we will try to convey the immense value that these two public spaces hold today in the city. To what extent these two spaces and how they have evolved into centers of culture and education for the city. We will emphasize to their contribution on interaction among individuals, the spatial relationships between

internal and external spaces, how they promote the functional relationships that allow interaction, the degrees of freedom provided to allow spontaneous activities, and new arrangements that augment the voice and the presence of often marginalized groups of users/identities.

Citizens enjoy visiting libraries, feeling comfortable and welcomed in these spaces, and they finding a sense of relaxation and pleasure that is necessary to encourage learning, as proven by our research on the University library. On the other hand, the

City Museum is a space that contributes to shaping collective memory and identity; it emits aesthetic, emotional, and intellectual stimuli in difficult times. And it is in constant dialogue with citizens.

Keywords: Public space, library, City Museum, Political, Culture, education, memory identity, democracy.

We were inspired this paper from a piece of our research that focused on public space. In particular, there was a questionnaire that included questions on the University Library of the University of Thessaly and the City Museum as public spaces.

I would like to provide here as an introduction a quote by Alice Garrigoux (1972). “The purpose of a public library is not just to store books and documents, but to provide a public service to all citizens. However, a public service only makes sense if it serves the needs of both, individuals and community, even if those needs are not readily apparent. A policy for public reading will only be achieved if the responsible politicians and administrators, as well as the public, recognize the usefulness of libraries for citizens of all ages and social professions. It would be futile to defend a purpose that does not have social acceptance.

The Library was established and started operating in September 1988, during the first academic year of the University of Thessaly. But it moved to its new facilities in the building of the previous Bank of Athens in 2005, leading to the closure of its branches at the Polytechnic School (Pedio Areos) and the Faculty of Humanities (Papastratou). In the beginning of our research the questions of our questionnaire did not cover in depth what we wanted to extract on the first place, we decided to delve deeper and understand what is happening abroad with libraries and what are the current challenges regarding their use. Thus, we decided to explore how libraries are dealing with the digitization of their collections, restructuring as meeting and community spaces, and developing relationships with

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the local community and students. Through this research, we hope to shed light on the role that public spaces play in contemporary society and suggest possible improvements in their operations. The University Library fills the gap left by many public libraries that should exist in Volos since its audience is not exclusively made up of students, professors, or researchers, but also includes other groups of the population who focus on literature, for example, and can be approached through qualitative research related to this subject. Additionally, the University Library can offer more resources and materials to its users compared to a public library. This can increase knowledge and education in the local community and provide access to information and content that may not be available elsewhere.

However, it is important to maintain a balance between the academic and general audience, so that there continues to be space and resources for all user groups. Also, the University Library should ensure that it provides services and programs that meet the needs and interests of all its users.

The concepts of library, and the museum, as places open to the public is similar to the theoretical concept of Jurgen Habermas for the public sphere. The concept of public sphere proposed by Habermas is a space for critical discussion and is open to all. The public sphere is understood as a domain of social life where public opinion can be formed. (Habermas, 1991, 398). It can be seen as the breeding ground, if you want. Habermas declares several aspects as vital for the public sphere. Mainly it is open to all citizens and constituted in every conversation in which individuals come together to form a public. The principles of public space advocated by Habermas, (1991) such as freedom of speech and assembly, freedom of the press, and the right to participate in decision-making, are upheld in libraries. Through libraries, individuals have the opportunity to voice their opinions, engage in debates, and contribute to societal change. Overall, libraries embody the essence of public space as envisioned by Habermas, serving as inclusive and accessible spaces for intellectual exchange and democratic participation, and is the basis for emancipatory social thinking. The public library serves as an essential neutral space, free from the influence of government pressure and the capitalism. In today's information society, libraries play a crucial role in bridging the information gap created by dominant elites seeking to control knowledge. Acting as agents of change, public libraries have the power to level the playing field and democratize access to information for all individuals. By providing a space for learning, discussion, and free access to information, libraries are key players in promoting an inclusive and equitable society. This marked a true revolution in the world of libraries, which had previously been reserved for an educated elite. With the advent of the Anglo-Saxon-style public library, everyone now had access to knowledge, regardless of their level of education. The aim was to make a wide range of documents available to readers, from fiction books to academic works, as well as newspapers and magazines. Public libraries were thus opened to all audiences, including children, teenagers, adults, and the elderly. This democratization of access to culture and knowledge allowed many people to discover reading, to inform themselves, to entertain themselves, and to educate themselves. It also strengthened social ties by offering citizens a place for exchange and sharing. Thus, the Anglo-Saxon-style public library revolutionized the traditional concept of the library, transforming it into a place open to all, promoting social and cultural inclusion. In the reality, the public library itself is an institution formed by the government, so that in its implementation it certainly cannot be separated from the government's vision and mission. Even in practice, censorship imposed by the government also applies in the library or the museum. Management and information flow are also inseparable from the government. In addition to the government's strong influence in the administration of public libraries, the domination of capitalists in public libraries was inevitable.

Information society is a society that arises as a result of the information age, and is marked by the rapid exchange and consumption of information through various technological platforms such as the internet, social media, and digital devices as our research proves. In the information society, individuals are constantly seeking out new information to stay informed, make decisions, and

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navigate the complex world around them. In an information based society, the way we learn, work, receive healthcare, and interact with our government has been transformed by the digital age and the vast amount of information that is readily available at our fingertips.

In conclusion, the information society represents a new era in which information is the key driver of social, economic, and cultural development. It is essential for individuals to be able to effectively navigate and utilize the vast amount of information that is available in order to thrive in this rapidly evolving society.

In a book on public space, Thierry Paquot, a philosopher specializing in urban issues, emphasizes on the following point: “Public space is a singular term, the plural of which - public spaces - does not correspond to it. Indeed, public space evokes not only the place for political debate, the confrontation of private opinions that advertising strives to make public, but also a democratic practice, a form of communication, circulation of diverse points of view; public spaces, on the other hand, refer to places accessible to the public, frequented by residents, whether they live nearby or not. These are streets and squares, forecourts and boulevards, gardens and parks, beaches and trails [...], allowing for the free movement of everyone, with due respect for accessibility and free access”. And according to Michel Bouvy the public library is neither a luxury service nor a charitable work. It is a public service as useful as the school, (M. Bouvy, 2006).

The qualitative research we conducted to confirm that the theoretical approaches of the experts on libraries and public spaces. And here I present some elements that characterize the library as a public space, focusing more on the theoretical part of the research:

- The library is considered as a space that promotes access to knowledge and information for all citizens, regardless of social and economic status.
- As a public space, the library offers citizens the opportunity to meet, discuss, exchange ideas, and create communities.
- The library functions as a center of culture and education, offering education programs, exhibitions, presentations, and other activities that contribute to the education and information of citizens.
- The library promotes social cohesion and citizen participation in public life, providing spaces for meetings, events, and activities that encourage interaction and the exchange of ideas.
- Libraries are a different kind of space, a place of breathing, of resistance. They should be clearly described as spaces of freedom (of opinion of expression) and therefore as political spaces.
- The library is not utopian because it is a space that does not exist, but it is utopian because it realizes the utopia of gathering. It is utopian because it creates a public space as Jean Pierre Rioux noticed.

Based on the above, the library emerges as an important public space that contributes to the promotion of education, culture, and social cohesion.

The present paper also demonstrates how the library occupies, in the public space, a “strange”, paradoxical place. The library is an eminently political institution, but is not recognized as such, which has unfortunate (scandalous, dramatic) consequences. Throughout Europe, the library is considered by definition as a political and democratic space. The library is a public service necessary for the exercise of democracy. From the charter of Libraries, Article 3 we learn that: “Libraries are public spaces open to everyone, without discrimination based on race, gender, religion, nationality, or socio-economic status. They promote access to culture, information, and knowledge for all individuals. Libraries encourage diversity and pluralism, and ensure that everyone can feel safe and respected in this space”.

Normally, libraries are not virtual, disembodied, abstract, or utopian. On the contrary, they are rooted in space, specifically in the space of the city, in urban space and in political space. As well the University Library of Volos, which has been built in the city center and serves as a focal point not

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only for the students but also for the entire community. Because it's a basic cultural space that must be harmoniously integrated into the urban organization and thus contribute, in intimate relation with other organs of cultural life, educational action, social action, and also to ensure the deep breathing of the city. And now it remains closed and cannot play her role due to the severe storm that hit the city in early September '23.

The fact that the library is located in a public building strengthens the political character of its activities. Because it is the "common house" as Jean-Pierre Rioux (1997) had wrote, a place where the community is virtually united, where it can gather. A place of unity, unity between generations, between educational or social status, between users, expectations, curiosities, or needs... The physical openness of the library building is a symbolic openness to the entire community - even if we are aware of the boundaries (socio-cultural) - of such a pursuit.

Another objective, also political, is assigned to libraries: it is education. In a republic founded on the education of citizens (and where school is a political passion, the only one, or the last one, capable of bringing hundreds of thousands of people into the streets), education is an eminently political issue. The claimed proximity to the public education service is therefore not innocent: it is an attempt to legitimize the library on the same level as school.

Many French architects as Laurent Baudouin architect of the library of Poitiers, or Gérard Thibault, architect of the Saint-Herblain media center, or Pierre Riboulet, architect of the Limoges library consider the library as a common space with multiple culture representations. However, Pierre Riboulet says: "In Limoges, I dreamed of the library as a single volume. It is perhaps, because, always all of us have the syndrome of the National: we always think the library as a big beautiful room, a unique room in a way, in the sense that what we need most today in the society we live in is this search, this meeting of unity, because we are in such a fragmented, dispersed, separated universe." Or they think the library as a community of books.

It's the same thing for some of the American's architects and they insist that if they reimagining the library as a dynamic public sphere institution, librarians can work towards preserving and enhancing the vital role that libraries play in promoting education, democracy, and community engagement. And they criticized US education for sacrificing education for democracy on the altar of (market) economic instrumentality.

The process of creation of modern libraries is based on a shared vision of the media library as a place of culture, education, social connection, and living together. It is therefore necessary to go beyond the simple concept of a library to think of a multidisciplinary and multifaceted space that can adapt to the needs and expectations of the local population. This also implies rethinking the traditional missions of the library and innovating by offering new services and activities related to contemporary cultural practices.

The symbolic construction of the library is also built through its architectural dimension and her interior design. The important is to create a welcoming space, open to its environment, which promoting the meeting and the exchange between users. Reflecting on the organization of spaces, highlighting collections, accessibility, and comfort are essential to guarantee a quality reading experience.

Finally, the media library cannot be dissociated from its territory and its inhabitants. It must be a place rooted in local life, in symbiosis with the cultural and social dynamics that surround it. Therefore, it is important to involve different local actors from the start in defining the project and to create lasting partnerships with institutions, associations, and cultural organizations in the territory.

In conclusion, creating a library is an opportunity to deeply rethink the public reading project, reinventing it in the light of contemporary issues and local specificities. This requires a participatory, collaborative, and innovative approach, highlighting the diversity of audiences, practices, and cultural discourses.

The municipality of Volos, in which we were working, suffered, like many towns in Greece, from the absence of public spaces and places suitable for hosting collective activities, favorable on the development of social cohesion. If we believe on the values of equality and solidarity, we want our city to remain a space of emancipation and connection between their residents rather than stay indifferent and confinements. Therefore, we want the library to restoring social connections, promoting access to culture for all, and leveling the social differences. Additionally, the library should actively collaborate with local organizations and institutions to address systemic inequalities and promote social justice. The University library is located in a central neighborhood where there were public services, as the Town Hall, we also aimed to open up to the city and animate it by attracting residents from the entire city.

On the other hand, the recently museum of the city The City Museum of Volos is housed in the three-story building of the former Papantou tobacco warehouse, on 17 Feron Street, in Palaios Volos. On the ground floor, there are spaces for temporary exhibitions and events, a shop, and a reading room. Below the exhibition hall, sections of water pipes from the middle Byzantine period (6th-7th centuries AD) are preserved and visible to visitors. It opened in December 2014 with the inauguration of the major temporary exhibition “Volos-Nea Ionia: so close, so far away”, dedicated to the 90 years since the establishment of the refugee settlement in Nea Ionia.

In the early 1990s, the need for the creation of the Volos City Museum began to mature and be adopted by the local community and municipality. From 1989 to 2000, the Municipality of Volos acquired the ex Papantou tobacco warehouse and three other buildings in the construction square OT 49, which was designated in 1997 as the space for the construction and operation of the Volos City Museum.

The Papantou tobacco warehouse was built around 1920 in an old district of the city, on which the city changes more slowly. Like other tobacco warehouses in the city, it housed refugees from Asia Minor until the establishment of the Settlement. There are here memories that affect the collectivity. The renovation of the building and the redevelopment of the surrounding area began in 2006 with funding from the Operational Programme of Thessaly and the Municipality of Volos. The study and supervision of the project were carried out by the Technical Services Directorate of the Municipality of Volos.

The restoration of the eastern part of the castle fortification, located in the courtyard area of the Museum, was carried out by the 7th Ephorate of Byzantine Antiquities, as part of the project “Conservation and restoration of the Castle of Palea Dimos Volos”. The project, with a total budget of 1.000.000 euros, was included in the Operational Program “Thessaly - Sterea Ellada - Epirus 2007 – 2013” and included works for stabilization, maintenance, restoration, and landscaping along the western, northern, and eastern sides of the defensive wall. In the museum courtyard, the wall was maintained along a total length of approximately 40m. The works carried out, apart from the obvious goal of stabilizing the antiquities, aimed to make the area accessible and visitor-friendly. The project for the conservation and restoration of the Castle of Palea Dimos Volos lasted from spring 2011 to October 2014.

The museum includes objects, photographs, and documents of all kinds and forms, related to the history and character of the city of Volos and the wider area of Magnesia and Thessaly. Chronologically, it spans from the incorporation of Volos into the Greek state (1881) to the present day.

A separate section is the digital collection, which includes audio recordings of events since 1991, the archive of the Municipal Television of Volos (1996-1998), interviews, photographs, videos, and other audio-visual material.

Following an agreement with the Social Anthropology sector of the Department of Architecture of the University of Thessaly, the City Museum of Volos has access to all the recordings gathered and being gathered by the Oral History bank of the Oral History Laboratory of the department. We may say that museums play a crucial role in the construction of social memory by preserving and

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presenting historical artifacts and stories, and this is the role of the city museum of Volos. It helps the society to remember her past, learn from it, and shape her identity. This museum also contributes to the reproduction of culture, traditions, and values that are important to a particular society. Furthermore, the museum serves as symbol of the city's cultural richness and heritage. Over time, the museum can become an iconic landmark that are closely associated with the city's identity. In conclusion, museums are not only repositories of historical artifacts but also powerful agents in shaping social memory and culture. Exactly as the two great semioticians Yuri Lotman and Boris Uspensky define culture itself as the memory of a community. They have the ability to preserve, interpret, and exhibit the past, thus contributing to the collective memory of societies and cities. Lefebvre in *the production of space* (1991) called these display spaces representations of space, and reasoned that such structures are spaces designed by artists, planners, urbanists, and technocrats who both dissolve and organize societal norms. These spaces, built by certain subjects, form their objects by becoming subjects over time. One of the main reasons why this museum is so important, from a sociological perspective, is that it is essential in preserving and transmitting cultural memories. Museums serve as important repositories of cultural memory, preserving and interpreting objects and artifacts that tell the stories of our past. Through exhibitions and displays, museums bring history to life and allow visitors to engage with the past in a tangible way. The reconstruction of memory in museums involves not only the physical preservation of objects, but also the interpretation and presentation of these objects in a way that helps visitors understand their significance and historical context. By providing a space for reflection and learning, museums play a crucial role in shaping our understanding of the past and contributing to the collective memory of society. Overall, museums are essential institutions for the reconstruction of memory, serving as guardians of our cultural heritage and offering opportunities for reflection, learning, and dialogue. Through their collections and exhibitions, museums help us connect with the past, understand our present, and shape our future.

The museum cluster transforms the concept of the public sphere and clearly demonstrates the shift from public institutions to public space. In this societal transformation, the architectural aspect of the museum becomes crucial. As illustrated in the blueprints, this facet of the museum project is depicted as the gateway from the city to the museum, as the integration of the museum into the city, and as the coalescing and integration of the surroundings, leading to the creation of a larger plan for the “city of museums” that fosters unity, identity, shape, and organization within the city.

These expressions of the architectural aspect of the museum converge in the public space, which connects the museums within the cluster and the cluster with its urban surroundings. As such, the public space plays a critical role as a mediator between the museums and the city, as well as between diverse audiences and functions, areas and movements, between speed and leisure, exploration and convenience, tradition and innovation, entertainment and education, commercialism and intangibles, order and spontaneity, between the idealized city and the practical city we inhabit.

This highlights the immense importance of the linkages between the elements of the museum system and their connections with other urban systems, emphasizing the significance of accessibility, movement, connections, flows, and networks that they establish. Thus, through the museum cluster, I demonstrate the new requirements and expectations for public spaces in the modern era, as a multi-dimensional showcase, interactive and educational area, a space for engagement with heritage and the urban environment.

As the library the museum claims a role in the construction of the public space, as a democratic place for debate and encounter with otherness, but we required to distinguish it from physical public spaces. The reality we found ourselves confronted with is that the confusion between public place and public space, the difficulty in identifying the specific function and rules of the place, led to difficulties in cohabitation of different publics and incompatible appropriations with the desired mix of uses. The research led us to think that a public place revolves around a function, which determines its reception modalities and rules of use. It clarified to us that we do not welcome the public “as is”, based merely

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on the notion of public service. This reception and connection are based on a specific public service mission, a specific service offer, but also on the perception of the establishment by the public and their partners.

The City Museum of Volos is an important public space in the city, where visitors can discover the history and culture of the area. Through the various exhibitions and activities held at the museum, people come into contact with the local heritage and learn about the past of the region.

The representation of history and interaction with the public at the City Museum of Volos are points of memory that preserve the tradition and identity of the area. Through exhibitions, events, and educational activities, visitors have the opportunity to explore the past and participate in an interactive experience that empowers and inspires them.

By highlighting the history and culture of the area through the City Museum of Volos, a space is created that connects the past with the present and keeps alive the memory of our ancestors for the future generations. Thus, the museum becomes an important part of the local community and contributes to the preservation and promotion of the identity and heritage of the region. The City Museum had revitalized a neighborhood that wasn't so rich and helped to the absence of public spaces and places to accommodate collective activities, and even dedicated public services for social, educational, and other policy needs. Every collective memory unfolds within a spatial framework. Space is where a specific moment becomes tangible, and it has always had a unique connection with experiences. And space holds condensed time in "its thousands of honeycombs" as says Bachelard, (20, p. 39), holds memories and create unites, limits, and gives identity to society and the individual, is finally sacred.

Today, the City Museum serves as a vital hub for the community, offering a place where residents can come together to connect with their shared history and culture. Through its exhibits, programs, and events, the museum actively engages with visitors, encouraging them to reflect on their personal experiences and consider their place within the larger community.

By showcasing artifacts, artworks, and stories that highlight the city's past, present, and future, the City Museum helps to preserve and celebrate the local heritage. It plays a critical role in transmitting knowledge and understanding from one generation to the next, ensuring that important stories and traditions are not lost over time.

Furthermore, the museum serves as a venue for dialogue and exchange, providing a space for citizens to come together to discuss and explore important issues facing the community. Through its programming, the museum fosters a sense of belonging and shared identity among residents, encouraging them to actively participate in shaping the future of their city.

In times of crisis or uncertainty, the City Museum serves as an inspiration of hope and resilience, offering a place of respite and inspiration for those who seek support and connection. By providing aesthetic, emotional, and intellectual stimuli, the museum helps to nourish the spirit and stimulate creativity, even in the face of adversity.

Ultimately, the City Museum stands as a testament to the power of culture and heritage in shaping individual and collective identity. By fostering a sense of pride and unity among citizens, the museum plays a vital role in strengthening the social fabric of the city and empowering its residents to build a more vibrant and inclusive community.

As a places of culture and access to knowledge, both the library and the museum, acts as a bridge between memory and projection towards the future. Through its resources and the mediation work that accompanies them, it allows individuals to connect with their personal and collective history, to access in their cultural roots. They also provide sources of inspiration, projection towards elsewhere, or attraction towards lives other than our own, which helps to develop the ability to look ahead, to imagine a future. By weaving this link between the past and the future, the media library contributes to the city and its inhabitants being able to reclaim their memory and collectively build their future. They help both to build the historicity of the city.

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Green Infrastructure for Urban Sustainability: Case Study in Altstetten-Albisrieden, Zurich

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Extended abstract

As cities grapple with the challenges of burgeoning populations and limited space, the role of greenery in fostering environmental balance, community well-being, and sustainable urban development becomes increasingly imperative. It underscores the need for approaches that harmonise the growing demands for built spaces to enhance the natural environment in urban areas.

This study focuses on the significant factors of urban greenery in terms of social equity and natural habitat fragmentation, using Altstetten-Albisrieden, Zurich, as a real case. It aims to offer insights for optimising architectural design and urban planning in the process of urban densification and transformation.

The study adopts a mixed-method approach to examine the greenery in Altstetten and Albisrieden. It employs analytical tools, such as distance matrices and nearest neighbourhoods in QGIS, to measure the distribution and allocation of green space throughout the district. Associated with the demographic information of the district, the study further discusses social justice in relation to green space accessibility and suggests potential solutions to improve the public green spaces in the district. The study used a 30-meter hexagon grid to abstract the situation of natural habitat fragmentation in Altstetten-Albisrieden. The ratio between greenery volume calculated with LAI and development intensity consisting of building footprints, grey surfaces, and streets within a hexagon unit to gauge the spatial resistance of the unit. The relevant geographic data and information are sourced from the open-source data of the City of Zurich. The visualisation of the spatial resistance indicates the fragmentation of green spaces in the district and some possible paths and corridors for the natural habitats crossing the district.

According to the study, gaining a thorough understanding of the organisational structure of urban areas is crucial in promoting social equity in public green spaces. Additionally, the research emphasises the pivotal role that building types play in mitigating habitat fragmentation in cities. Structures with ample open spaces and rooftop green spaces have the potential to increase the permeability of green spaces between land parcels, allowing animal species to move more freely between nearby populations. This approach is a valuable tool in mitigating the effects of urban densification and preserving natural habitats.

Keywords: *greenery provision, public green spaces, densification, urban transformation, accessibility, Altstetten-Albisrieden, Zurich*

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Schoolyards as Urban Public Spaces: Investigating Opportunities and Challenges in Greek Cities

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Abstract

Public spaces are crucial elements of urban environments, contributing to social interaction, community engagement, and cultural exchange. This paper presents a number of various aspects of transforming schoolyards into vibrant public spaces, in the context of Greek cities, examining the potential benefits they offer and the challenges that need to be addressed.

Schoolyards are usually spaces with restricted access, where only educational activities take place during school hours. The typical image of a school unit in a Greek city, is that of a massive building inside an enclosed space, protected from the potentially dangerous external environment, both during school hours and afterwards. In the afternoon, locked and inaccessible schoolyards seem to be once again shielded from an unknown danger of the public space, working as urban voids inside the city. This contradicts the concept of continuity of urban space and appears to create a fragmented public space. According to the Greek School Buildings Organization, since the late 1980s until today, the expansion of the social environment of the school is encouraged, as there is provision for spaces open to the community within the school environment, such as the multipurpose room, the courtyard area, the library, the event hall. This could be an aspect of inclusive urbanism; however, rarely do we see examples of such open schools in the Greek urban environment.

Another dimension to consider is the focus of contemporary education, which is directed towards fluid and interrelated networks within the urban environment. The architectural design of school buildings and their open space must accommodate a shifting spatial context, fostering an environment that promotes dialogue and social interaction among students.

Urban centers face the challenge of lively public spaces, accessible by everyone. In this framework, with their central locations and existing infrastructure, schools have the potential to serve as hubs for social activities and cultural events, balancing the needs of students, teachers, and administrators with those of the broader community. Several successful examples of school units functioning as public spaces exist within European cities. By embracing innovative design solutions, participatory planning approaches, and collaborative governance models, Greek cities could unlock various opportunities for schoolyards as vibrant public spaces, contributing to the quality of urban life.

Keywords: *schoolyards; urban public space; Greek cities; inclusive urbanism; contemporary education*

1. INTRODUCTION

A public schoolyard typically operates six to eight hours daily during the week. During the remaining hours, everyone leaves the area, and the yard becomes inaccessible, a strictly delineated and isolated empty space around a public building. Just as with urban voids in a city, schoolyards, during the afternoons or evenings, when their use is restricted, either cause insecurity and discomfort to pedestrians or, at best, indifference, and a sense that the space cannot be utilized or exploited by the user. Those who use it during prohibited hours enter illegally, often leading to misuse or damage. Essentially, these spaces are not protected from vandalism, as many believe, simply by placing a hard

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boundary toward the public space. On the contrary, this exclusion strengthens the indifference of the residents, creating an unapproachable environment for them, to which they have no access, or any obligation to look after. This article studies schoolyards as functional urban voids and examines their relationship with the surrounding urban fabric. The typical hard boundary of the yard spaces, which most often is implemented with a fence or an enclosure, emphasizes the discontinuity in the urban fabric, preventing access to this space. Various approaches are explored to integrate schoolyards into the Greek urban fabric, transforming them into open spaces for community interaction.

2. THE OUTDOOR SPACES OF A CITY - THE CASE OF SCHOOLYARDS

The outdoor spaces of a city are divided into private and public. Private outdoor spaces are either highly private, such as private courtyards, gardens, and balconies, or private spaces that function as communal areas, such as an undeveloped plot of land, the communal courtyard of a building, or its rooftop. Many of these spaces have access for a specific group of people, such as the residents of an apartment building, while entry is prohibited for others. Public outdoor spaces are distinguished between those that are freely accessible to everyone, such as public gardens, squares, and streets, and those spaces or structures where entry is not permitted to everyone but to a group of people with common characteristics. For example, in many countries, adults are not allowed to enter playgrounds without accompanying children. Not only this, but in some playgrounds, only children of a specific age group are allowed to entry. Similarly, public schoolyards are considered as public open spaces, where entry is permitted only to students and teachers, and only during specific hours of the day. In this category of public outdoor spaces, there is always a physical boundary separating them from the rest of the public space to define the area of partial accessibility.

The urban voids of a city are similarly being categorized. We are accustomed to defining an urban void as an empty public or private space located within the urban fabric, without any use, and showing signs of abandonment. Typically, these spaces have three characteristics: A) They have no role in the urban fabric, B) They are not easily exploitable due to deficiencies, C) They have many potential uses.

L. Lerup [1] defines the urban void as a residual, forgotten, and seemingly useless space in the city. I. de Solà-Morales Rubió [2] calls these voids “terrain vague”, marginal spaces without a clear role, with a potential to become something, “places of possibility”. P. Eisenman [3] introduces the term “urban interstitial space”, a transitional space characterized by arbitrariness, randomness, and indeterminate use. According to D. Polychronopoulos, who for the first time gives a positive connotation to the term "void," these spaces are "containers waiting for content" [4]. Thus, we can recognize in an urban fabric, “private voids” (open spaces within building blocks, rooftops of apartment buildings, undeveloped plots of land), as well as “public voids” (unused squares, abandoned parks or public buildings, and adjacent spaces of the road network). According to architect Andrea Rojas [5], there are three categories of urban voids:

1. Phenomenological voids (undeveloped spaces resulting from a disaster or natural phenomenon).
2. Functional voids (change or absence of use in the urban fabric).
3. Geographic voids (inaccessible places within the urban fabric primarily created due to their natural form).

The schoolyard belongs to the category of public outdoor spaces with restricted access. It serves as a common area for students, strictly delineated, within which outdoor educational activities take place during school hours. The image of a massive building inside an enclosed space, protected from the potentially dangerous external environment, both during school hours and afterwards, is very typical in Greece. In the afternoon, locked and inaccessible schoolyards seem to be once again shielded from an unknown danger of the public space, working as functional voids inside the city. This opposes the concept of continuity in urban space and appears to divide public space into accessible and forbidden

areas [6]. It is paradoxical that this prohibition extends even to the school's users during the afternoon hours.

3. THE BOUNDARIES OF A SCHOOLYARD

The boundary of a schoolyard is sometimes defined by hard materials with no visual contact with the surrounding public space and other times by perforated or light materials, and occasionally it is even rudimentary. This form can lead either to isolation and introversion or to connection with the city and extroversion. The relationship between a schoolyard and the urban landscape depends a lot on the form and materiality of this boundary. This connection (or this no-connection) with the city affects the pedagogical and social aspects of the educational process for the students. A boundary isolates the school environment from the rest of the public space. Simultaneously, it defines the points of entry and exit, making the school environment accessible when desired. The fencing is the primary characteristic of an enclosed yard, forming clear entrances and exits and reflecting an inward focus. This barrier hinders any relationship between the school building and the urban space.

The discontinuity of public spaces is not limited to schoolyards but also extends to many outdoor areas of public buildings. Public outdoor spaces are intended to be open communal spaces, but fences and closed entrances often discourage, or even deter, pedestrians. "The public space is the ground where the interests and goals of many different social groups meet. The more fragmented a society is, the more dysfunctional its public space becomes", as E. Filippopoulou states [7]. It is a fact that the contemporary urban space in most Greek cities is characterized by a lack of open spaces and greenery.

In relation to the city, the fence represents a direct vertical boundary that divides the public space into accessible and inaccessible areas, reflecting dualities such as inside-outside, introspection-extroversion, and order-chaos. As Kahn notes, "the fence symbolizes the function of a refuge" [8]. While there is enclosure (inside), there is simultaneously an escape (outside) from the external environment, which, in this case, is the city. The less someone can see and hear from the open public space, the greater their distance from the social life of the city. Conversely, it creates a negative sense of isolation for the passerby whose access to this space is restricted, especially when architectural elements such as difficult access, prominent fencing, or solid facades dominate. In many cases, there is not even visual contact.

The citizen's ability to access public space can be not only physical but also visual and psychological/symbolic [9]. This multifaceted inaccessibility reinforces the separation between the school and its urban context, emphasizing a disconnect, that affects both the students within and the community outside.

From a different perspective, Hardin's approach [10] argues that if access to common resources is unrestricted for everyone, without limitations, then users exploit these resources recklessly until they are depleted. Thus, the only way to use these resources properly is to use them in moderation, which is achieved through their regulation. In recent decades, it is a fact that rigid boundaries constantly expand [11]. In "gated communities," mainly found in America, the entire community area is isolated from the rest of the world with tall fences, and access to the public space of these communities is only allowed to the residents of the area. "Architectural elements such as inconspicuous or inaccessible entrances, solid facades, or iron fence openings do not attract the potential user to approach the space" [7]. Even aesthetically pleasing buildings and spaces can create a negative sense of distance if their architectural design is characterized by oversized scale or excessive monumentality.

According to Hardt and Negri, the concept of "commons" extends beyond traditional notions of community, which may limit individual freedom, and emphasizes open, free communication among singularities in a common space that emerges through collaborative social processes of production [12]. An emerging category of "commons" and less studied is the so-called "urban commons", which can serve as a means for both redefining production processes and managing public spaces [13]. Hardt

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and Negri propose viewing the city as a producer of collective resources, emphasizing that cities serve as vibrant nodes where people meet, share resources, communicate, and exchange goods and ideas [12]. From this perspective, the city itself becomes a dynamic common ground for interaction and collaboration, encouraging participatory practices and community involvement, aiming to empower citizens and promote social cohesion.

A lot of researchers refer nowadays to inclusive design, which involves creating products, services, and environments that are accessible to as many people as possible, regardless of their age or ability. This concept is also known as universal design or design for all. It represents a shift in mindset towards a more inclusive approach to design [14]. Furthermore, inclusive urbanism is characterized by the integration of different social groups, providing equal opportunities for participation [15]. An accessible schoolyard open to the public undoubtedly contributes to this social aspect of design. Neal examined these parameters of the concept of public space: 1. Public space is not limited to specific physical areas but can refer to any physical or virtual space that allows interaction between individuals or groups. 2. Public spaces must be open and accessible to everyone, without material or immaterial barriers. 3. Public spaces should be available and relevant to all members of society. 4. The actual ability to use and stay in public spaces may be limited or hindered due to deficiencies in design, such as lack or inappropriate placement of seating, lack or inappropriate placement of greenery, unsuitable construction or paving materials, design complexity and inflexibility, as well as technical issues such as inadequate lighting or lack thereof, and even explicit or written prohibitions [13].

Until recently, the city served as a place for socialization, strolling, and meeting new people. Citizens enjoyed exploring the streets, squares, and other public spaces. The benefits of spending time in outdoor spaces have been widely recognized, with research showing that time spent in natural environments can have significant psychological, cognitive, social, and spiritual benefits. It has been found that the presence of greenery in public spaces encourages their use and promotes social interaction, contributing to social cohesion [16]. However, in recent years, the situation seems to have changed. The city has become increasingly hostile, and people tend to move from one private space to another using private means of transportation, mainly cars.

4. CONTEMPORARY SCHOOL ARCHITECTURE

The orientation of contemporary education is directed towards fluid and interconnected networks with the urban environment. According to K. Tsoukala [17], architectural design now needs to support a changing spatial framework with a strong communicative character, a school environment that encourages dialogue and social interaction. In the design of alternative models in educational buildings in Europe in recent decades, we encounter a fluid spatiality, where architects seem to be interested not so much in form but in a communicative atmosphere that promotes contact and togetherness (as seen in the school buildings of Hertzberger, Behnisch, Miralles) [31, 32, 33]. However, in most cases, the schoolyard remains strictly delineated, an autonomous space with no connection to the socio-spatial environment and the urban fabric [17].



Figures 1, 2. Herman Hertzberger School Architecture, Central Halls of schools (https://publik.tuwien.ac.at/files/publik_295229.pdf)

New models of interaction are emerging in both outdoor and indoor environments, integrating school outdoor spaces with the urban landscape. Despite protective measures against vandalism, some architects strive to connect educational spaces with urban public areas through various means, such as widening sidewalks to extend into building interiors, or by opening specific sections of the schoolyard to the community. Such example is the European School Copenhagen by NORD Architects and Vilhelm Lauritzen Architects in 2018 [18].

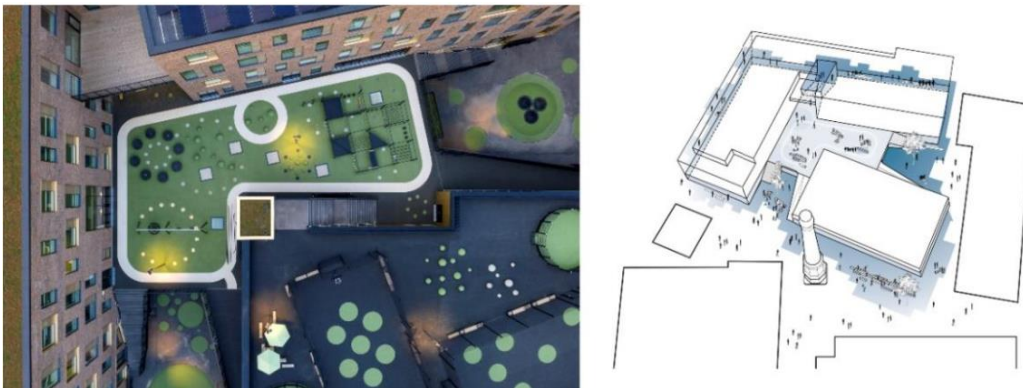


Figure 3. NORD Architects, Vilhelm Lauritzen Architects - European School Copenhagen (2018), school outdoor spaces as city public space (NORD Architects private archive)

The case of Primary school "Fran Krsto Frankopan", which is located on the north-eastern edge of the historic core of the city of Krk, utilizes the city's existing features – like streets, plazas, and boundary walls – to engage and enhance the surrounding urban environment. When the school and the city wall reconstructed, public spaces were converted into private spaces and vice versa. This approach eliminated the boundaries between public areas and school grounds, effectively integrating the school into the urban fabric [18].



Figure 4. “Fran Krsto Frankopan” school and Turato Architecture, Sports hall, Krk a) Public Street space as school space, b) school yard as city wall activator (Turato Architecture private archive)

In Greece, the approved Building Program guidelines mention the necessity of fencing, especially for kindergartens, and the requirement to create two entrances to the schoolyard. According to Greek Organization of School Buildings [19], from the late 1980s to the present, there has been an encouragement to expand the social environment of the school by providing spaces within the school that are open to the community. The multi-purpose hall, the courtyard with a theater, the library, and the event hall are some of the spaces within the school environment recommended by the Ministry to be used by the community.

A characteristic example of implementing these proposals is the 5th High School in Ilioupoli, Attica. Taking advantage of the new building program guidelines that provided for spaces within the school to be open to the community, the building designed by T. and D. Biris (construction completed: 1988) included a multi-purpose hall, library, gym, and an outdoor amphitheater, so that it could function for the entire community independently of the school during free hours [20].

Nevertheless, most active public schools in Greece show a strong introversion because of the design of the building, the schoolyard and their boundary in relation to the public street. The most particular example is the school environment of Grava, in Athens. According to the records of the Organization of School Buildings, the architectural design of Grava resulted from a competition in 1970 and its construction began in 1973 [21]. The winning architects were the modernists K. Papaioannou, K. Fines, and N. Chatzitheodorou, who had designed several public buildings during that period. The strict approach of the competition era aimed for a school that was introverted, looking only inward, towards its own spaces, ignoring and excluding the rapidly developing city around it. The schools were studied and constructed based on criteria such as orientation, sunlight, spacious courtyards, and ease of construction. Designed as a grid of successive rectangular buildings alternating with large outdoor spaces, it was clear and rational but introverted and strict, resembling a walled fortress. However, the basic principles for the operation of the vast complex were not upheld. Passages were 'cut off,' the corridors were isolated from the courtyards, and the school complex was filled with railings. In fact, since the late 1970s, the uses of the common areas have been modified, the courtyards have been isolated, and the accesses have been cut off to accommodate the need for mass housing for thousands of students, which at one point reached 14,000. As a result, the complex became fragmented, an enclosed space hostile to students. The school complex can still house up to 24 schools, which do not communicate with each other, nor with the immediate environment [21].



Figure 5. Lyceum of Ilioupoli – T. and D. Biris (<https://tassos.biris-tsiraki-architects.com>)

Figure 6. Public schools of Grava (<https://www.protothema.gr/greecearticle/867819/kleisto-aurio-to-sholiko-sugrotima-gravas>)

5. OPEN SCHOOLS IN GREECE

The last decade, many attempts have been made in all over the world to open the schoolyards to the local community, outside the school timetable and during the weekends. Such attempts are the program “School Playgrounds Open to the Neighbourhood” [22], developed in Barcelona, the OASIS project in Paris [23], the “Community Schoolyard” program in the United States [24]. All examples are trying to convert underused, paved schoolyards into green spaces for the community and turn them into local hubs. This would provide many residents with nearby access to parks and open areas. However, while some of these school programs have focused on greening their schoolyards and others have made their yards accessible to the public outside of school hours, very few have done both [25]. This dual approach is essential for the effective implementation of multiple-use spaces.

During the years of 2015-2019, an innovative program called “Open schools” took place in Athens. The program was established thanks to a founding donation from the Stavros Niarchos Foundation, coordinated by the Athens Partnership, and supported by the actions of the Ioannis S. Latsis Foundation. The ‘Open Schools’ program collaborated with more than 100 organizations and individuals to implement the actions [26]. Few years later, the “Open Schools in the Neighborhood” program was an initiative of the Directorate of Education and Sports of the Municipality of Thessaloniki, in collaboration with Creativity Platform (NGO), which coordinates the program, and with the exclusive donor being the Stavros Niarchos Foundation [27].



Figures 7, 8. Open schools in Athens (<https://athensopenschools.gr/>)

These pilot and innovative projects aimed to open up the school, the neighborhood, and the municipality to issues of pedagogy, creative engagement, empowerment, and support for children, parents, and citizens. The school was highlighted as a core element for improving the quality of life in each neighborhood, strengthening the concept of "community", while it served as a common space for meeting, collaboration, play, sports, and entertainment. The programs developed thematic activities and intercultural meetings after the school hours, when all typical schoolyards are locked down. Workshops on multilingualism, child rights awareness, sports and music workshops were some of the activities for all the local community.

From the evaluation forms, the great success of the program is evident [28]. By carefully examining the statistical data on the number of beneficiaries per action category at each school, we find out that the upgraded area of Plaka holds the first place with the most beneficiaries, followed by the downgraded area of Vathis Square. This demonstrates the multifaceted and highly democratic nature of the program, which can encompass under its umbrella a wide range of people with different economic, social, and cultural criteria. Reports indicate that neighborhood children and their parents have found a new space for expression and creativity, with more than 300 people attending some Open Schools on weekends. The success of the program has nationwide impact, as other municipalities in Greece are showing interest in opening their schools as well. Holding creative and alternative activities in schoolyards during the afternoons enriches children's daily lives, enhances neighborhood socialization, and offers democratic opportunities for continuing education and lifelong learning.

6. CONCLUSION

Since then, many local authorities open the schoolyards for the community in different Greek cities, especially in summer, which usually serve as play areas for children. Nevertheless, these attempts do not cope with any change in the design of the schoolyard, which is usually a large, fenced space paved with cement, without greenery, or any urban spatial elements.

There is a significant reason for incorporating schoolyards into the urban fabric, and this is the problem of lacking communal spaces and green areas. This issue is mainly evident in dense urban areas, such as Greek cities. In these cases, the use of schoolyards as open public outdoor spaces integrated into the broader green and pathway network of the urban fabric is more necessary than ever. Furthermore, the schoolyard of Greek schools presents significant deficiencies in its design. The dominant spatial design creates a lack of connection with public space, the urban fabric, and nature.

It prevents students from participating in various activities, while being characterized by inwardness and fragmentation [6].

Both from a spatial and pedagogical perspective, the design of the school environment, particularly the enclosed schoolyard, hinders the communication between the school and the city on an urban and educational level. This constitutes a significant issue with pedagogical, architectural, and social dimensions. The challenge for a school complex is to be open to the public environment without losing the original coherence of its building structure. The issue is particularly complex and directly related to educational, social, and economic issues, but it could be a way for people, to become visible and claim their space within cities characterized by isolation and exclusion. Addressing such complex issues requires the collaboration of residents, public authorities, architects, urban planners, and educators within a framework of participatory processes and pilot programs. Organized planning of all public outdoor spaces within an urban zone, adequate lighting during the night, visual contact to provide a sense of security, shading and planting, in continuity with the local urban pathways, maintaining schoolyard boundaries to protect students during school hours, designed with negotiation and permeability, and finally using the space under conditions set by local residents during free hours, are some of the aspects that need to be addressed in order to include schoolyards in a unified urban network, citizen-friendly and respectful of students.

To conclude, schoolyards in the Greek context are predictable public areas with some common characteristics. If they are treated as "functional urban voids," they could be transformed into open interaction spaces for the entire community and add to the inclusive urbanism. In their planning, primary consideration should be given to the basic use of the schoolyard, which intertwines with the urban fabric and "contributes to the transformation of an inward-looking and self-referential material framework into an 'open' space permeated by the public life of the city" (K. Tsoukala) [29].

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The urban identity during the star architects era and after

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Abstract

In the period from 1990 to 2010, star architects played a significant role in architectural communication. They managed to capture the spotlight on their designs, both on architectural level and within society. While architects have always enjoyed varying degrees of popularity, the influence of star architects during this period was particularly profound, shaping cities and directly influencing the identity of cities.

This period coincided with the emergence and development of technology - the internet, and later social media, which made architectural imagery more immediate, powerful, and influential. As a result, architecture became a discipline with rapidly flowing images worldwide. The end of this period coincided with the international financial crisis of 2007, which primarily affected "western societies". But what happened during this period? What are the lessons be learned from this?

The architecture produced during this period, especially architectural schemes created by major firms of star architects, redefined and reshaped the city's image. Flagship buildings generated image-landmarks within the cityscape, redefining skyline as a tourism attraction. The rise of tourism over these decades and the strengthening of tourism development had a prominent influence on cities. The term 'City branding' was introduced by the architectural brands of the time, defining the city's identity. Buildings undertook a predominant role in comparison (for example) to public open spaces. In enhancing the city's identity, photographs of flagship buildings, cut-off from their surrounding milieu, had a significant role, often overshadowing their relationship with the surrounding built environment.

In the realm of city branding, star architects play a pivotal role. Their iconic design-schemes became synonymous with urban identity, shaping the city's image and attracting tourism. Through innovative and 'photogenic' architecture, they contributed in defining the city's character, fostering its prominence on the global stage.

The aim of this paper is to investigate how the city's identity, as influenced by star architects, was shaped during the period 1990-2010 and how it changed afterwards when the influence of star architects was diminished. It's worth noting that our observations are spatially confined to the so-called "western world," roughly comprising North America and Europe. This is because the impact of the 2007 financial crisis led to a drastic reduction in architectural production, especially of star architects, in this region. However, this doesn't imply that the phenomenon disappeared entirely; rather, it shifted geographically. Architectural-schemes currently produced in United Arab Emirates and Asian regions with fast growing economies such as Hong Kong, Singapore, still exhibit these characteristics - i.e., particularly 'photogenic', dynamic, and solitary flagship buildings, cut-off from their surroundings. It's an architectural approach generating images of tourism attraction, highlighting the dynamics and prominence of these countries in the new era.

Keywords: city branding; urban identity; global influence; spatial dynamics; star architects

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1. INTRODUCTION

The period spanning from the decade of 1990 to the end of 2010 witnessed a very important phenomenon in the world of architecture—the rise of star architects. These designers not only reshaped the skyline of the contemporary cities but also left a lasting mark on the fabric of urban life (Jencks, 2005) [1]. This period coincided with substantial technological improvements, such as the birth and expansion of the internet and the social media, which has as a result the capacity of the architectural imaginary to reach broader audience and to have bigger impact, not only, on the architectural community, but also on the general public. Consequently, architecture transcended its previous role and became an impactful tool for shaping perceptions, identities, and even local economies.

At this point, it is worth mentioning that the profile of the star architect existed in the past, but it never had the importance that it later acquired. There were architects in the past who had a significant influence on the community interested for the culture and some of them even on the broader society, but they never had the decisive role that we will encounter later. Architects, during the period we are discussing, through their creative work, gained the ability to express ideas, strategies, opinions, and proposals that could easily and quickly reach the broader public through new technology and acquire greater communicative power (Sudjic, 2005) [2]. These architects become known to the wider public like actors, writers, and other artistic personalities who, through their words and proposals, can influence the cultural developments of the era and the daily lives of citizens. Images produced by star architects become more potent. These images become alluring, attractive, and more dynamic. Visions for the contemporary city can reach citizens more directly and can significantly influence them. These creative proposals can find fertile ground among those seeking the transformation of the city through architecture and urban planning.

2. THE ERA OF STAR ARCHITECTS

"Star architects", often referred to as "starchitects", are architects who have achieved celebrity status, influencing not only the field of architecture but also popular culture. Their influence extends beyond their buildings to encompass broader cultural and social trends. Their creations, often emblematic of their architectural firms, become synonymous with urban identity and global influence. The characteristics of star architects' production are:

- a) Unique and recognizable designs: Star architects are known for their "signature" design strategy. Their buildings are instantly recognizable and frequently serve as landmarks. In most cases, these architects are formalists, meaning they focus on the form and aesthetic quality of their architecture, which is a main characteristic of their work.
- b) Influence on urban development: The works of star architects can transform cities, attracting tourism and boosting local economies. The "Bilbao Effect," named after the economic revitalization brought by Gehry's Guggenheim Museum, exemplifies how a single iconic building can stimulate urban regeneration and cultural tourism [3].
- c) Media presence and public profile: Star architects often enjoy a high level of media attention. They are featured in magazines, documentaries, and interviews, making their work and personalities well-known to the public.
- d) Brand and commercial influence: Star architects often have their own architectural firms, which become brands in themselves. These brands are associated with quality, prestige, and innovation, allowing star architects to attract high-profile projects. Their influence extends to product design, fashion, and other industries where their aesthetic principles are applied, as seen in the case of Zaha Hadid [4].
- e) Social and cultural impact: Beyond their architectural achievements, star architects play a significant role in shaping social and cultural narratives. Their designs often provoke discussions

about identity, sustainability, and societal values, contributing to broader conversations about the role of architecture in contemporary society.

3. THE CASE OF BARCELONA

Despite its rich architectural heritage and innovative urban planning, Barcelona has been significantly influenced by the works of several star architects, including Jean Nouvel, Enric Miralles, Zaha Hadid, and Herzog & de Meuron. These architects have left an indelible mark on the urban landscape of Barcelona, blending contemporary design with the city's historical fabric. Although the work of Frank Gehry, Zaha Hadid and West 8 remained in the project phase, they have also influenced Barcelona's theoretical architectural conversation about contemporary city planning and urban design.

Jean Nouvel: His influence is exemplified by the Torre Glòries (formerly known as Torre Agbar), a striking, cylindrical skyscraper that has become a modern icon of Barcelona. Completed in 2005, this building stands out with its colorful, illuminated façade, symbolizing the city's progressive spirit and technological innovation.

Enric Miralles: He contributed to the revitalization of Barcelona through projects like the Mercat de Santa Caterina. This market, with its undulating, colorful roof, not only revitalized the area but also integrated seamlessly with the surrounding Gothic Quarter, showcasing Miralles' ability to blend modernity with tradition. Moreover, his work on the Gas Natural Headquarters, one of his last emblematic projects, reshaped the city skyline. It engages in a dialogue with other high-rise buildings that are landmarks in Barcelona, such as Nouvel's Torre Glòries and Gaudí's Sagrada Família.

Herzog & de Meuron: The Swiss duo have made a significant impact on Barcelona with their design of the former Forum Building, now known as the Museu Blau. This distinctive structure, part of the larger 2004 Universal Forum of Cultures, exemplifies their innovative approach to architecture. The building's striking triangular form and blue façade contribute to Barcelona's contemporary architectural landscape.

Although designed and constructed during an earlier period for the preparation of the 1992 Olympic Games, Norman Foster's Torre de Collserola remains a prominent feature of Barcelona's skyline. It may have been among the first buildings to shape its skyline. Previously, only Gaudí's Sagrada Família held such a dominant role.

During the period we investigate, cities around the world competed for architectural prestige, believing that iconic structures would enhance their global standing and attract investment. The result was a proliferation of landmark buildings, each competing for attention and recognition. In Barcelona, the Forum Building by Herzog & de Meuron and the Torre Glòries by Jean Nouvel are testament to this trend, their avant-garde designs adding layers to the city's architectural tapestry. Furthermore, Barcelona's urban development has been heavily influenced by theoretical discourses such as the "Barcelona Model" [5], which advocates for sustainable urban planning, mixed land use, and social integration.

4. ARCHITECTURAL BRANDS / CITY BRANDING

During the period we investigate (1990-2010), the emergence of star architects, each with their distinctive architectural brands, coincided with a growing interest in city branding. This intersection between architectural branding and city branding was not merely coincidental but rather deeply intertwined, influencing urban landscapes and global perceptions of cities.

Architectural brands, epitomized by figures like Frank Gehry, Jean Nouvel, and Zaha Hadid, MVRDV, Rem Koolhaas were built upon unique design philosophies, innovative approaches, and iconic projects. These architects became synonymous with groundbreaking designs that challenged conventional norms and captivated global attention. Their creations, characterized by bold forms and avant-garde aesthetics, transcended mere buildings to become symbols of architectural expertise and cultural significance.

Simultaneously, cities worldwide recognized the importance of branding themselves to attract investment, tourism, and talent in an increasingly competitive global landscape. City branding initiatives aimed to craft distinctive identities that differentiated cities from their rivals, leveraging their unique histories, cultures and assets. The goal was to position cities as desirable places to live, work, visit and invest in.

The interrelation between architectural brands and city branding became apparent as cities sought to exploit the prestige and charm of star architects and their iconic projects to strengthen their own brand identities. Iconic buildings designed by star architects served as focal points of city branding efforts, embodying the values and aspirations of their respective cities. These architectural landmarks became powerful symbols of urban identity, attracting international acclaim and becoming magnets for tourism and investment.

Moreover, Kavaratzis and Hatch [6] argue that the dynamics of place branding are rooted in identity-based approaches, highlighting the importance of understanding the unique identities of cities in crafting effective city branding strategies (Anholt, 2007) [7]. This theoretical perspective sheds light on how architectural projects contribute to the identity and image of cities, providing valuable insights into the symbiotic relationship between architectural brands and city branding initiatives.

In the case of Barcelona, Joan Busquets' book "Barcelona: The Urban Evolution of a Compact City" (Busquets, 2006) [8] offers an insightful exploration of the city's urban development and its branding strategies. Busquets' work delves into how Barcelona has positioned itself as a global city through urban planning, architecture, and cultural initiatives, providing valuable context for understanding the city's branding efforts within the broader framework of architectural and urban development.

The symbiotic relationship between architectural brands and city branding fostered a cycle of reinvention, as cities competed for global recognition. This dynamic interplay was deeply rooted in identity-based approaches to place branding, as argued by Kavaratzis and Hatch. Their research emphasizes the importance of understanding the unique identities of cities in crafting effective branding strategies. Iconic buildings designed by star architects not only served as focal points of city branding efforts but also embodied the values and aspirations of their respective cities. This convergence of architectural branding and city branding underscored the crucial role of architecture in shaping the identity, image, and trajectory of cities in the contemporary world.

5. THE ROLE OF TECHNOLOGY AND MEDIA

The architectural image holds an important role within both the architectural community and the public sphere. In the architectural community, images serve as potent tools for communicating design concepts and expressing the creative vision of architects. These visual representations enable architects to communicate complex ideas effectively and fostering a shared understanding of projects. Beyond the architectural community, images play a crucial role in engaging the public and shaping perceptions of the built environment. Through renderings, drawings, and visualizations, architectural concepts are made accessible to a broader audience, sparking interest, generating discourse, and fostering appreciation for architectural design. Images serve as catalysts for public engagement, inviting participation in discussions about urban development and the future of cities. Thus, the architectural image serves as a bridge between the architectural profession and society, facilitating dialogue and collective imagination.

The rise of technology, particularly the internet and social media, has revolutionized the way architectural discourse and media operate. New digital platforms and social media channels have democratized architectural discourse, allowing for greater accessibility and participation. Architects and architectural critics can now reach wider audiences and engage in real-time conversations about architectural ideas, projects, and issues. Digital tools and social media platforms and online forums have facilitated the sharing of architectural content and ideas, fostering a global community of architects, designers, and enthusiasts.

However, the proliferation of architectural content on social media has also raised questions about the quality and integrity of architectural discourse. The emphasis on visual aesthetics and the culture of "starchitecture" sometimes overshadow more substantive discussions about the social, cultural, and environmental dimensions of architecture. Critics argue that the superficiality of social media platforms incentivizes sensationalism and spectacle over thoughtful critique and analysis, leading to a commodification of architecture and a loss of critical engagement.

6. STAR ARCHITECTS' PRODUCTION AND ITS RELATIONSHIP WITH THE URBAN FABRIC

The influence of star architects on the reshaping of contemporary urban landscapes is undeniable. However, it's crucial to acknowledge that their architectural production often prioritizes iconicity and photogenicity over integration with the surrounding urban fabric. The designs conceived by star architects are frequently intended to stand out as singular, attention-grabbing landmarks rather than seamlessly integrate into the existing urban context. This approach results in architecture that is more isolated and less interested in establishing meaningful relationships with its surroundings. As a consequence, the urban tissue may become fragmented, with iconic buildings standing as isolated entities rather than contributing to a cohesive urban fabric. While these architectural icons undoubtedly leave a lasting impression on the cityscape, their impact on the overall urban environment and social dynamics may be less substantial than desired.

The design philosophy of star architects often stands in contrast to concepts such as "urban acupuncture," as advocated by Jaime Lerner. In his book "Urban Acupuncture: Celebrating Pinpricks of Change That Enrich City Life" [9], Lerner proposes an alternative approach to urban design that focuses on small-scale interventions to revitalize urban areas. Instead of grandiose architectural statements, Lerner emphasizes the importance of subtle, localized interventions that address specific urban challenges and enhance the quality of life for residents. By targeting key areas with targeted interventions, such as pedestrian-friendly streets, public art installations, or green spaces, Lerner argues that cities can achieve meaningful transformations without sacrificing the integrity of their urban fabric.

Sennett's work "Building and Dwelling: Ethics for the City" [10] provides further insights into the relationship between architecture, urban design, and social behavior. In his book, Sennett explores how the built environment shapes human interactions and community dynamics within cities. He explores into the ethical considerations of urban design, examining the impact of architectural interventions on social cohesion, inclusion, and well-being. By considering the ethical dimensions of urban development, Sennett offers perspectives on the challenges and opportunities inherent in creating cities that foster meaningful human connections and collective identity.

In contrast to the integrated approach seen in projects like the Olympic Village, the architectural production of star architects often demonstrates a less cohesive relationship with their surroundings and the urban fabric. For instance, Jean Nouvel's Torre Agbar in Barcelona stands as a striking icon within the cityscape, but its relationship with the surrounding urban context is more ambiguous. The tower's unconventional form and reflective facade make it visually striking. However, its integration into the broader urban fabric is limited, with little regard for the surrounding context.

Similarly, Enric Miralles' Gas Natural Headquarters presents a unique architectural expression that commands attention, but its relationship with its surroundings is characterized by a sense of detachment. The building's dynamic form and use of materials create a distinct identity, yet its interaction with the urban fabric appears fragmented, lacking a coherent connection to the surrounding streets and public spaces. Overall, while these projects may contribute to the attractiveness of the urban landscape, their design priorities often prioritize individual expression over integration with the surrounding context. This can result in a disconnection between the architectural

object and its urban setting, leading to challenges in creating cohesive and vibrant urban environments.

If we move outside the Barcelona city center, where the urban fabric is already established and the new architecture frequently function as acupuncture in it, we will see that the situation may become more dramatic. A notable example is the Forum Area, situated at the intersection of Diagonal Avenue and the sea. This area was previously devoid of built references until it underwent urban redevelopment for the 2004 Universal Forum of Cultures. The Forum Area's design, characterized by skyscrapers and isolated buildings, resembles the layout typically found in American city downtowns rather than reflecting the intimate, pedestrian-friendly scale and character of a Mediterranean city. This departure from the Mediterranean urban typology may result in a disconnect between the built environment and the local context, impacting the overall sense of place and identity. The emphasis on tall buildings and open spaces, while creating a visually dramatic landscape, may contribute to a sense of fragmentation and lack of cohesion within the urban fabric. Furthermore, the design of such areas may prioritize functionality and “innovative aesthetics” over considerations of cultural heritage, social interaction, and environmental sustainability, further distancing them from the qualities that define Mediterranean cities.

7. POST-2010: SHIFTING TRENDS AND NEW PARADIGMS

The global financial crisis of 2007 marked a turning point for the architectural profession (especially in Europe), prompting a reassessment of priorities and practices. In the aftermath of the crisis, there was a shift away from grandiose projects toward more pragmatic and sustainable approaches to design. Scholarly insights from Florida [11] highlight the challenges facing cities in the post-crisis era, including issues of inequality, segregation, and urban renewal. Florida's work explores the socioeconomic dynamics that shape urban environments, offering valuable perspectives on the complex interplay between economic forces and urban development. By examining the impacts of the global financial crisis on cities, Florida sheds light on the urgent need for sustainable and equitable urban planning strategies.

Many cities began prioritizing adaptive reuse and urban renewal projects, breathing new life into neglected neighborhoods. Furthermore, the rise of grassroots movements and community-led initiatives signaled a democratization of urban planning and design. Iveson's research [12] offers a comprehensive exploration of grassroots movements and community-led initiatives in urban development. Through detailed case studies and theoretical analysis, Iveson illuminates the transformative potential of bottom-up approaches to urban renewal and placemaking. By highlighting successful examples of community-driven projects, Iveson underscores the importance of empowering local residents in shaping their built environments and fostering social cohesion.

In Barcelona's Poblenou district, for instance, residents and local organizations have played an important role in transforming former industrial spaces into vibrant cultural hubs [13]. This bottom-up approach to urban development represents a departure from the top-down, star architect-driven models of the past. It aligns with principles of community engagement, participatory planning, and adaptive reuse, showcasing how local initiatives can shape the urban landscape and foster inclusive, sustainable urban environments.

The post-crisis period following 2007 has seen a shift in architectural trends towards designs that prioritize integration with the surrounding urban fabric and foster stronger connections with the community. This departure from the iconic, photogenic architecture of the past reflects a growing emphasis on sustainability, resilience, and social responsibility in architectural practice. Architects and urban planners are increasingly recognizing the importance of creating built environments that respond to the needs and aspirations of the people who inhabit them. This has led to a renewed focus on human-scale design, placemaking, and community engagement. Rather than creating standalone

architectural objects or landmarks, architects are designing projects that seamlessly integrate into their surroundings, contributing to the vitality and character of the urban fabric.

Furthermore, there is a greater emphasis on fostering communication and interaction between buildings and their surroundings. Architects are exploring innovative design strategies such as adaptive reuse and mixed-use development to create more inclusive and sustainable urban environments. By prioritizing pedestrian-friendly streetscapes, public spaces, and social infrastructure, architects are enhancing the quality of life for residents and fostering a sense of belonging within the community.

In contemporary architectural practice, the integration of new structures into the existing urban fabric is essential. This process involves meticulous consideration of several physical parameters inherent to the built environment. Architects carefully evaluate building height and volume, ensuring that new constructions align harmoniously with the existing urban tissue and do not disrupt the visual continuity of the surrounding urban landscape. The selection of materials holds significant importance in achieving seamless integration. Architects often opt for materials that not only reflect the local architectural character, but also complement the adjacent built environment in terms of color, texture, and materiality. The attention to scale and form is indispensable in fostering architectural coherence with the character of the area. This requires employing design strategies to establish a dialogue between the new structure and its context, thereby enriching the urban experience. By adhering to these principles, contemporary architects strive to create designs that not only enhance the physical environment but also contribute meaningfully to the cultural and social fabric of the community.

One characteristic example of a contemporary building in Barcelona that exemplifies the principles outlined above is the Media-TIC building [14], designed by the architectural firm Cloud 9. Situated in the 22@Barcelona district [15], known for its innovation and sustainability initiatives, the Media-TIC building seamlessly integrates into its urban context while contributing to the vibrant fabric of the surrounding area. Another example is the Sant Antoni-Joan Oliver Library [16], a public library located in the Eixample district of Barcelona. Designed by architects RCR Arquitectes, the library is renowned for its innovative architectural design, which includes a striking facade composed of translucent glass panels and metal mesh. Finally, the Gabriel García Márquez Library [17], designed by SUMA Arquitectura, aims to serve as community hub and cultural landmark, emphasizing accessibility, sustainability, and social engagement. It seeks to enhance the urban experience while contributing meaningfully to the cultural and social fabric of the community.

8. CHANGES IN GLOBAL URBAN DEVELOPMENT

While star architects may have less influence in some areas, their impact is still felt worldwide. In Europe and North America, the trend has shifted towards more sustainable and community-focused architectural practices. The emphasis is now on creating buildings that blend seamlessly with their surroundings and contribute to the social and cultural fabric of their environments. However, in other parts of the world, the legacy of star architects remains vibrant and influential. In cities like Dubai and Shanghai, iconic structures by renowned architects serve as symbols of economic capability and ambition [18].

In Asia and the Arabic countries, the architectural landscape is still heavily dominated by the creations of star architects. These regions have embraced iconic architecture as a means of city branding and expressing their expanding economic power. For instance, Dubai's Burj Khalifa, designed by Adrian Smith (SOM), stands as the tallest building in the world, a testament to human ingenuity and aspiration. This structure not only serves as a landmark but also as a symbol of Dubai's rapid development and its status as a global city. Similarly, the cityscape of Shanghai is dotted with iconic buildings like the Shanghai Tower, designed by Gensler, which emphasizes both height and modernity.

The focus on landmark architecture in these regions highlights a different set of priorities compared to the more integrated approaches seen in Western cities. In places like Dubai and Shanghai, the architectural icons are often designed to stand out dramatically from their surroundings, drawing attention and generating global interest. This approach is deeply connected to city branding strategies that aim to elevate the international profile of these cities. The buildings are not just structures; they are statements of identity and ambition, crafted to attract tourists, investors, and global recognition. In this context, the role of star architects continues to be important. Their ability to create visually striking and innovative designs aligns perfectly with the goals of cities in Asia and the Arabic countries. These regions prioritize architectural landmarks that can serve as symbols of progress and modernity, even if this means that the buildings do not necessarily integrate seamlessly with their urban context. The influence of star architects in these areas underscores the ongoing relevance of iconic architecture in city branding and economic development strategies, illustrating how the architectural priorities can vary significantly across different parts of the world.

9. CONCLUSION

In conclusion, the era of star architects, spanning from the 1990s to the late 2010s, marked a significant period of transformation in the field of architecture. These architects gained unprecedented celebrity status and utilized considerable influence over urban landscapes and global perceptions of cities. However, as we transition into the post-2010 era, we observe shifting trends and new paradigms emerging in architectural practice and urban development.

The rise of sustainable and community-focused architectural practices in Europe and North America reflects a growing awareness of the need for more inclusive and environmentally conscious design approaches. Architects and urban planners are prioritizing integration with the surrounding urban fabric and fostering stronger connections with local communities. This shift is evident in projects that prioritize human-scale design, placemaking, and adaptive reuse, contributing to vibrant and resilient urban environments.

Meanwhile, in regions like Asia and the Arabic countries, the legacy of star architects continues to thrive. Iconic structures by renowned architects serve as symbols of economic capability and ambition, contributing to city branding efforts and global recognition. The architectural priorities in these regions often prioritize spectacle and innovation over integration with the urban context, reflecting a different set of values and aspirations.

Despite these regional variations, the role of star architects remains significant in shaping global urban landscapes. Their ability to create visually striking and innovative designs aligns with the goals of cities seeking to enhance their international profile and attract investment. However, as we move forward, it is essential to strike a balance between architectural innovation and urban integration, ensuring that iconic structures contribute meaningfully to the social, cultural, and environmental fabric of cities worldwide. By embracing more inclusive and sustainable design practices, architects can continue to shape cities that are not only visually captivating but also resilient, vibrant, and inclusive.

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Palmscaping project - Tracing the multiple journeys of the Palm tree in Mesolonghi, Greece.

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Extended abstract

The main aim of this paper is to present a tree story and investigate palm-migration and its consequences to cityscapes. Given that ‘nature’, and in particular plant elements, play a substantial role in shaping urban landscapes and social identities, this paper presents a new reading of the contemporary Greek landscape seeking the tools of this approach in relation to the Palm tree.

Palms in their majority, are considered tropical trees, in the sense that they originate from tropical and subtropical regions. However, nowadays palms are found all around the world, being ‘*great travelers*’.

Since antiquity, palms have been traveling a lot throughout the world, either as a product, fruit, a tree, or a myth. The perpetual journey of plants and trees has deeply reformed the alimentary and agricultural practices all over the world. The introduction of new plants in new ecosystems, changes their architecture, their inflorescence, and evolution, and sometimes results in new species, proving the creation of a hybrid ecosystem. However, a new balance is to be found on a social level, as well. Transplantation of plants in different cultural environments changes their content, and their social role and they are called to play a new role.

The term ‘Palmscaping’, was invented within the frame of my wider ongoing Ph.D. research project to indicate that palm trees have been introduced in the Greek territory several periods, each time in a different way, under different cultural conditions, and in a different socioeconomic frame. It seems that the conceptual content of Palm trees can easily be abolished, renewed, or enriched playing an active role in the contemporary Greek landscape. More specifically, palm trees are dominant elements in Mesolonghi, a small historical city in Greece, where they are not only part of the cityscape but also part of the social identity, collective memory, and history.

Mesolonghi’s rich history and unique ecosystem, tied with the continuous and persistent presence of palms, offer a compelling narrative. Through diagrammatic mapping, this project focuses on the consequences of the transplantation and distribution of Palms in the Greek landscape and opens the discussion about new methods of exploring the intersection of memory, urban experience, and temporality.

Keywords: *palm tree; transplantation; collective memory; place identity; hybrid ecosystem; Greek landscape; East-West; meeting with the ‘other’;*

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Disabled people and "mobility". Proposal for infrastructures intended to prevent parking in disabled spaces and their pilot application in the city.

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Abstract

In recent years, the issue of accessibility for people with mobility difficulties, more and more "aggressively" introduced to all scales of urban planning, but also of its legal interpretation. Even if the "poverty" of the existing infrastructure is another factor that makes this development difficult, for the Greek standards, the design findings of recent years are at least encouraging, albeit in an embryonic stage.

Despite this fact, there are daily phenomena in which even these elementary infrastructures become the object of exploitation or/ and violation of elementary rules of civil behavior as well as an indication of civilization. Even if the fact that the specific reality has clear origins of elementary rules and level of education, urban planning must take further measures to deal with such everyday phenomena, by planning and constructing "smart" applications to prevent related phenomena.

This article attempts to propose a specific, intelligent, low-cost infrastructure, to prevent parking, in places reserved for people with mobility difficulties. The aim of the specific applications is not prevention with, police-type, countermeasures but the highlighting and social "targeting" of vehicles and users who resort to such methods. The user of the vehicle who will park in this type of spaces, which objectively are few to minimal in Greek cities, will be perceived, with the use of the specific infrastructures, in that the place that he parked his vehicle was not foreseen. therefore, the specific "violation" will also be noticed by passers-by or users of the land uses of adjacent buildings.

Keywords: *Disable people, Free parking spaces, Accessibility, Smart infrastructure, Mobility*

1. INTRODUCTION

Nowadays, accessibility, concerns the equal opportunity of all without exception the members of a society, without discrimination, social, racial, sexual and/or mobility, in access to all infrastructure, urban or not, without the slightest restriction, in contrast with the conventional design of the past, which for a big period, either directly or indirectly, created a series of discriminations against the above assumption of parity.

With the goal of seamless and autonomous access for everyone, indiscriminately combined with the protection and respect of the environment, planning today through comprehensive plans and actions, in fact owes, to take into account both the equal access of all to all the infrastructures of the built and natural environment as well as the provision of the specific possibility through a series of actions and interventions in existing infrastructures which carry the heavy "negative" burden of the planning of

past, taking into account a number of other data and factors today, such as the characteristic of population aging.

An additional element that must be highlighted, and the needs of this article will be emphasized, is also education the awareness of all agencies whether it concerns the planners of the aforementioned infrastructures or much more, the everyday users of the designed and built infrastructure which we daily observe to be a part of abuse from their unrestricted and, lack of education and awareness, use mainly by the users of motorized means of transport and especially the private car.

The requirement of an overall design in which each action complements the previous one but it will also be a stepping stone for the next one is today more imperative than ever and will continue to be since parity in access must in the future become a way of life, of planners and users, and not piecemeal treatment due to a requirement of the respective legislation which lead, until today, to design and construction discontinuities.

The existing national and international actions are oriented in all the aforementioned directions however, the scientific community itself must contribute either by highlighting these practices with a positive or negative sign either by proposing new actions and interventions that will contribute to the intended goal of equality in access, individually or in combination but also taking into account all the new data which must be introduced into the nowadays planning such as the influence of climatic and environmental factors and the need to address emergency situations with which, both the Greek and the international society and their respective cities, in recent years have been repeatedly confronted cases in which especially people with mobility difficulties and vulnerable groups of people in general they must have a special and distinct place in the planning to deal with such emergency situations for which the strategic planning has already set the basic parameters.

Therefore, undertaking the present article to focus from the general to the specific and in daily dealing with, elementary and in many cases rudimentary, urban infrastructures which are a burden of abuse much more of unconscionability than, now, of ignorance with the most typical and immediate cases being those of sloping ramps and especially parking spaces intended for people with mobility difficulties it will be sought to highlight this type of bad practices and above all to propose smart methods direct response to such practices which will gradually lead to dealing with such phenomena in the way of thinking of perception and the correct attitude towards such phenomena and not with the proposal of police-type practices.

2. ACCESSIBILITY, MOBILITY AND PLANNING WITHIN THE CONTEXT OF EXISTING LITERATURE AND LEGISLATION

Access and accessibility, are exclusively complementary and convergent concepts since access is about providing the possibility of equal participation in all aspects of social life whether this concerns participation in the productive process-work, or even leisure sports, education, etc. while accessibility concerns the planning and construction of the built and natural environment can be carried out seamlessly, autonomously, safely and without difficulties, both in infrastructure and services. Planning is particularly important and irreplaceable in that direction which must now be oriented towards the aforementioned direction of equal access for all without the need of customization or specialized design to the greatest extent possible given, additionally, that the percentage of residents, at EU level with mobility or other type of difficulties, form up 15% of the total population, while disabled people in general make up about half of that.

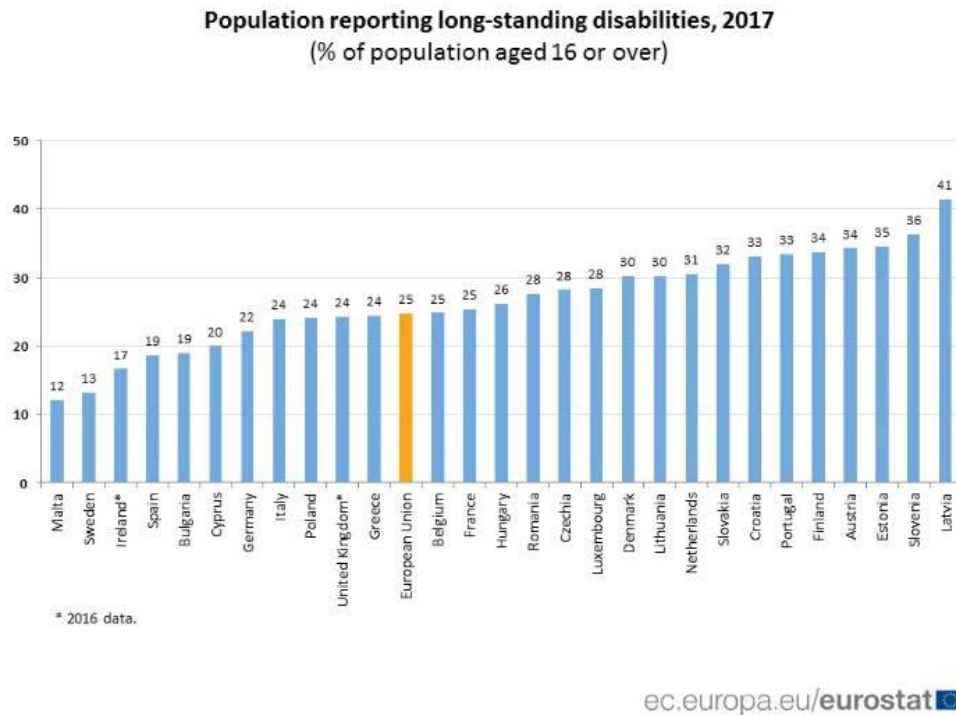


Figure 1: Percentage of population with long-term disabilities, aged 16 or over. Source: Eurostat

The first category concerns all persons with any type of disability, whether this concerns movement or any sensory characteristic of them, even mental ailments, and the second any type of human being who does not fit into the average type, which may concern other types of characteristics such as age-related (children-elderly), social (pregnant-parents with strollers), professional (carriers of objects) or even occasionally (temporarily injured). The corresponding products of this type of planning are characterized as accessible.

Dealing with this entire process must be perceived as a single chain, which in the official literature is called as "Accessible chain" links of which are separate interventions, material or not, in the built environment with the aim of the safe and seamless movement of everyone, including people with mobility difficulties, who move and operate in the respective networks. The specific process is characterized as a chain because precisely if even one of its links is omitted or due to misuse it is bypassed or ceases to function, then, correspondingly, the overall operation of the chain stops, with fragmentary effects, a phenomenon particularly pronounced both in the past and in our days.

In Athens, more than 70% of the total length of existing sidewalks, which amounts to an order of magnitude of 2,000 m, does not meet the basic specifications in terms of their geometrical characteristics (cross section >2.1m). And when it comes to sidewalks, it should be understood that we are talking about the basic infrastructure that people with mobility difficulties are called upon to use for their movements.

<u>Sidewalk width (m)</u>	<u>Length</u>	<u>Percentage (%) of total</u>
0	31	2
<1	706	37
1-2	619	32
>2	476	25
No data	86	4

Total:	1918	
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Table 1: Percentage distribution of sidewalks in the Municipality of Athens based on their cross-section

The main reason for this phenomenon is none other than the car-centric planning of the basic infrastructure, including sidewalks and others, which "conflict" with the exclusive use of as much space as possible from the car, combined with a number of other historical elements. Unfortunately, the recent campaign of promoting electric mobility seems to have exactly these characteristics, which under other circumstances could be described as "revolutionary", given that this particular aid enables people, mainly, with mobility difficulties, to overcome obstacles which do not concern infrastructures as much as geomorphological elements, and have the possibility to access even more places and infrastructures that they did not have in the past. In other words, people with mobility difficulties as well as other wheelchair users, as mentioned above, temporarily injured, carrying parents with baby carriages, to have the possibility, using electric mobility, to have access to areas, in which during the past, with the use of motorized wheelchairs, on a range of infrastructures, such as roads with steep gradients, roads with worn infrastructure, roads with other obstacles, and their respective, surrounding uses, were not able to use.

Nevertheless, the majority of both the propaganda and the actual aid concerns the promotion of the private car. In essence, with this particular practice, the promotion of strengthening the occupation of more and more space by the private car and its users which constitutes the modern challenge and requirement of modern cities, is not achieved, while at the same time, with the lack of incentives, even financial ones, for electric mobility and for people with mobility difficulties it will not "get" the disabled people out of their homes to the city or even, in the best case, of the basic movements they have managed to carry out on a periodic basis (e.g. residence-work).

Finally, as a society we have to apart from the social reflexes which will oblige society itself and its participants to realize their obligations towards people with mobility difficulties and/or particularities to take basic political but mainly scientific initiatives and decisions, the combination of which will be the starting point (one more) for their equal contribution and participation in everyday life and the corresponding infrastructures of the city.

This goal has already begun to be achieved in terms of travel with a number of alternative means of travel which, however, are used by users who in the past also participated equally in mobility and city life. The necessity, however, to improve living conditions, both environmentally and at the infrastructure level, definitely combined with political and scientific initiatives, has led in a number of cities to the strengthening of the use of bicycles and micro-mobility, and to a clear reduction in the use of the private car. But in the case of people with mobility difficulties and in general people with disabilities, except from traffic, transport, urban planning and everything else, it is now also a question of humanity, democracy and above all the perception of the right to equal access and use of all the parameters of everyday life. There is therefore a huge necessity to highlight the dialectical relationship between improving urban everyday life and equal access for all, regardless, of the users and residents of a city or a wider urban area.

In Greece today, based on the current legislation, in a city, it is mandatory to provide 5% of parking spaces for people with any type of disability in all of its public spaces (M.D. of MIN.EN/124964/1561/2022- FEK 6213/B/7-12-2022, as it replaced under no 52907/2009 M.D. "Special arrangements for the service of disabled people in common areas of settlements intended for pedestrian traffic" (B' 2621)).

In addition, a number of their geometric-technical characteristics are also foreseen, based on which "the minimum width of these special places is determined at 3.50m". Of these special spaces, at least one (1) meets the parking requirements of disabled VAN type vehicles, or access to a vehicle from

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the rear with minimum required dimensions of 4.50mX6.60m. In the section where the special vehicle seats for people with disabilities are provided, the appropriate connection of the level of the parking area with any adjacent sidewalk with an inclined level is also provided. Special parking spaces are marked on the ground and on poles with the International Access Symbol. At the same time as a series of other provisions of the specific M.D. and ignoring the fact of the difficulty of the process of locating a parking space for people with mobility difficulties, which can and must take into account a series of traffic urban planning and (mainly) social characteristics, such as a residence of a person with mobility difficulties near, or as close as possible, to its proposed location, or land use that attracts many movements and users during the day, such as public service, social space, etc. in any case, there are very few cases of Greek cities in which even the otherwise small percentage of 5% is covered, out of the totality of these positions. However, even in the case of their location, whether it is fake parking or cases of organized parking spaces or even for parking spaces that serve a specific use of existing building infrastructure, it is common for them to be occupied by private car users, since we are talking exclusively about this particular vehicle, who do not have mobility difficulties either and much more, as a consequence of this, they do not even have the right to use the specific, minimum, parking spaces.

3. THE SOCIAL PHENOMENON OF CAR DOMINATION AND ITS TREATMENT IN CORRESPONDING TERMS

In ideal circumstances there should be no discussion of the question of "right" for using of such parking spaces or not, but the specific issue should have been resolved in social and not legal or police terms but unfortunately it is currently beyond the scope and scientific area of this particular article. In exactly the same way of thinking, the aim of the article is the individual suggestion of smart infrastructure, which will act as a deterrent to the occupation of such parking spaces, intended for people with mobility difficulties, proposing at the same time a method and places for their pilot application.

Despite the fact that the factors under which such an infrastructure is called to be implemented have a purely deterrent and mainly social character, free from the way of police type measures, in contrast to a number of other similar applications which exist today, and, unfortunately, the vast majority have remained in their pilot nature and mode of application fatally, indirectly, both on the basis of the proposed pilot application areas, as well as in the proposed way of implementing them, easily one can assume, that the final goal is the implementation of police-type measures of direct or indirect future prevention.

The uncontrollable, for decades, through, of course, corresponding political practices of encouragement, of the presence of the private car in urban areas and especially in cities, the phenomenon of abuse as well as one, aggressive, for the car users which in nowadays could be condensed into the sentence "I have no problem but I consider electric skates unsuitable for the streets because they are silent and develop such speeds that they can fall on me and scratch my car" from car users is more than common. In other words, as if the public spaces-roads are exclusively intended for the car and the users of all other, mainly non-motorized, means use them abusively. Both corresponding social experiments, as well as an everyday image from the city streets confirms the assumption above precisely because the private car has imposed its own reality on the roads.

An ally in this joint effort, in terms of transportation, can be a series of other alternative modes of transportation in combination with the aforementioned new perspectives provided by electric mobility, based in sustainable mobility, and not exclusively the private car from the point of view of only the non-emission of gaseous pollutants. The use of the respective infrastructures by means used by people with mobility difficulties but also from other alternative means of transportation such as the bicycle and the means of micromobility is a solution that the scientific community has been putting forward for years, each time, that the specific infrastructures will not be occupied by illegally

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parked cars. And if in an infrastructure with large geometric characteristics, length or width the point occupation still gives the possibility of passing through the occupied point, in the case of parking spaces for people with mobility difficulties, the possibilities are limited. In contrast to the electric car, which has monopolized the interest of transport electrification policies, however, it won't improve the image of the city in the slightest as the only change will concern the chosen fuel and not the number of vehicles circulating in the cities and the effects they cause. In contrast to electromobility, combined with a range of alternative means of transport which will concern both people with mobility difficulties and micromobility.

The reality above is, unfortunately, a daily routine for the average Greek city. This phenomenon, combined with the lack of basic infrastructure for the safe and smooth movement of people with mobility difficulties, make their appearance and movement deterrent in public areas, which are almost completely occupied by private cars. Temporary parking phenomena, which apart from the fact that in many cases, becomes permanent either by the same vehicle or by repeated ones, whose users adopt the same way of thinking and reacting each time, they work cumulatively as a result, the people with mobility difficulties, knowing the reality in advance with which they will probably be confronted, to avoid circulating on the streets or in free public spaces. Therefore, any dialogue, as it is perceived, is many steps backwards mainly in its starting point regarding whether these individuals move even rudimentarily finally on the streets and not a word about the parity of use of any existing infrastructures.

The phenomenon of "temporary" parking in places intended for people with mobility difficulties is unfortunately an established habit as if all the remaining space is for both movement and parking, a geographically limited size. Whether for road parking, or parking spaces that serve specific uses, based on the existing legislation as described above. The development and implementation of a specific infrastructure, which is proposed, aims to prevent the occurrence of such phenomena, which under other circumstances should have been the norm.

4. PROPOSAL FOR SMART INFRASTRUCTURE PLANNING AND ZONNING

A parking space intended for people with mobility difficulties has specific geographical dimensions. Specifically, as mentioned above, based on the existing legislation it is foreseen to be 3.50x 1.50 m. if it is a conventional car and 4.50x 6.60 m if it is a VAN type car. Although these dimensions, purely geometrically, appear to be sufficient for parking an ordinary vehicle there are not a few times when, either partially or exclusively, the specific positions are occupied. That data, as mentioned above, since it is known whether in the persons with mobility difficulties themselves or not, is a negative and unpleasant starting point for the specific people, to choose to move by using their private car, while it is very common, the phenomenon of refusing to move, precisely because of these unfavorable conditions but also of the fact that overall cities are inhospitable with dozens of obstacles for a simple conventional movement of even a few meters.

The aim of this proposal is the construction of elementary infrastructures which, with a social sign, will attempt to prevent such phenomena with a series of criteria which are described above. In particular, a metal structure is proposed to be placed at the rear boundary of a parking space intended for people with mobility difficulties with clear delineation and coloring of the floor in accordance with the provisions of 6213/B/7-12-2022 M.D. The specific infrastructures may have a dual role since first of all and given that it is proposed to be placed perpendicular to the road surface and parallel to the rear boundary of the parking space, they will prevent partial occupation of these special parking spaces, by vehicles of users without mobility difficulties which (partial occupation) constitutes in essence occupation of the parking space in its entirety. At the same time, with the use of a series of smart infrastructure, more specifically a smart barcode reader, with a particularly large range angle, the reader will be able to detect any existence of a specific Qr Code, which will be the most recognized for holding the right of a car user to occupy the position or not.

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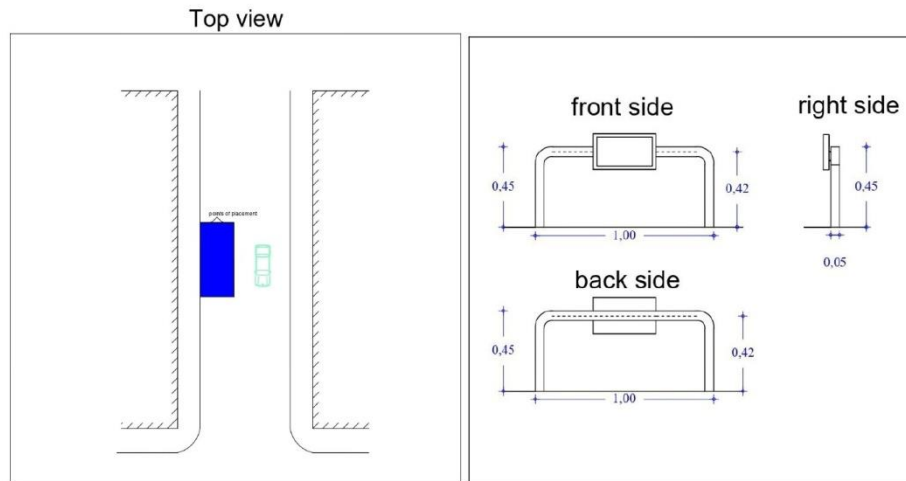


Picture 1. Suggestion of the proposed Qr code

The specific Qr code, can work exactly work the way the corresponding cards for disabled people with their own car, work today, which people with mobility difficulties or disabilities are provided by the respective Ministry after proving, based on the prescribed procedures, that they belong to the specific category. Basic difference both in the way of use and in the general philosophy of the proposal relative to corresponding existing methods is to isolate this type of illegal seating behavior for people with mobility difficulties in a social way and not with police-type measures. More specifically, today, when a vehicle that does not have the relevant card occupies the position in question then either the person with mobility difficulties, which is deprived of that particular position, or anyone else, must report the incident to the relevant police authorities who are obliged to intervene. However, apart from the fact that this particular way is far from the approach of our scientific team at the same time, there are not a few cases in which no one reports the incident, resulting in the continuous increase of similar phenomena, on the other hand, even in the event of a complaint it is handled painlessly or much longer in the time between the complaint and the intervention the vehicle has already left.

So, the specific metal structure which will be placed at the rear limit of the parking space for a person with mobility difficulties as well as the wide-angle Qr code reader, within a certain period of time will be able to locate the specific Qr code which will be placed in a discreet place, preferably invisible at the rear of the vehicle, during the parking process of each vehicle. Although the time interval may vary, a suggested time of 60 seconds from the moment that the vehicle stops is considered as sufficient, since it gives the necessary time to the reader to detect the code, on the other hand, it is not large enough to create the possibility of temporary parking phenomenon which, as mentioned above, is very common. After the specific period of time has passed, a piercing hiss from the particular infrastructure will start, who will point out that the specific vehicle is not intended for the specific position. Given that this particular infrastructure will not replace everything that is currently in place, it is obvious that any non-existence of the right to use the specific position can be certified, secondarily, by the existence of a relevant card or not. However, it will already have created these social conditions on the basis of which those who are moving to the area will be able to perceive the illegal use of an infrastructure intended for people whom, as a society, must include equally in their movement in public spaces and in the city as a whole, by car users who can use all the remaining 95% of the corresponding existing infrastructures, and given that said whistling is suggested to be particularly piercing, bordering on annoying, will have already targeted the user who resorts to the specific practice. Finally, given that the solution of police-style meters in not completely rejected, or even that those social conditions are missing on the basis of which we can today consider them unnecessary or even bypass them, the specific practice will be the starting point for them to be denounced given that, both due to the existing, today, infrastructure, and due to the fact that the period of time is particularly short the users of private cars who resort to such methods, in the great majority, are doing it completely consciously.

Alternatively, the installation of a smart magnetic card reader is recommended, which cards the user will procure in the same manner as mentioned above and bring into contact with the reader immediately after parking. If this is not happen, and the reader-sensor perceives the presence of a vehicle without the existence of a corresponding right then the process will be exactly the same as above, however, this specific proposal falls into a series of issues related to the personal data of the users of the cards and the corresponding vehicles, so it is proposed as an alternative solution.



Picture 2. Indicative images of infrastructure

5. SUGGESTION OF PILOT USE

Despite the fact that the concept of shared spaces, also nowadays, even in the scientific area of urban planning is particularly enlarged, the existing legislative framework clearly defines the designation of parking spaces for people with mobility difficulties, which must be located in such an area, both in terms of the number and its geometrical characteristics but also in terms of their proximity of the use they are planning to serve. Specifically, as described above “when the parking areas serve a building that houses services, banks, theaters, cinemas, etc., then care will be taken so that the parking spaces for people with disabilities are located at the shortest possible distance from them, if possible less than 50m.”. Accordingly, also in the specific areas both from lack of information about the role and character of the specific positions, as well as by a number of other subjective criteria, including the element of social outcry but also the sense of a much smaller risk of, police-style, punishment the phenomenon of their occupation by vehicles that lack the relevant right, is particularly common. Supermarkets are also a very indicative and everyday phenomenon with organized parking spaces, the specific spaces of which otherwise meet the other conditions while in recent years the phenomena of social automation have also been particularly intense when there are corresponding behaviors, of their illegal occupation.

With the pilot application of the specific infrastructure in such areas, so the above phenomena will be further formalized while the users of these spaces will also become familiar with the specific infrastructure for their possible future use in the urban road network. While the user of a private car will have more difficulty occupying a relevant position on the urban road network however due to a larger range of users per unit of time also the specific positions as mentioned above are usually filled in areas such as supermarkets where the feeling of temporary occupation but also the fatalistic treatment of the fact that it is difficult for people with mobility difficulties to make use of the specific land uses it is, if not more, just as intense without however this being proven by relevant research results. It is therefore estimated that the implementation of this specific infrastructure in places such as supermarkets will lead, on the one hand, to safe scientific but above all practical results and conclusions on the other hand, they will bring a large part of commuters into contact with the specific

infrastructure since it is one of the most massive land uses and an attraction of many hundreds of commuters every day while, finally, the ownership status of the specific land uses it is likely to make possible the simultaneous implementation of the specific infrastructure at dozens of sites in the same time in different geographical areas all over the country, so that any sample from their implementation might be, statistically, even safer.

6. SUMMARIZED

The question of access and accessibility, has been particularly intense in recent years, has constituted a specific field of scientific research and application. Apart from the scientific determination of a number of related disciplines, is also a question of equal access to all the urban, and not only, infrastructures of the area. People with mobility difficulties but also people with different habits and conditions of movement both in terms of the use of urban space and especially the road and street network as well as its corresponding infrastructures must be ensured for the possibility of equal access with people who do not fall into the specified categories. Even if the conversation today is limited to the aspect of access and not, yet, to the aspect of parity both planning and the corresponding legislative framework must be focused on the second direction. Obviously, the degree of difficulty of the specific goal might be different, as in cases of old parts of cities, both in terms of the structure of the road network, as well as regarding the age of the existing shells, science, technology and especially planning, they must take all those measures that will lead to a continuous improvement of these conditions.

Unfortunately today there are phenomena of abuse of even the basic infrastructures for people with mobility difficulties that exist in the urban area with the most typical example the occupation of special parking spaces. This particular phenomenon, in addition to a number of social characteristics regarding private car users who abuse the specific infrastructures, since it constitutes a negative reality, is also an inhibiting factor for people with chronic problems with mobility difficulties to move. In other words, a person with mobility difficulties or mobility peculiarities, knowing this reality will make the decision to move much more difficultly, if the movement he/she is about to make is not imperative. In this particular phenomenon the negative reality is also based, the rare phenomenon of the image of the presence and/or movement of people with mobility difficulties in the urban area as well as the corresponding structures and infrastructures.

With the proposed infrastructure, is being attempted, mainly in a social way and not with police type measures to prevent the abusive occupation of the, otherwise, few parking spaces for people with mobility difficulties or mobility peculiarities making more use of social automation rather than the civil and criminal code. In particular, the placement of specific infrastructure is proposed, which in a smart way and in a very short time will be possible to perceive whether a user of a private car who parks in such a parking space has the corresponding "right" or not. Private car users with mobility difficulties or mobility peculiarities will procure and place, in a discreet, perhaps not visible, part of their vehicle, a specific type of Qr code, or equivalent, which will be supplied by the respective official and certified body, such as the Prefectural Association of Disable People, or other bodies that may be proposed for further scientific research related to this topic. The specific infrastructure will be placed transversely at the rear of the specific parking spaces simultaneously creating "privacy" conditions but also acting as a deterrent for phenomena of partial occupation of the specific positions since it will also constitute their artificial limit. The specific infrastructure is proposed to consist of a "II" shaped metal arm which will be based on the ground while its geometric features are proposed to be such as to ensure that they will not be easily, if at all, destructible while at the same time they will meet a series of specifications related to road safety. The height of the arm, as well as the Qr codes reader, is suggested to be, in order of magnitude, at the height of the vehicle's license plate, the position of which, due to the different types of vehicles, may be partially differentiated. For this reason the recommended reader, should have a wide reading angle range so as to cover both the

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different types of vehicles as well as the possibly different placement position of the specific Qr code by the owner of the vehicle which can also be determined at which point and height should be placed even if this placement takes place in an inconspicuous place, but be able to be read by the specific reader. Finally, the same reader (or another one), when motion is detected will be activated provided that this movement will last more than a certain period of time, a few seconds to ensure that it will not be perceived as movement, movements which do not contradict the terms of use and operation of the specific parking spaces, such as pedestrian crossing except for parked vehicles, two-wheeled or four-wheeled vehicles. When this movement stops and the obstacle remains after the lapse, also of a short time (60 sec are recommended), and has not noticed the existence of the specific Qr code, that is, the parked vehicle will not have a relevant permit, a loud piercing hiss will be activated, and will point out to the neighbors or passers-by, as well as the drivers themselves, about the offense committed.

As emphasized above, target of the measure is not a police- type police-style handling of arbitrary parking in spaces intended for people with mobility difficulties or mobility peculiarities but the activation of a series of characteristics which are left to the perception of the users of the structures of the urban environment about the fact of the necessity of the transformation of the equal accessibility of all from goal, that is today, into a reality.

Alternatively, the installation of a smart reader is also suggested with the help of which the local Municipality will have, by using the NBiOT Technology, and minimum, among other things, electrical energy requirements in a real time, view of the situation in which, the set of positions available within its administrative boundaries are, regarding their availability or not as well as the nature of the vehicles parked in them that is, if they are indeed from users with mobility difficulties and/or particularities or not. The electrification of the infrastructure can be carried out either by connecting to the central electricity supply system, since they will be placed within the urban area, or by installing solar panels and an electric battery Finally, for reasons of personal data protection the Qr codes will be the same for all those who are entitled to purchase them, by presenting the corresponding supporting documents proving the disability or special condition from the competent granting body, and not separate for each individual-vehicle so that any sample of occupying the specific positions as described above, to be exclusively statistical and not personal.

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cycle lanes and mild-traffic roads by reducing the speed limit to 30 km/h on local roads or in residential areas”.

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CITIES & CULTURAL HERITAGE MANAGEMENT

**CHANGING
CITIES**



Changing Cities VI, Rhodes, 24 - 28 June 2024

An interpretation of the Urban Heritage of Small Post-Socialist Towns in Poland and Ukraine, taking the Warsaw and Lviv Regions as Examples.

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Extended abstract

For many years, small towns in Poland and Ukraine, which are often referred to as “post-socialist”, have been struggling with the spatial chaos of historical urban layouts resulting from the deformations of the socialist and post-socialist periods. These towns tended to be largely neglected and often struggled to maintain a sense of identity. After the political transformation, a process of “shrinking” was observed in these towns following the closure of unprofitable socialist factories. Poland’s accession to the European Union helped change both the appearance of towns and society’s attitude towards them. Small towns (known as ‘slow cities’, as opposed to ‘smart cities’) provide a counterbalance to large, fast-paced, populous cities and have become attractive as they have begun to offer better (cheaper) living and working conditions. Supported by European funds, towns are undergoing a spatial metamorphosis and there has been a renewal of regionalism and identification of their inhabitants with the local culture. However, as a result of rising property values, they are often subject to economic pressure, resulting in chaotic development. This has caused both Polish and Ukrainian towns to face similar problems related to spatial degradation and cultural heritage protection.

The article looks at the preserved urban heritage of the historic small towns of Poland and Ukraine, which were founded on similar roots, and makes a comparative analysis of their development during their socialist history, especially since Poland’s accession to the European Union and Ukraine’s independence, namely over the last 30 years.

Keywords: *urban heritage, small towns, Warsaw, Lviv*

Beyond Boundaries: Augmented Reality's Role in Authentic Onsite Heritage Experiences

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Extended abstract

This research explores the intersection of augmented reality (AR) technology, authenticity, and the enhancement of onsite heritage experiences. As the demand for authentic encounters with cultural and historical sites grows, AR emerges as a transformative tool capable of providing users with a more objective and immersive understanding of heritage.

The concept of authenticity has long been contested in both heritage conservation and cultural tourism studies. There exist a range of interpretations of what is authentic, parting from objective or object-based authenticity centered on the material originality of the object and culminating in the most recent post-modernist views that see authenticity as an entirely subjective, individual experience. Once digital technologies are introduced into the equation, the concept of authenticity continues to expand, with questions arising as to the impact of digital reproductions, designs, and experiences on the authenticity of heritage sites and objects.

While the concept of authenticity has been extensively explored in both academia and practice, little research has been carried out to understand the intersection of these different concepts and how they relate to digital technologies. Past studies have primarily focused on the post-modernist perspective of authenticity when discussing digital surrogates and experiences. This research, in contrast, delves into how AR technologies can augment onsite experiences by seamlessly integrating digital overlays that offer a wider local context, thereby creating an existentialist perception of authenticity and potentially increasing the object-based authenticity of heritage sites.

Through case studies and practical examples, this research aims to showcase how AR can be effectively employed to create onsite heritage experiences that are both academically rigorous and engaging for diverse audiences. By leveraging AR, heritage sites can transcend physical constraints, enabling users to explore historical layers, artifacts, and narratives that are not immediately visible. This approach fosters a more comprehensive and nuanced understanding of the site's history, enhancing the overall authenticity of the experience. The discussion will also address the challenges associated with balancing authenticity and innovation in the development of AR applications for heritage sites.

Keywords: *cultural heritage, augmented reality, authenticity, digital heritage*

Landscape Protection, Physiognomy Preservation and Tourism Sustainability in isolated island regions: Case study of development of an agro-touristic landscape on Astypalaia Island

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Abstract

Tourism is perhaps the most important lever for development in Greek islands, but it is subject to strong fluctuations due to seasonality, especially in the most isolated areas. With the aim of improving the quality and diversity of tourism products, as well as the protection of natural landscapes and the preservation of the physiognomy of remote islands, the central authorities promote the development of alternative and thematic forms of tourism. Agro-tourism is an alternative form of tourism that combines rural and tourist activities. Agro-touristic landscapes become tourist attractions. Therefore, the natural and anthropogenic elements that make it up must attract visitors while stimulating their imagination. The landscape architect, possessing specialized knowledge from a wide range of scientific disciplines, is called upon to format and design a rural landscape in agro-touristic. Through the organization of the various uses and the design, the aim is the preservation and protection of the specific landscapes and the character of place, also the improvement and creation of attractive rural-touristic landscapes to be functional, aesthetically pleasant, meaningful and sustainable, to serve a variety of human needs and objectives.

Astypalaia, the westernmost island of the Dodecanese, is an island, unsaturated in terms of tourism, which is a geographical and cultural "bridge" with the Cyclades. It has been characterized as an ecologically important area and a landscape of superb natural beauty. The aim of the study was to design the landscape of an agro-tourism unit that hosts various activities during most of the year within private field of the coastal settlement of Exo Vathy, located in the north-eastern part of Astypalaia, while also providing open spaces for visitors to meditate.

The approach followed was, on the one hand, the gathering of general regional data, cultural, historical and architectural elements, information on the vegetation, crops, meteorology and soil of the island and on the other hand, the assessment of the natural and anthropogenic elements of the landscape. The bibliographic research and the visual analysis were processed with the views and wishes of the owners, regarding the utilization of visitors' free time in an agro-tourism unit, and the design guidelines emerged.

Use zones, facilities and services, accessibility and aesthetics were defined to make the landscape functional and attractive and to make the project potentially sustainable. The public space of the traditional settlement of Chora of Astypalaia and the settlements of the Cyclades were the source of inspiration. Special care was given to the preservation, protection and improvement of the landscape, with the use of plant material harmonized with the climatic data of the area and the existing flora, but also the construction of ecological technical projects, in an effort to integrate into the existing landscape.

Keywords: *agro-tourism; landscape design; island regions; sustainable design; outdoor meditation*

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1. INTRODUCTION

1.1 Agro-tourism and isolated island areas

Alternative or soft tourism is a qualitatively upgraded and particularly hospitable tourism, which with discreet integration of the guests brings economic benefits for the locals and creates a climate of reciprocity between locals and visitors, while at the same time it does not affect either the ecological environment, or the social-cultural character of the area [1]. "Agro-tourism" is the tourist activity that develops in a non-urban area, by those employed mainly in the primary and secondary production sector and in particular in family or cooperative small tourist units providing goods and services [2]. It is based on the exploitation of natural, cultural and human local resources, it satisfies the specialized personal needs of modern man and aims at the retention or return of the local population, the strengthening of agricultural income and the local economy and the rise of the living and cultural level [3]. Rural tourism develops, mainly, in non-saturated touristic rural areas and is one of the alternative forms of tourism, which connects the rural with the touristic activity. There are various forms of agro-tourism development: a) on farms, where the visitor shares food and accommodation with the owners -in the same or a separate house or in the form of a camp-, b) in a pension within the farm, c) in a cooperative promoting local products and d) in settlements that are built with materials of the vernacular architecture, so as to give the image of a "traditional" village [4].

Tourism is probably the most important driver of the development of the Greek island regions, but presenting, especially in the most isolated of them, strong fluctuations due to seasonality. With the aim of upgrading the quality and diversification of the tourist product, alongside the protection of the natural landscape and the preservation of the characteristics of the isolated islands, the development of alternative and thematic forms of tourism is promoted by the central authority. Agro-tourism is a gentle form of tourism and, at the same time, an important initiative that provides opportunities for development in isolated rural areas, contributing to the protection of their natural, cultural and social environment. The agro-tourism tourist is a visitor and at the same times a friend and admirer of the place. He is a traveller who seeks the quiet life, authenticity and beauty of each region, is interested in the natural and cultural heritage of each place and seeks to discover its secrets and come into contact with its unique and special elements. Thus, in agro-tourism, the visitor comes into contact with nature, the cultivation of the land and the collection of fruits, learns the local cuisine, makes traditional sweets, food and drinks, embroiders or weaves on the loom, observes the animals and the birds. He visits wooded paths, rushing rivers, peaceful lakes, discovers impressive waterfalls and stone bridges and is guided to archaeological sites, Byzantine churches and Venetian castles. The agro-tourism landscape emerges as a tourist attraction and therefore, the natural and human-made elements that make it up, should provoke the imagination of tourists and at the same time invite them to visit. The landscape architect, possessing specialized knowledge from a wide range of scientific disciplines, is called upon to format and design a rural landscape in agro-touristic [5]. Through the organization of the various uses and the design, the aim is the preservation and protection of the specific landscapes and the character of place, also the improvement and creation of attractive rural-touristic landscapes to be functional, aesthetically pleasant, meaningful and sustainable, to serve a variety of human needs and objectives.

1.2 Study objective

The aim of the study is to create an agro-tourism landscape with a variety of activities for most of the year, which will also provide outdoor spaces for meditation to visitors, in a seaside private field within the Exo Vathi coastal settlement, located in the north-eastern part of Astypalaia.



Figure 1. (left) The private field within the coastal settlement of Exo Vathi, located in the north-eastern part of Astypalaia Island, Greece (Provided by the author & [6])

Figure 2. (right) Astypalaia, the westernmost island of the complex of the Dodecanese, Greece [7]

2. SUBJECT APPROACH

The approach followed was, on the one hand, the gathering of general regional data, cultural, historical and architectural elements, information about the vegetation, crops, meteorology and soil of the island and on the other hand, the assessment of the natural and anthropogenic elements of the landscape. The literature research and visual analysis were elaborated with the views and wishes of the owners, regarding the utilization of visitors' free time in an agro-tourism unit, and the design guidelines emerged.

3. ASTYPALAIA

Astypalaia, the westernmost island of the Dodecanese (Figure 2), is a geographical and cultural "bridge" with the Cyclades and has been characterized as an ecologically important area and a landscape of special natural beauty. A strip of land about 100 meters wide, "Steno" (the Strait), divides the island into two parts, the inner and the outer island and gives it its characteristic, butterfly-like shape (Figure 1). The capital is the homonymous settlement or Chora, which is geographically connected to the port. Clusters of small islands and islets are located in the southeast and west of the island (Figure 1).

3.1 Demographic information

It is a semi-mountainous island, with an area of 97 sq. km, a varied coastline of 110 km and with 1,399 inhabitants [8]. Its population showed a continuous decrease until 1981, while after that it shows a small increase [9]. The largest percentage of the population (44%) is employed in the tertiary sector [10], mainly due to the development of tourism during the last time period. It is connected by ferry to Piraeus and the other islands of the Dodecanese, while there is also an airport with a relatively good connection to the airport of Athens and Rhodes Island.

3.2 Natural landscape of Astypalaia

The topography of Astypalaia is semi-mountainous (Figure 3) with two distinct lowlands in its southwestern and northeastern parts (Livadi and Vathi, respectively). The coastline of the island forms many small bays (Figure 3), with steep shores in several cases.



Figure 3. The coastline of the island forms many small bays [11]



Figure 4. In the coastal settlements there are olive trees, figs, tamarisks [12]

According to the meteorological station of Astypalaia [13] for the period 1977-2013, an average annual temperature of 19.27°C was recorded, while the average monthly values range between 11.68°C (February) and 27.20°C (July). The average minimum monthly air temperature of 7.73°C is recorded in the month of February, while the average maximum monthly temperature is recorded in July and amounts to 32.09°C. The absolute minimum value (-5.00°C) was recorded in the month of February, while the maximum (40.20°C) was recorded in the months of June and July [14].

The island is home to many rare species of flora and fauna [15], as well as endemic species of Aegean flora (Figure 4). Its eastern part, together with the cluster of 12 surrounding islets, is part of the NATURA 2000 network.

The vegetation there is characterized by bushy cypresses, skins and sparse gorse. In the western part, phrygic species dominate (*Sarcopoterium Spinosum*), while in the streambeds we find wickers, oleanders and figs. In the coastal settlements there are olive trees, figs, tamarisks, but also coniferous trees, reed beds and vines [16]. Intertwined with the landscape of Astypalaia is the presence of

aromatic-medicinal plants, which captivate visitors with their strong aromas. In the mountains grows the saffron plant, which is used in local cooking and confectionery.

3.3 Architecture of Astypalaia

The flow of the centuries is imprinted in Chora, with the medieval castle dominating the landscape (Figure 5). The very well preserved windmills are one of the dominant landmarks of the island. The architecture of the settlements is part of the Aegean style [17] and follows more the morphological characteristics of the Cycladic islands (Figure 6 &7). The dominant color of the buildings is white (Figure 6 & 7) and the public space within the residential fabric, following the morphology of the ground, consists of stone staircases with often crooked and irregular shapes, which highlight a synthetic freedom and plasticity and form a variety of stance points (Figure 7).



Figure 5. The medieval castle dominating the landscape of Chora [18]



Figure 6. It looks like a Cycladic island [19]



Figure 7. The public space of Chora [20]

4. READING THE LANDSCAPE

The topographic survey (Figure 8) of the plot identifies its boundaries, the proposed positions and contours of the new building tourist facilities, as well as the slope of the ground, which along its length forms strongly in the northern part and smoothly from the middle to its southern limit. The landscape of the area follows the form of the natural landscape of the eastern areas of Astypalaia, with bushy cypresses and lentisks, but as it is also a coastal area, there are reed beds to the south of the plot that reach the beach, conifers, figs and tamarisks (Figure 8). In the north-eastern part of the plot, near the municipal road, which leads to the beach and faces it, there are remains of old stone livestock facilities (photo on the right).

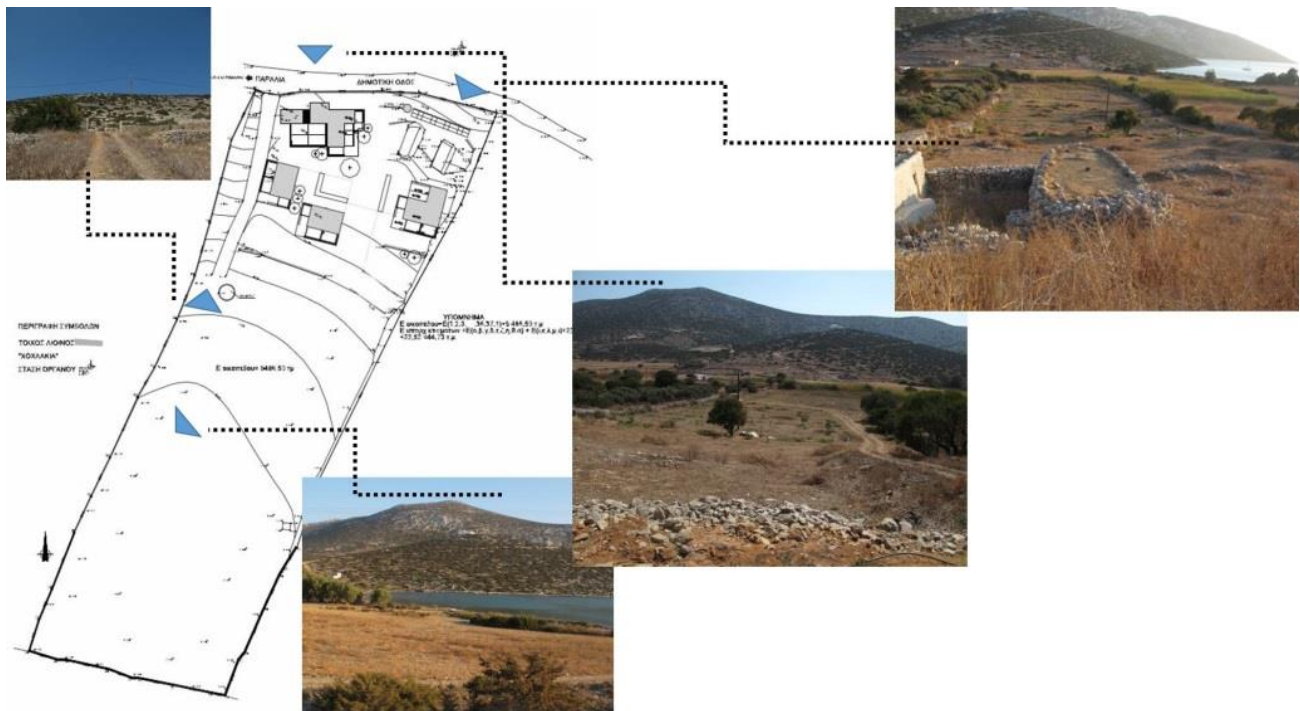


Figure 8. Visual analysis (Provided by the author)

5. DESIGNING AN AGRO-TOURISM LANDSCAPE

5.1 Design Guidelines

Following the owners' desire to make the specific space functional, attractive and sustainable for most of the year, the zones of use, facilities and services, accessibility and aesthetics were defined to serve a variety of human needs and goals. For the formation of the movement network and the places for visitors to stop and relax, the public space of the traditional settlement of Chora of Astypalea, as well as the Cyclades, was a source of inspiration, morphologically as well as in terms of structure and composition. Points of interest and activities with different identities are created (rest, recreation, cultivation, cooking, and exercise) (Figure 9). The organic lines of the olive grove define isolated spots for meditation and tranquility, constituting a Mediterranean approach for these spaces (Figure 10).

5.2 Design proposal

The landscape of the agro-tourism unit is formed by "borrowing" functional and morphological elements from the traditional settlements of the country and the rural landscape, but adapted to the needs of the establishment (Figure 18). The movement inside the space is made by stone paths, which

follows the slope of the ground and along its course, terraces, stopping and viewing points are created (Figure 11).

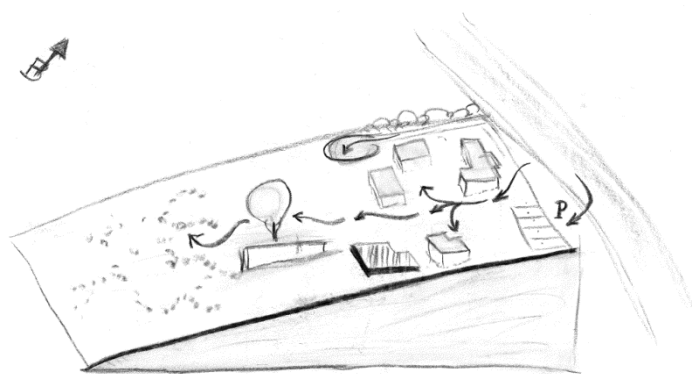


Figure 9. Concept diagram illustration (Provided by the author)

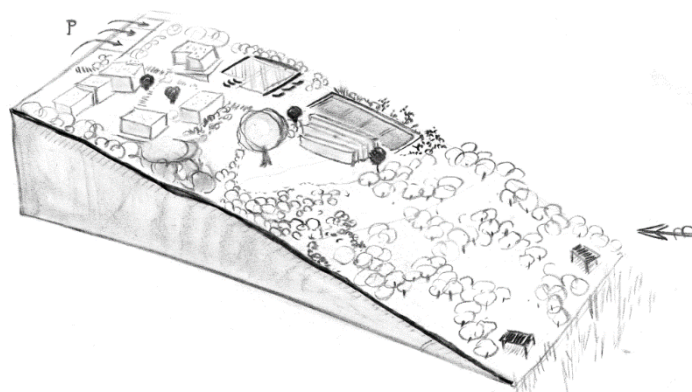


Figure 10. Design approach (Provided by the author)

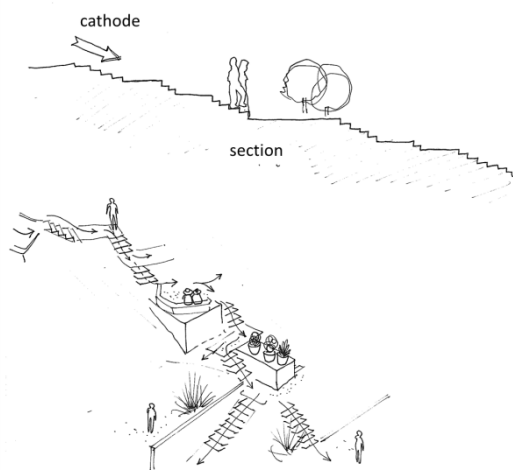


Figure 11. Schematic cross-section along the plot and illustration of movement with sketches (Provided by the author)

The design proposal includes:

- Configuration of a car parking area to the left of the entrance to the plot with perimeter planting with shrubs (Figure 12, left).
- Bar & Shop selling local products. The remains of the old livestock facilities are preserved and turned into a bar and a small shop selling local products (Figure 13, right).

- Placement of an ecological swimming pool on two levels, near the eastern boundary of the plot, at a point that offers the possibility of a view towards the sea and the west. To the west of this, among the almond trees, hammocks are placed for resting under their shade (Figure 14, left).
- "The threshing floor": The path between the prickly pear trees leads to the threshing floor, a rest area with a view to the west, surrounded by peanut and fruit trees (Figure 15, right).
- "The square": The stone path leads, approximately in the middle of the plot, to the "square", a gathering place for the residents of the tourist unit, but also the visitors, where the plane tree dominates, surrounded by aromatic plants (mainly rosemary, lavender & honeysuckle) (Figure 16, left).
- Creation of a vegetable garden on the eastern border, separated from the "square" by a wall of wire mesh boxes with stones, which also functions as a backdrop for exhibitions or projections. Products from the vegetable garden are used in outdoor cooking classes under the almond trees (Figure 18).
- "The olive grove-a place of meditation": The lowest level of the plot, next to the reed beds, is formed into an olive grove with rhyming movements, where among the olives, gazebos and small openings offer the right space for meditation (Figure 17, right).

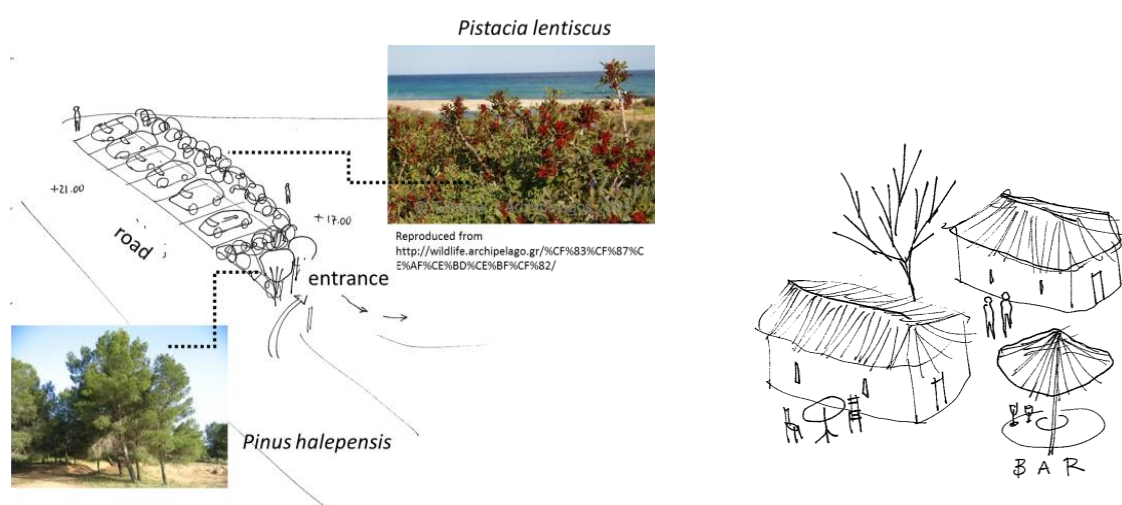


Figure 12. (left) Car parking space (Provided by the author)

Figure 13. (right) hop selling local products (Provided by the author)

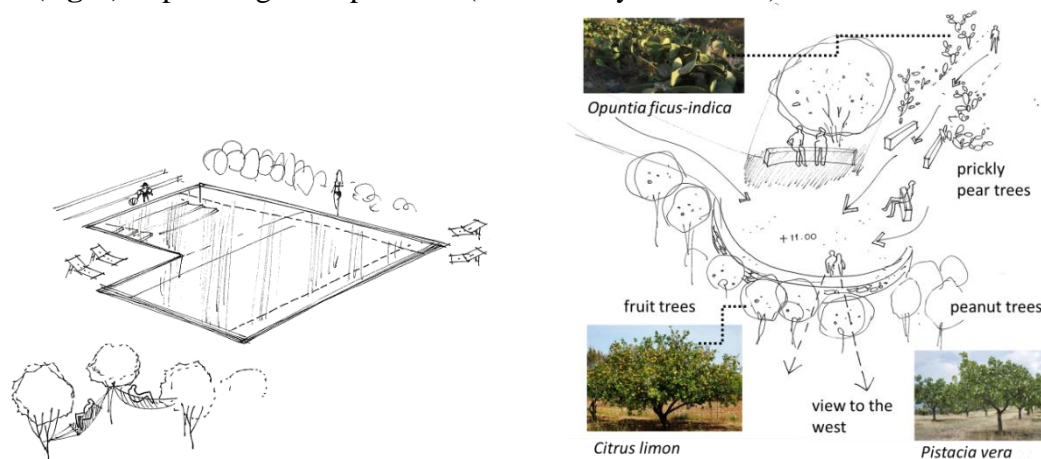


Figure 14.(left) Ecological swimming pool and hammocks (Provided by the author)

Figure 15. (right) "The threshing floor" (Provided by the author)

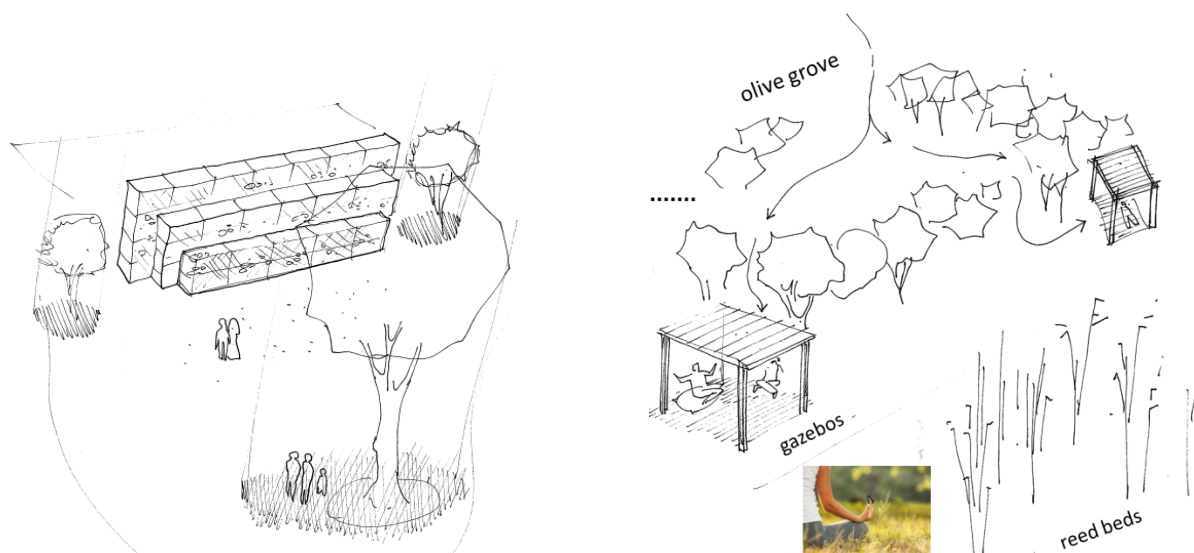


Figure 16.(left) "The Square" (Provided by the author)

Figure 17. (right) "The olive grove - a place of meditation" (Provided by the author)

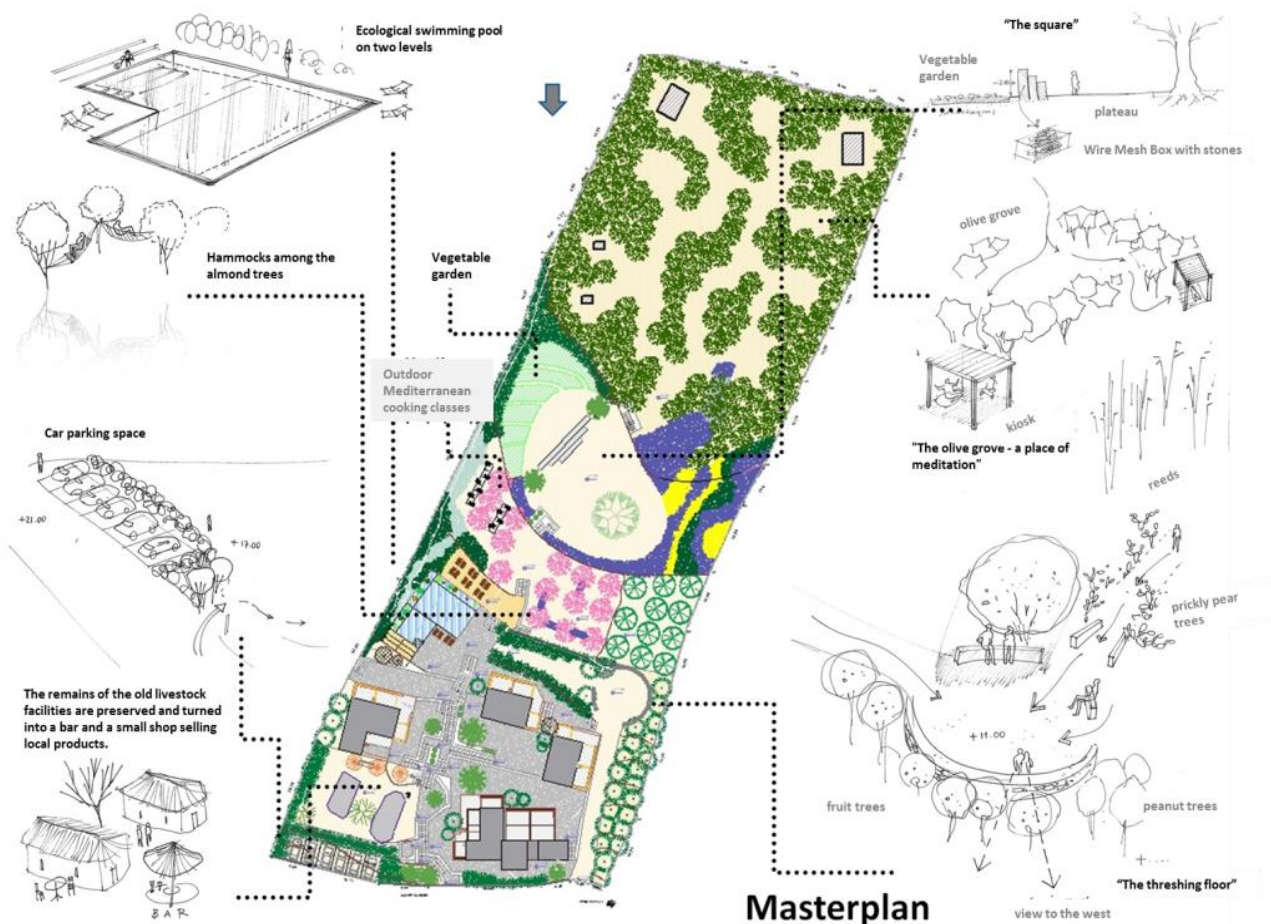


Figure 18. Masterplan and sketches (Provided by the author)

5.3 Materials

Special care was given to the preservation, protection and improvement of the landscape, with the use of plant material, which harmonizes with the climatic data of the area, but also with the existing

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flora. It is proposed to use natural materials, colors and textures, but also ecological technical works, such as the swimming pool, in an attempt to integrate into the existing landscape.

6. CONCLUSIONS

The design proposal for the creation of an agro-tourism landscape in a private field in the Exo Vathi coastal settlement of Astypalaia combines the production, aesthetics and function of recreation. So, it forms the appropriate conditions for the promotion and rational utilization of the plot for most of the year with the parallel protection of the natural landscape and the place physiognomy, constituting at the same time, a potentially sustainable application of an alternative form of tourism in an isolated Greek island region.

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Inclusive and accessible design regarding architectural heritage buildings, as a disaster prevention and climate resilience key

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Abstract

The climate crisis and the emergencies originating from natural disasters affect the ability of society to such an extent that direct and effective management is required. Focusing on architectural heritage and further on vernacular and historic buildings, measures concerning their adaptation to climate change impact as well as interventions for disaster prevention and preparedness, need to be developed. Heritage buildings have particular features which constitute their identities and contribute to culture and collective memory preservation. On the other hand, these features often limit buildings' accessibility and, consequently, possible adjustments for disaster prevention and preparedness, thus putting heritage buildings' sustainability under discussion. Undoubtedly, people with disabilities are more vulnerable to the impact of climate change and disproportionately affected by natural disasters, as they face considerable problems and inequality regarding disaster management. As a condition for inclusion, accessibility needs to be addressed as a core component of disaster risk management and resilience against climate change crisis to integrate inclusive and accessible design, with implementation in the built environment and particularly in architectural heritage. The research field of accessibility in architectural heritage environments has not been significantly investigated at the Greek national level, so it is deemed a challenge to generate relevant research. The detection and recording of the obstacles encountered, which can restrict the mobility of people with various types of disability, is crucial for the evaluation of heritage buildings' accessibility level, especially in the frame of evacuation during emergencies.

This paper presents a structured methodology for the investigation and evaluation of the accessibility of heritage buildings, in general and especially in case of evacuation of disabled people, focusing on different types of impairment (mobility, sensory, mental), the specific problems to deal with, and the relevant needs. The investigation is carried out under the prism of preservation of architectural heritage and in terms of traditional or historic structures, forms, materials, and construction techniques, which are considered possible generators of physical and intellectual barriers, in conjunction with evacuation procedures and warnings. Through the recording of the obstacles concerning access, the evaluation of the existing means, and the proposal of interventions in the context of Universal Design, the aim is to contribute to achieving accessibility for all and to make climate change resilient buildings. Enhancing heritage buildings' accessibility and thus their functionality, usability, and safety, also boosting their climate change resilience, is expected to largely contribute to heritage preservation and to settlements' and cities' sustainability.

Keywords: *accessibility; architectural heritage buildings; climate resilient buildings; disaster prevention*

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1. INTRODUCTION

Undoubtedly, natural disasters related to climate change or other cause as well as human-caused ones, entail greater danger for disabled people. Belonging to the vulnerable groups, they face considerably bigger problems and often inequality regarding disaster management. The empowerment of vulnerable people, also in emergencies, by removing obstacles and constraints is widely emphasized (1 point 23). The detection and recording of the obstacles encountered in the built environment and particularly in buildings, which can restrict the mobility and perception of people with various types of disability, is crucial for the evaluation of these buildings' accessibility level, especially in the frame of emergencies and evacuation. This evaluation can lead to the necessary environmental and organizational modifications for the full participation and safety of persons with disabilities, and consequently of all people.

As historic and traditional architecture worldwide is deemed at risk [2], facing serious problems of obsolescence due to the contemporary culture homogenization and global socio-economic transformation, it seems that accessibility can constitute a pillar for heritage's sustainability. In this frame, the recording and evaluation of heritage buildings' accessibility and the relevant necessary modifications are critical. The enhancement of heritage buildings' accessibility is expected to boost their functionality and usability to a great extent, thus contributing to their sustainability. The evaluation and interventions are carried out in the framework of Universal Design. The application of its principles in the historic/ traditional environment, with the necessary adjustments and under the prism of protection and restoration, is determining.

The interface between two issues of great importance concerning the built environment, namely the ensuring of the unobstructed and autonomous access of all people to it, and the measures and interventions for friendly to the environment modifications which will enable its sustainability and resilience to climate change, is crucial [3]. The improvement of access and perception of buildings, focusing on heritage ones, is supposed to be a driver concerning disaster prevention, preparedness and risk management, and also resilience to climate change regarding the impact via natural disasters and the critical role of the accessible buildings in the accessibility chain in the built environment.

Within the frame of the investigation and evaluation of the accessibility of buildings, with the emphasis on heritage ones, in case of evacuation of disabled people during emergencies, the research focuses on four different groups of disabled people: people with mobility impairment, sensory impairment, particularly sight and hearing, and people with mental impairment. The problems they confront and their needs are examined and taken into account with the objective to structure a methodology for the evaluation of buildings' accessibility level. The proposed tool, in the context of this methodology, comprises an analytic list of criteria related to a building's general use by the aforementioned groups of people, and also its use in emergencies regarding evacuation and warning in case of a fire, an earthquake, a flood, or other. The methodology is structured for contemporary and conventional buildings, however being applicable to heritage buildings too, vernacular and historic ones.

Through the proposal of a tool for buildings' accessibility measurement and evaluation, the research aims to contribute to the creation of inclusive and accessible buildings which can ensure to the highest possible extent a safe and unobstructed operation and use, also in emergencies, for all including disabled people. This is expected to largely enhance disaster prevention, preparedness and risk management in the environment of cities and settlements, particularly regarding architectural heritage, boosting at the same time preservation, resilience against climate change crisis and sustainability.

2. PERSONS WITH DISABILITIES, ACCESSIBILITY AND ARCHITECTURAL HERITAGE

The perceptual features of the environment which mainly influence people while moving inside it can be described as: imageability, enclosure, human scale, transparency, complexity, legibility, linkage and coherence [4]. The built environment is characterized by both physical features, as those of urban infrastructure, and intangible features, as human scale and transparency, which affect and form people's walkability [5].

According to the "International Classification of Functioning, Disability and Health (ICF)" [6], in the framework of the World Health Organization (WHO), the term disability includes different types of impairment, physical, cognitive, intellectual, mental, sensory, developmental, or even a combination of the above. Disability creates a number of limitations or restrictions during interaction of disabled people with other groups, features of the society [7] and the environment. A person's functioning and disability are dynamic interactions between health conditions and contextual factors, including personal and environmental factors [8, 9]. The term "persons with disabilities" corresponds to a large and heterogeneous population which faces mobility restrictions for different reasons or in different periods. It encompasses the disabled people, the elderly, the pregnant women, the children of pre-adolescent age, the persons with temporary injuries and chronic ailments, the parents with children in strollers, and other groups.

The objective of full participation of persons with disabilities in all areas of social life, leads to necessary environmental modifications as well as to organizational ones and attitudes. Especially regarding the access to culture and furthermore to architectural heritage, United Nations' Universal Declaration of Human Rights [10 article 27.1] provides for all individuals' access to cultural commodities. In addition, the Convention on the Rights of Persons with Disabilities (CRPD) [11 article 30] emphasizes the right of persons with disabilities to participate in cultural life on an equal basis with others. Accessibility can ensure this right regarding the various activities, services and places related to cultural life, including monuments, sites and heritage buildings. Moreover, in the frame of the Amsterdam Declaration on the European Architectural Heritage [12], architectural heritage conservation is deemed an integral part of urban planning, thus taking into account social factors as inclusivity. By extension, the heritage protection and conservation context encompasses the factor of accessibility.

Focusing, further, on the included into traditional and historic settings buildings, the elements which constitute these buildings' identity often restrict their accessibility. Therefore, under the accessibility prism, the infrastructure which expresses history, place memory and architecture via the traditional and historic structures, forms, materials and techniques, and is related to distances, height differences and inclinations, is deemed a possible generator of multidimensional barriers [13]. As a result, persons with disabilities face physical (structural) barriers which hinder their approach and transfer within heritage spaces, and also intellectual barriers which do not allow them enjoy the full experience of the commodity of heritage. Nevertheless, each historic building or place is unique and the level of access to it that can be achieved is dependent on the characteristics of the site itself [14].

Furthermore, it should be highlighted that as architectural heritage has evolved into a cultural commodity [15] of cultural and economic value, its protection, conservation and enhancement including that of its accessibility level, increases heritage's efficiency, with benefits for the society. The above, always in the strict frame of protection and conservation, is vital for this significant asset's sustainability.

3. ACCESSIBILITY, DISASTER PREVENTION AND CLIMATE CHANGE RESILIENCE

3.1 Persons with disabilities and natural and human-caused disasters

According to United Nation Office for Disaster Risk Reduction (UNDRR) [16], a "disaster" is a serious disruption of the functioning of a community or a society at any scale due to hazardous events

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interacting with conditions of exposure, vulnerability and capacity, leading to one or more of the following: human, material, economic and environmental losses and impacts. “Emergency” is sometimes used interchangeably with the term disaster.

Generally, in order to cope effectively with emergencies originating in natural and human-caused disasters and for the safe evacuation of a building, it is quite important to consider vulnerability of particular groups of population, such as disabled people. Specifically for critical infrastructures, evacuation of the population of people with disabilities is an issue of a high priority [7:15]. Undoubtedly the risks for them are much higher and it should be highlighted that mortality rate regarding the aforementioned is two to four times higher than that of the other population [17]. When evacuation is considered necessary, as in the case of a fire, for people with disabilities dealing with the emergency situation might be much more complicated compared to the other population. Their response to emergency in most cases is inadequate and usually costs their lives. A typical example is wheelchair users, encountering permanent or temporary mobility problems. The whole evacuation process which comprises the tracking of the evacuation routes and the journey towards the emergency exit, in their chairs and quickly, requires increased physical endeavor, especially in a harsh environment of dense smoke and high temperatures [7:7]. As for the earthquakes, the level of risk for people with disabilities is increased. During a building’s evacuation, many problems is possible to be confronted, such as difficulties in movement, in orientation, in the perception of hazards and warnings, as well as in emergency response coordination [18].

3.2 Persons with disabilities, accessibility and disaster preparedness and response

In the frame of the “European and Mediterranean Major Hazards Agreement (EUR-OPA)”, for the cooperation between European and Southern Mediterranean countries in the field of major natural and technological disaster, the recommendation 2013-1 on the inclusion of people with disabilities in disaster preparedness and response, was adopted [19]. The involvement of people with disabilities in preparedness and response against major hazards is deemed to reduce their vulnerability. A personal preparedness plan for disasters is expected to help people with disabilities to evacuate and survive, since emergency and care systems are poorly designed for people who depend on help or have disabilities. The evacuation plans, which can also be personal if needed, especially regarding persons with disabilities, are plans designed to help someone understand his exact position inside a building, so that to orient themselves upon the planned escape routes.

Based on the “Design for All approach”, involvement of people with disabilities in disaster risk reduction cycle seems to have an added value, especially in preparedness and response phases. Preparedness may include policies, training, planning and exercise for potential crises, whereas response refers to actions in order to resolve in effective way the crisis or emergency [20]. In regard to the preparedness phase, the so called strategic planning, people with disabilities could be trained in regard to disaster preparedness, enhancing their emergency response skills, and hence strengthening their opportunities to react effectively before, during, and after a disaster. The accessibility of buildings in this phase is crucial, especially concerning heritage buildings. Emergency response phase of the disaster management cycle may lead to development of new building codes and general standards for accessibility, rehabilitation and reconstruction. Any existing regulations or laws should be monitored and enforced to enhance emergency response for people with disabilities [7:17-18].

Focusing on the emergency evacuation planning and regarding circulation paths and notification systems in a building [21], these paths refer to the escape routes for continuous and unobstructed travelling from any position inside a building to an emergency exit. Components of a circulation path may include rooms, corridors, doors, stairs, smoke-proof enclosures, ramps, fire escape stairs, fire escape ladders, slide escapes, elevators etc. During an emergency evacuation, people who are unable to use stairways will probably need a place to remain temporarily and wait for instructions or

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assistance. These areas of the buildings which are described in buildings' fire safety plans, can be defined as refuge areas. The notification systems include alarms and public address systems [7:22].

3.3 Disabled people's general problems and needs regarding buildings' use in emergencies

Focusing on the aforementioned (see Introduction) four big groups of disabled people and concerning the problems they experience moving inside a building in case of emergency, especially during an evacuation, and also their relevant needs regarding the structural and mobile elements, the signage, the light and sound systems etc., the following are recorded [22]:

A. Regarding people with mobility impairment, they face (a) significant difficulty, given that the use of lifts is not recommended in emergencies, (b) need of more time and possibly of intervals for rest during a building evacuation, (c) need for other people's help to reach the emergency exit, (d) during the evacuation, possible loss of their necessary medical equipment and devices like walking sticks or walkers, which provide autonomy in movement, (e) possible difficulty regarding direction if there are not lower height signs indicating the escape route and the exit, and (f) difficulty in moving to the places of refuge if there are obstacles in the route. Moreover, this group needs structural elements as ramps and in case there are not any, portable ramps, evacuation chairs and for the wheelchair users, powered tracked stair climbers. They are also in need of handrails according to standards, for ramps and stairs, and other elements, light and sound systems etc. It is crucial for mobility impaired to know whether there are usable circulation paths (escape routes) inside a building, otherwise alternative evacuation routes and methods may need to be examined.

B. As for people with sight impairment, the problems faced during a building evacuation are (a) difficulty in perceiving an emergency, if the relevant warning is not audible, (b) difficulty in understanding the relevant information and generally the information material, if it is not audible or in Braille system and generally in a tactile form, (c) difficulty in evacuation, if the usual to these people exits are not in operation and (d) difficulty in moving towards and inside the places of refuge. This group's needs during evacuation are for audible alarm systems, warning and notices of danger, escape signs in Braille system and of color contrast, probably personal evacuation plans with alternative escape routes, and high lighting level not creating reflections, for the partially sighted persons.

C. About people with hearing impairment, the problems faced during a building evacuation are (a) difficulty in perceiving an emergency, if the relevant warning is only audible, (b) difficulty in understanding the relevant information and generally the information material, if this is not available in written form or with images too, (c) difficulty inside the places of refuge, if there are not interpreters in sign language or written notices. The needs for structural and other elements during evacuation are particularly for visual warning systems, lighted panels with scrolling messages, high lighting level which facilitates reading, possibly personal warning devices (in watch form). In general, people with hearing impairments can use the standard means and systems of a building, however it is extremely important for them to be aware of any existing visual notification systems inside the building.

D. Regarding people with mental impairment and the problems faced during a building evacuation, these are (a) significant difficulty in the evacuation of a place, (b) difficulty in perceiving an emergency, (c) difficulty in understanding the relevant information and guidelines, (d) confusion regarding the use of various precautions and (d) isolation in the places of refuge. The needs of this group are for elements as leaflets with description of the evacuation procedure in easy and understandable language with the use of images and symbols, use of color codes for the emergency exits, support of the "friends system" in which friends act as a team where one helps the other in emergencies, and presence of a trainer. In general, people with intellectual disabilities, cognitive impairments or mental health issues may not understand an emergency warning. As a result, cognitive impairments prevent a person from using all standard building systems for safe evacuation. In such a case, assistance plans need to be developed.

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4. INCLUSIVE AND ACCESSIBLE DESIGN

Universal design is an inclusive design which integrates the understanding and managing of the diverse population's needs and concerns in the design of environments, as well as of products, programs and services, to be usable by all people to the greatest extent possible [23]. Regarding persons with disabilities, universal design is crucial for ensuring their access and participation to the activities taking place in the built environment. In this context, the various types and levels of barriers to heritage buildings' accessibility need to be addressed via this design, by certain measures and interventions. In every single case of heritage building, reasonable adjustments [11 article 2] comprising the necessary and appropriate modifications, can be applied. The objective is the effective integration of building's idiom elements and new elements appropriate for access and perception. The design incorporates also possibly required assistive technological devices for particular groups of persons with disabilities. Taking into account these persons' needs facilitates all people's life. Moreover, universal design is an innovative and dynamic strategy which focuses on constantly seeking better solutions in a context where technology, knowledge and awareness are rapidly changing. Thus, it is necessary to consider continually new solutions as a means of minimising technical and environmental limitations.

5. METHODOLOGY FOR BUILDINGS' ACCESSIBILITY EVALUATION IN THE FRAME OF EMERGENCY EVACUATION OF DISABLED PEOPLE

The following proposed methodology for accessibility recording and evaluation, can be applied in conventional buildings as well as in heritage buildings in historic centers of cities or in vernacular settlements. Although it emphasizes the condition of emergency evacuation, it is applicable generally in buildings for the evaluation of their accessibility level. This structured methodology comprises a process which consists of the following steps:

1. General building description with reference to the accessibility requirements according to the current regulations.
2. Recording of the building's population (employees, visitors etc.) including disabled people.
3. Listing of the general problems and the relevant needs which each group of disabled people, depending on the type of disability, encounters during building evacuation, concerning the building's structural and mobile elements, the signage, the light and sound systems etc.
4. Investigation and evaluation of building's accessibility in the frame of the planned evacuation procedure regarding each group of disabled people, and in the frame of warning in case of a fire or an earthquake. In this context, the escape route is examined for each floor in parts and in terms of geometrical characteristics, floor characteristics, signage (visual, audible and tactile). The starting point of the escape route is the room where a disabled person is possibly located in case of a fire or an earthquake, and the final point is the assembly point, usually outside of the building. The obstacles inside the building which can limit the mobility of the groups of disabled people, are located and recorded with the focus on the escape route. The building's structural elements (e.g. height and width of corridors, level differences), the mobile elements of the spaces (furniture, other equipment), the signage, the light and sound systems, can possibly act as obstacles.
5. Proposals for improvement of the building's accessibility in order to reduce or even eliminate the recorded obstacles regarding the evacuation in emergencies.

5.1 The emergency evacuation plan of a building

The evacuation of a conventional building is usually carried out via the main staircase and the main entrance/ exit, following the escape route which has relevant signage. If there are basements, people escape by using vehicle ramps or alternatively, and in heritage buildings too, the staircase. Getting out of the building, they are directed to the assembly point, if determined. Apart from the general evacuation plan, when required, there is usually provision for the creation of personal emergency evacuation plans for disabled people whose requirements for help cannot be entirely met by the

evacuation plan. Respectively, the disabled visitors can declare their requirements for help in case of evacuation. It is critical that a special evacuation procedure regarding each of the groups of disabled people is developed. The evacuation plan of a building has to be accessible to all, fulfilling the requirements of a conventional text and diagram, of a tactile form and of a simplified form with symbols and colors.

5.2 Recording and evaluation of buildings' accessibility level - synoptic and analytic tables

The following structured tables, namely the synoptic (Table 1) and the analytic one (Table 2), encompass the criteria for the assessment of the accessibility level of a building especially in case of emergency evacuation, focusing on persons with disabilities. Concerning evacuation, the escape route is examined analytically and in parts. The recorded data are assessed and the evaluation is accompanied by proposals for improvement interventions regarding the building's accessibility.

Table 1. Synoptic table of criteria for the assessment of the accessibility level of a building, in case of emergency evacuation

Floor	Inspection checklist	Evaluation - Improvement proposals
Emergency Exits - Floor - Ground Floor		
PARTS OF THE ESCAPE ROUTE		
1. Room where a Disabled Person is situated in case of a Fire or an Earthquake	Main room	
	Accessible toilet	
	Other (kitchen etc)	
2. Floor corridor		
3. Staircase (fire compartment)		
4. Route in the open area in front of the building		
5. Route to the Assembly Point		

Table 2. Analytic table of criteria for the assessment of the accessibility level of a building, in case of emergency evacuation (parts 4 and 5 of the escape route are not included)

Floor	Inspection checklist	Evaluation - Improvement proposals
Floor Emergency Exits Ground Emergency Exits	Number Position	
PARTS OF THE ESCAPE ROUTE		
1.Room where a Disabled Person is situated in case of a Fire or an Earthquake	Room's corridors' width, for the wheelchair user Space of 1.50m diameter for the wheelchair user to rotate Height free of obstacles Level difference/ bridged by a ramp or other Ramp -ramp gradient -ramp width -ramp landings (in the beginning and end of ramp/ in relation to ramp length and gradient) -double handrails at both 0.70m and 0.90m height from the floor -ramp kerbs -ramp surface material Room's door width (clear)/ opening/ to outside/ opening not requiring significant force Door color different from the one on the doorframe and the adjacent wall Door handle -type -length -height from the floor Room floor surface material Mobile furniture (for facilitating Disabled People) Room lighting -natural -artificial Room signage -visual -audible -tactile (in Braille system) -anti-reflective plates -of different color of the one on the adjacent wall Regarding emergencies: Alarm system and signage for evacuation -Audible alarm -Light alarm -Signs (with light) for the escape route	
2. Floor corridor	Width free of obstacles Space of 1.50m diameter for the wheelchair user to rotate Height free of obstacles Level difference/ bridged by a ramp or other Floor surface material Handles of no sharp end Regarding emergencies: Floor Evacuation Plan -provision of evacuation procedure regarding Disabled People -suitable form of sign plate for People with sight impairment -suitable form of sign plate for People with mental impairment -sign plate at suitable height for wheelchair users -anti-reflective sign plate -of different color of the one on the adjacent wall Regarding emergencies: Alarm system and signage for evacuation -Audible alarm -Light alarm -Signs (with light) for the escape route Evacuation system -powered tracked stair climber for evacuation through the staircase (in waiting position)	
3.Staircase	Type and form of staircase Width of staircase (clear) Stair landings/ length/ per number of risers Stair -Depth of the tread -Riser	

Surface material	
Slip-resistant material of different colour at the edge of the stairs	
Zone of a 0.30m width, of special tiles of type «DANGER», in 0.30m distance from the first and the last stair of the staircase	
Handrail -on both sides of the staircase -double handrails at both 0.70m and 0.90m from the stair edge -continuous throughout the staircase (the stair landings included) -overhanging both the start and the end of the staircase by min 0.30m -diameter -distance from the wall	
Staircase kerbs	
Staircase lighting	
Signage -visual -audible -tactile (in Braille system) -anti-reflective signs -of different color of the one on the adjacent wall	
Regarding emergencies: Alarm system and signage for evacuation -Audible alarm -Light alarm -Signs (with light) for the escape route Evacuation system -powered tracked stairclimber for evacuation through staircase (in waiting position)	

6. CONCLUSION

Enhancing buildings', especially heritage ones', functionality, usability and perceptibility, by ensuring their accessibility, will largely contribute to their sustainability as historic places, living places, and tourism and education destinations. Moreover, accessibility needs to be addressed as a core component of disaster prevention and risk management, and of resilience against climate change crisis. Given, generally, the unpredictable time of emergency events, enhancing the accessibility and perceptibility of buildings is deemed to constitute a basis for constant and effective addressing of environment's disasters and emergencies. The proposed in this paper methodology and tool for buildings' accessibility measurement and evaluation, are expected to contribute to the configuration of a holistic approach regarding buildings, inclusivity, disaster prevention and management, and climate change resilience. The effective combination and management of the above will benefit the society, the economy and the environment including architectural heritage.

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Biocultural city: An answer to urban challenges

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Extended abstract

The present paper deals with issues of urban sustainability policies. It focuses on the case study of the city of Kalamata, a municipality in southern Greece, and examines the biocultural approach to municipal sustainable development policies since 2019.

Living in times of uncertainties and emergencies and in order to face challenges such as cultural diversity, climate change, environmental degradation, digital transformation, energy demands, migration, social exclusion, mortality and population ageing, pandemics, economic upheavals, growing inequalities, conflicts, etc., the local governments need to adopt innovative responses and new governance approaches as traditional practices fail to respond to the above issues.

To address these challenges effectively, we need a diversity of actors, resources and tools that can unleash our collective imagination and unite communities in common efforts to change the current status quo.

Culture and ecology have a powerful role to play in the regeneration of the potential of diverse communities and contexts and in their global interconnection for the benefit of all the people and of the planet also. To this end, cultural and environmental policies must be integrated into the concept of sustainability, both as an autonomous backbone of sustainability and as a contributor to its many dimensions.

To strengthen and substantiate our argument, the city of Kalamata is used as a case-study, where we conducted a qualitative survey using mixed methods to explore, among other issues, how residents and the municipality authorities perceive cultural heritage and to what extent it could be used as an asset for sustainability.

This paper presents the outcomes of ongoing field research, highlighting the necessity for multi-level governance with a bottom-up approach and synergies. The actors have confirmed that the biocultural approach to urban governance can address modern challenges. Vast majority of residents believe that utilizing cultural heritage is essential for local development. Renovations in the historical center of the city were perceived, by most of the residents, to have positive impact on cultural heritage as they consider that urban planning greatly improves social cohesion. However, the majority believe that social consultation was insufficient.

Data demonstrate that in Kalamata culture and creativity play the role of a visionary connector, as they help municipal authorities and residents to grasp the complex realities we live in and offer tools and spaces to participatorily design different, more sustainable ways of living together.

As a core outcome of the research is the imperative need to change governance values and culture to deal with current challenges and achieve SDGs.

Keywords: *biocultural approach, cultural heritage, sustainability, governance*

Outreach activities in archaeological sites – Public Archaeology within the city

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Extended abstract

In recent years there is a massive urge in public engagement programmes taking place internationally which combine various approaches from ‘bottom-up’ to ‘top-down’ and promote collaboration among community groups and heritage managers. In Greece, although there is a gap of communication between archaeologists and the wider public, there are certain activities run by museums, institutions or individuals and addressed to public and aiming at the protection, preservation and presentation of monuments and archaeological sites.

This paper deals with outreach activities taking place in archaeological sites within cities. The paper outlines main theoretical issues and definitions in Public Archaeology; it considers the current trends requiring commitment to sustainability, adopting inclusivity and ethics as the basis for a responsible practice; and it focuses on public engagement programmes that take place in Greece.

The paper presents programmes run by state and non-state institutions which are addressed to local communities, students or tourists and explore the value of these programmes in terms of the connection between people and cultural heritage.

The paper presents different case studies in order to show the similarities and differences of various agents, to approach the role of public archaeology and the potential of archaeological sites to raise awareness: Through archaeology, the public can learn what was successful and unsuccessful for people in the past who faced problems similar to those we face today. Besides, public may also learn about management and policies that could be sustainable or non-sustainable in time-periods of climate and sea-level change; or dynamics of population. Moreover, communicating archaeology with non-expert audiences can implant respect for cultural heritage, and connect descendant communities to their past.

However, academics have been trained to avoid storytelling due to the risk of inaccurate communication including insensitive portrayals and oversimplified issues. Parallel to this, outreach programmes are used to enhance the qualities of archaeological sites and their potential to translate complex ideas while retaining their richness. Thus, these programmes can maximize audience engagement.

Keywords: *outreach activities; public archaeology; heritage of the city; community participation; heritage management.*

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How Do International Social Media Users Perceive Chinese Cities? The Case Study of Suzhou, China's Heritage City Destination

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Extended abstract

Social media exerts a profound influence on shaping the destination image of tourist attractions. China has developed an independent social media landscape, which has led to a noticeable void in understanding the experience of international visitors when they travel to China. Unlike prominent destinations like Beijing, Shanghai, and Xi'an, lesser-known cities face limited exposure beyond China's great firewall, hindering global access to information about these hidden gems. This research aims to unveil how international visitors and social media users perceive Chinese historic cities and explores the potential of international social media to promote the inbound tourism of less popular Chinese cities. Specifically, the study delves into user comments on YouTube videos about Suzhou Historic City in Jiangsu Province, renowned as the "Venice of the East" for its historic waterways, cultural heritage, and meticulous preservation efforts. The city is arguably one of China's most highly esteemed heritage destinations drawing a significant annual influx of domestic tourists. Despite this, concerted efforts to raise its international profile and boost inbound tourism revenue have proven relatively futile.

The research taps into the city's sizable expatriate population and looks at the marketing efforts of local Destination Management Organizations (DMOs) on YouTube. Employing a mixed-methodology approach, specifically text mining analysis and Partial Least Squares Structural Equation Modelling (PLS-SEM), the research assesses the relationship between the destination image crafted by local DMOs, visitor experiences and behaviours, and social media users' cognitive constructs of the city. Additionally, the study examines how visitors' feelings about Suzhou (affective responses) mediate positively or negatively in the three above-mentioned components. The findings of this research yield insights into the destination image of Suzhou as perceived by international visitors and social media, thereby providing a foundation for less popular Chinese cities to strategically leverage international social media platforms in promoting inbound tourism and enhancing the overall understanding of destination image dynamics.

Keywords: *destination image; social media; user comments; text mining; heritage tourism*

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Historical memory and colonial urban units of the period of Italian occupation in the Dodecanese (1912-1945)

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Abstract

The built environment as a palimpsest of historical memory enhances the possibility of multiple readings of the dynamics and goals; it was called to serve at the time of its creation, but it's also amenable to beautifying interpretations in terms of new dynamics and new goals that is subsequently called upon to serve. The historical path and identity of Italian expansionism is revealed, through both urban interventions architectural projects that imposed specific morphological characteristics which were enhancing the political image of the regime. The specific Architecture that dominated and was imposed during the Fascist version of the Kingdom of Italy and that obsessively claimed its ethno - racial dimension and supremacy, simultaneously includes the Fascist-Ethno-Racial and Colonialist dimension both during the pre-Fascist and Fascist versions of the Italian Monarchy. The modern type of development imposed by the colonial Italy on the islands (mainly in Rhodes, Kos and Leros) essentially involved a new kind of economic-production system in the colonies, a Euro-colonial type, "non-competitive with the metropolis" due to both "the torrential urban planning activity and the rapid processes of birth and change of the spatial forms imposed by the metropolis".[1]

Keywords: *Rhodes; Kos; Leros; Italian colonialism; Italian occupation in the Dodecanese.*

1. INTRODUCTION

The architectural production of the period of Italian occupation in the Dodecanese, with its extensive and intense presence in the tissues of the cities of Rhodes, Kos and Leros, was a specific morphological approach and process by the central and regional service structures of Italian colonialism. It was deliberately attempted to shape and impose on space all ideologies and social practice of the metropolis, through a specific synthesis, or mixture of colonial and fascist imposition. The cultural pressures being sometimes mild and sometimes extreme, the complete economic control, population changes by colonization, the attempts to adjust space to their interests and the fascist ideological orientation, were the dominant characteristics of the Italian occupation from 1912 to 1945.



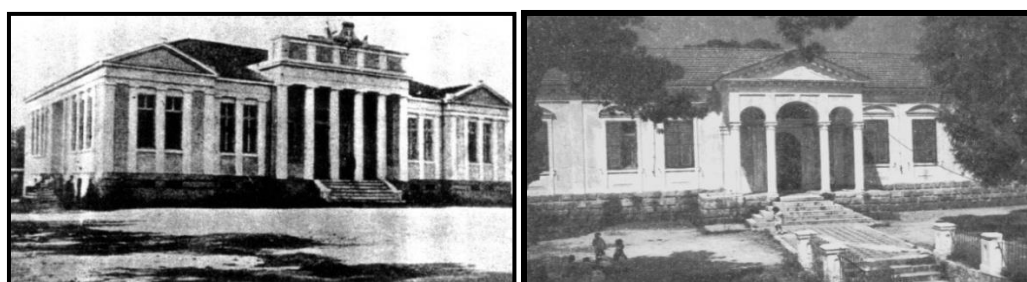
The neoclassical morphological references of buildings inside (*Muslim School*) and outside the fortifications of the old town in the last period of the ottoman occupation in Rhodes.

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Images 1, 2 : The first buildings of the extension along the port of Mandraki in the last years of the Ottoman occupation, the Government Palace (konak), the "Union and Progress" club, clearly give the mark of the neoclassical architectural choices in the attempt to modernize the ottoman administration.



Images 3, 4 : The Venetoklio Gymnasium, 1909-1910, the Muslim School.

2.THE ARCHAEOLOGICAL RESEARCH AS A PRETEXT OF ITALIAN EXPANSION TO THE EASTH



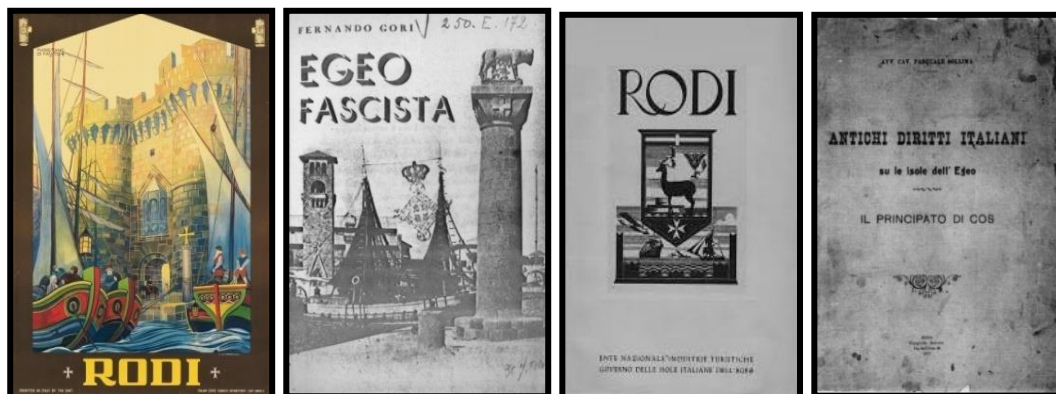
Images 5, 6, 7, 8 : The Archaeologists: Federico Halbher. Giuseppe Gerola. Alessandro Della Seta. Amedeo Maiuri.

The role of archaeology, in shaping the ideological background of Italian expansion in the Mediterranean through roman, medieval and fascist "modern" identity, was also decisive. The archaeologist Amedeo Maiuri, as reported by the Greek Consul in Bari, in a lecture organized by the fascist center of the city, in 1924, "characterized the monuments of Rhodes as beings of Italian style and art", concluding that "Rhodes ethnologically and religiously belongs to the Italian Nation, to whose possession it naturally returned due to its last occupation 11 years ago by the Italian army".[2] His predecessor in Rhodes, archaeologist Giuseppe Gerola, took a similar stance with Amedeo Maiuri, promoting the same ideological network to support the pro-fascist and fascist ideologies of Italian nationalism. Giuseppe Gerola supported and served the closed ties between archeology and colonial politics that were a serious means of promoting cultural expansionism. In 1930, in the obituary he wrote for his uncle and mentor Federico Halbher, he referred to the "...discreet activity of the late man who concealed a political and cultural penetration under the pretext of archaeological

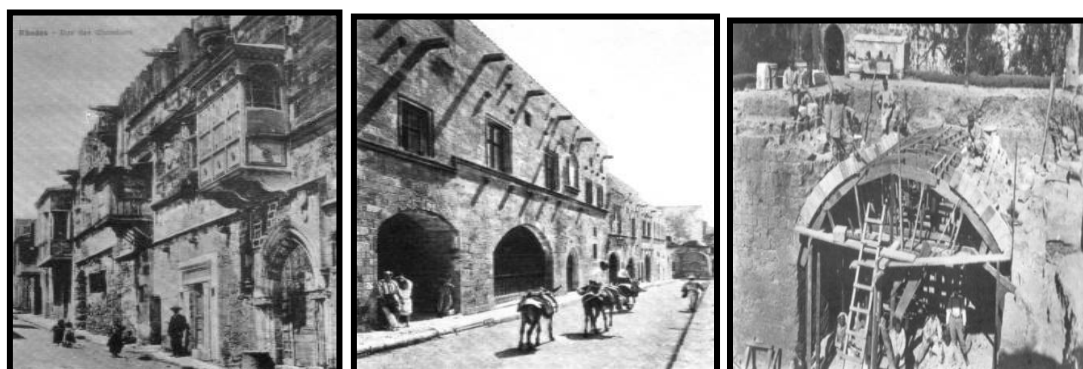
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research". The roman and medieval identity ("Romanita" - "Medievalismo") constituted a time-historical designation, as a presumption of historical "connection" and "continuity", while the new "Mediterranean" fascist identity should constitute a new recognizable geographic spatial designation. "Modernity" was a means of deconstructing local cultural-aesthetic references and a new reconstruction adapted to the particular context of fascist aesthetics and ideology. A new dynamic expression of a national character that would resonated the "totality, eternity and universality of the fascist revolution" as Bottai G. declared, in the review *Quadrante* in Dicembre 1933. [3]



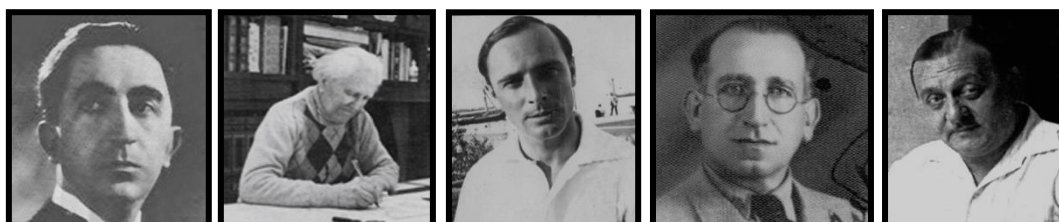
Images 9, 10, 11,12 : Postcard and poster, designed by the architect Florestano Di Fausto in 1927, showing the sea gate of Chivalric period fortification. The upper part is dominated by the two fascist emblems. Edition in Italy with the title "Fascist Aegean". Issued by the Government of the "Italian Islands of the Aegean" and the Tourism Industries Organization. The form of the Legal Knight Avv. Cav. P. Solima "Antichi Diritti Italiani su le isole dell' Egeo-Il Principato di Cos" (Historical Rights in the Aegean Islands - The Principality of Kos).



Images 13, 14, 15 . Rhodes: The reconstruction of knights street and other buildings marked the appropriation of medieval identity in Rhodes. Part of the Street of the Knights in the fortifications of the old city before and after the restoration - reconstruction operations. It was the first cleaning - purification operation of historical buildings.

3. PERCEPTION - REPRESENTATION - ORGANIZATION OF SPACE - MORPHOLOGICAL REFERENCES AND SEMIOLOGICAL AFFINITIES OF THE INTERVENTIONS

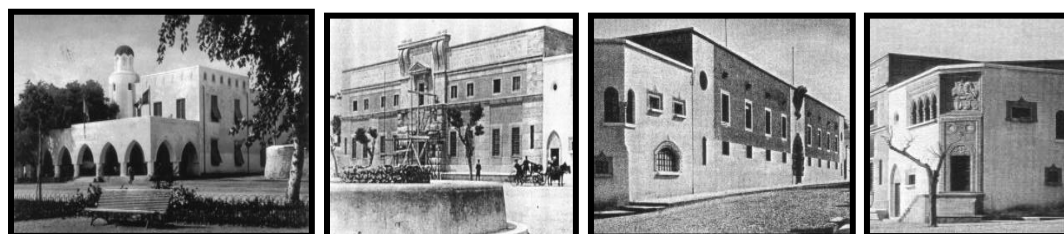
The creation of Italian Colonial Architecture in the area of the Dodecanese followed a path that is schematically delimited through the appointed governments of Mario Lago, 1923 – 1936 and Cesare Maria De Vecchi, 1936 – 1940. Mario Lago's period was the most important, because during the 14 years that it lasted, all the intervention programs were created and a large part of them were implemented. Governor Mario Lago worked closely first with the architect Florestano Di Fausto, and then with Pietro Lombardi. In the mid - 20s when the technical services were organized, but also in the 30s, new names such as Rodolfo Petracco, Armando Bernabiti and Mario Paolini emerged.



Images 16, 17, 18, 19, 20. The Architects: Florestano Di Fausto. Pietro Lombardi. Armando Bernabiti. Rodolfo Petracco. Mario Paolini.

This first period can be characterized as a fascist version of an Italian eclecticism, which drew the morphological elements of its buildings from the Knightly architecture (Gothic - idiom of Lindos), the Italian architecture of the mature renaissance and the Venetian architecture as an expression of an early "of Italian" orientalism.

The morphological redefinition and the morphological choices during the period of governor Mario Lago

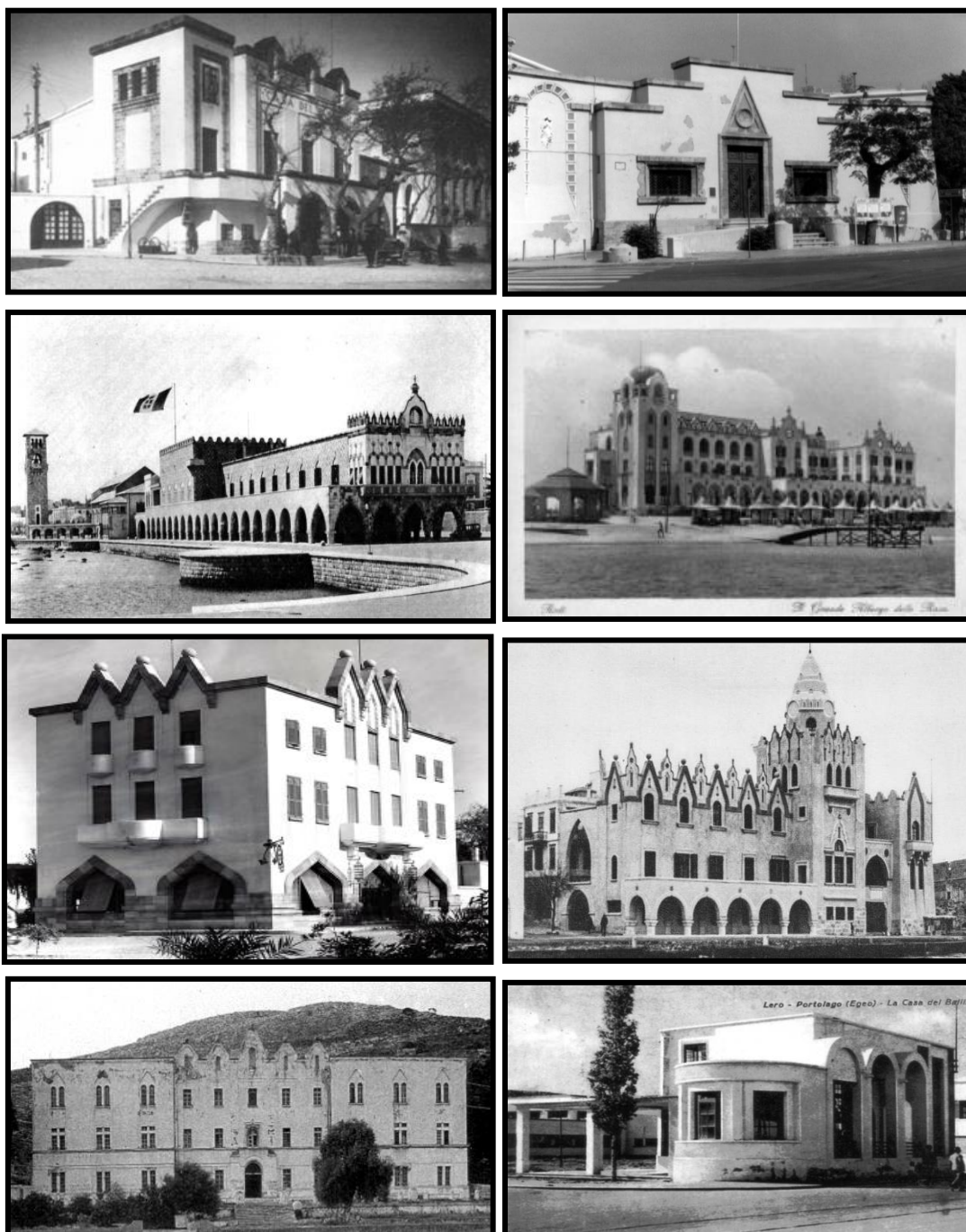


Images 21, 22, 23, 24. Rhodes: During the government of Mario Lago with the addition of the portico and morphological redefining it was used as the Italian Club. 1925-1927, Architect Florestano Di Fausto. Palazzo di giustizia e tribunal (Courthouse), 1924, Palazzo lavori pubblici (Public Works Palace), 1928, Palazzetto San Giorgio - Ca' San Giorgio (Small Agios Georgios Palace), 1927, Architect Florestano Di Fausto.

Despite the morphological complexity of eclecticism, a recognizable vocabulary emerged, which was also the first colonial stigma of fascism in buildings and in the organization of space. In the last years of Mario Lago's rule, the fascist version of rationalist architecture was also used.

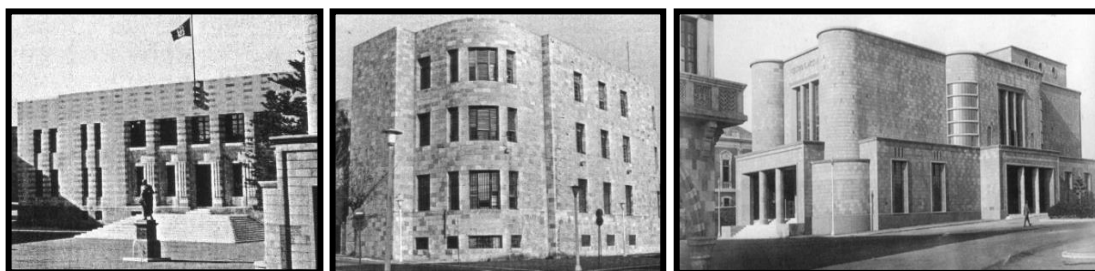
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The morphological choices and references of buildings in Rhodes Kos and Lero during the period of governor Mario Lago



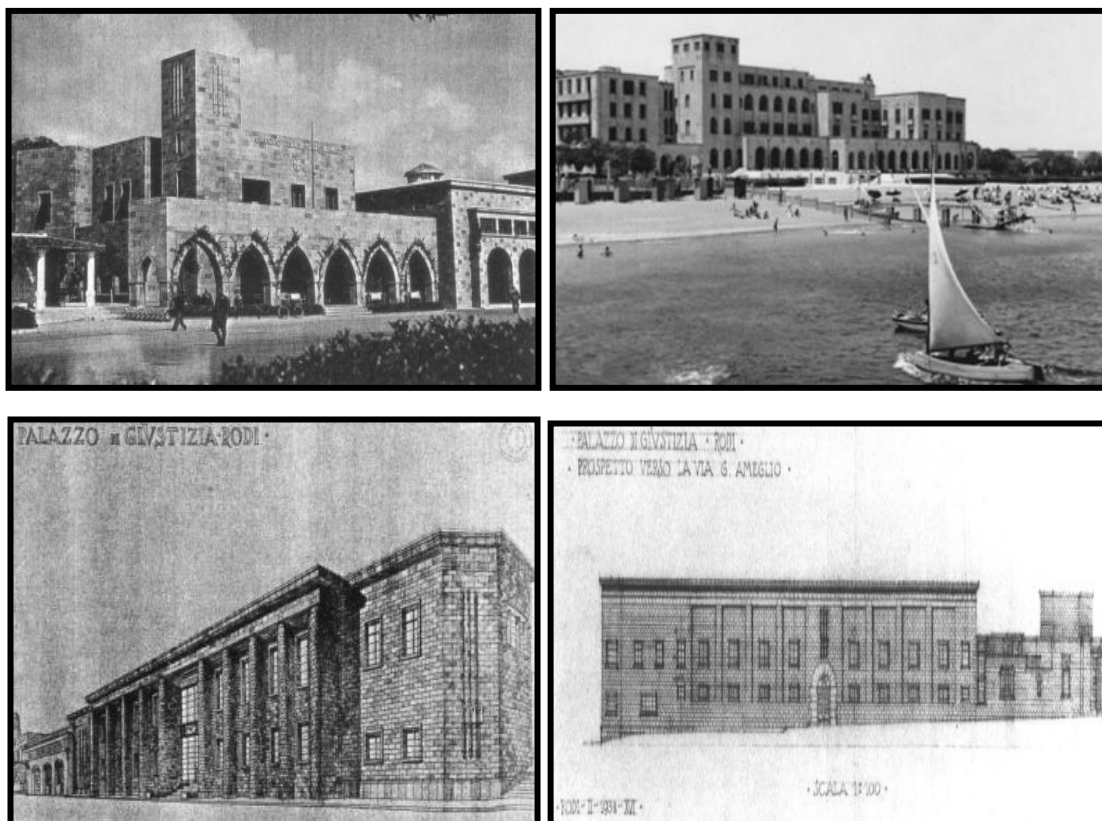
Images 25, 26, 27, 28, 29, 30, 31, 32. Rhodes: Casa del Fascio (Fascist club) and Casa del Ballila (Fascist youth club).“The trilogy of the period of Mario Lago”: Chiesa di San Giovanni, Cattedrale (Catholic Cathedral of St. John) - Arcivescovado (Catholic Archdiocese), 1925-1929 - Palazzo del governo (Government Palace), 1926 -27. Kos: Albergo Gelsomino (Jasmine Hotel), 1928-1929. Kos: Palazzo del Governo-Palazzo della Reggenza (Government-Palace of the Regency). The Albergo delle Rose (Hotel of the Roses). Leros-Portolago: Aeronautical base-barracks and the fascist youth club (Casa del Ballila).

The period of Cesare Maria De Vecchi's rule, despite its short duration, was very important for the final appearance of buildings through their morphological redefinition (mainly public buildings) in the city of Rhodes. The facades of the buildings in the city of Rhodes were covered with either a plaster of pseudo-stonework (*pietra finta*) or with slabs of processed poristone, to achieve a presence reminiscent of the buildings of the Chivalry period. A typical building is the "Union and Progress" club from the Turkish period in its three morphological versions. In 1939, the newspaper *Messenger of Rodi* (*Messaggero di Rodi*) highlighted the change in the appearance of the Court House after its morphological redefinition: "...and now it has become a new building, harmonious, characteristically rationalistic and modern of fascist architecture"[4] as well as the transformation of the Hotel of the Roses in its two versions. The milder theoretical approaches in Italy in 1933, although referring to the use of local elements of aesthetics and traditions, to constitute elements of harmony and balance, adopted the ideology and intention of "an Italian colonial vocabulary", through which "...This - the architecture - must be a clear and permanent sign of the dominant colonial race..."[5] while in 1936 they clearly stated that "... every nation that should export its own culture had better "colonize", and this cannot be done if it is not enforced with its own laws and its own buildings. Because since the dawn of time, culture and architecture have gone hand in hand" [6] "...The architecture of public buildings must command respect for the indigenous people. All constructions that are not private but public or religious of a colonial people in a land subject to its hegemony must express an idiom clear to both the subject peoples and the guests. There should be no doubt about the character of the culture and civilization of the nation that built those buildings. As we speak the Italian language in Rome, so we speak it in Tripoli and Benghazi, and so we must use Italian architecture"[7]. In the city of Rhodes, the Catholic church of Agios Ioannis (of the Knights), after its transfer and reconstruction on the coastal avenue, composed with the building of the Catholic archdiocese and the governor's office a single building complex (which formed the trilogy of the governor Mario Lago's period). It is perhaps the most typical example of colonial architecture of the 1920s. The sarcophagi of the great Masters were placed in the arcades, displaying the historical references of the Knighthood, while the governorate represented the political power and the Catholic church together with the Catholic archdiocese the religious one, concentrated in a focal point of the new city. The morphological references of the governorate in the Doge's Palace of Venice are clear, with embossed verbal quotations in the circular skylights and symbols related to the ideology and semiology of fascism.



Images 33, 34, 35. Rhodes: Palazzo Littorio-Palazzo della Federazione Fascista(Palace of fascist federation), 1936-1939, Palazzo delle forze armate(Palace of military force) 1938-1939, Teatro G.Puccini(Theater G.Puccini), 1936-1937. "The trilogy" of the period of Cesare Maria De Vecchi"

The morphological redefinition of buildings during the period of governor De Vecchi



Images 36, 37, 38, 39. Rhodes: During De Vecchi's administration, the buildings accepted new forms redefinitions of mature fascist references, such as the Italian club building, renamed Circolo delle forze armate (Armed Forces Club) from 1938, the Albergo delle Rose (Hotel of the Roses) and the new Courthouse. The extension of the Courthouse was made by integrating the Palazzo dei lavori pubblici (Public Works Palace), and Small Agios Georgios Palace. The relief facade of the entrance to the Public Works Building it was replaced by three bas-relief fascist symbols and three bas-relief fascist symbols were added in height to the surface of the corner in the ex Small Palace of Agios Georgios in place of the bas-relief representation of the Saint.

It is interesting to emphasize the Western colonial attitude which faced the regional cultures in particular, within the context of an aestheticization which tends to conceal some of their sharp political and cultural particularities in terms of beautification. In this context, in the end, the form of things must be related to the projection of the orientalist elements that Western civilizations extract and re-introduce in their areas of control. In this sense, after all, these areas must adapt to the image of the orientalist interpreted past. Of course, this is not the only condition for the promotion of Italian cultural sovereignty in the Dodecanese. Italian Orientalism (as a Euro-colonial view and interpretation of the history and culture of the East) is then sidelined by a strong rationalism in its fascist version, with some wider individual modern influences as in the case of Leros. In his article, the architect Emidio Ciucci, in 1938, clearly captures the dominant positions regarding the architectural physiognomy of the empire:

"THE EMPIRE MUST HAVE A CHARACTERISTIC ARCHITECTURAL PHYSIOGNOMY. Rome at its height subjugated the peoples, imposed on them its own law, its own urban planning order, its own architecture [...] Where the Roman legions arrived, the markets, the temples, the amphitheatres, and all civil and military constructions wished to resemble those of Rome [...] Today

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we are returning to a new era of apogee [...] Ancient ruins are not dead affairs, but trunks sprouting shoots [...] In recent years it has matured in Tripoli, Benghazi and elsewhere a Mediterranean character of our own which clearly dominates in that region and which is completely liberated from the Moorish elements and the spurious imitations of the early years [...] But avoiding the danger of spurious neo-romanticism we must let's also avoid that of leveling internationalism"[8].



Images 40. Newspaper Voce del Tana, July 8, 1938.

Here is clear the intention and effort of an architectural identity of a national character of Italian rationalism and its differentiation, from those characteristics, of the style and intentions of the historically recognized “international style”. The architecture of Italian rule, with its extensive and intense presence, leads to the finding that it was a specific expressive approach, which consciously attempted to shape and impose on the environment all the ideology and social practice of Italian colonialism, through a mixture of colonial and fascist enforcement.

4. CONCLUSION

The beginning of the Italian occupation in 1912 was the result of the expansionist rivalries of the great European powers in the region. In 1923 was the beginning of an overt alignment of the islands with their new metropolis, Italy. Mild or extreme cultural pressures, complete economic control and fascist ideological determination were the dominant features of the twenty years that followed. The 1930s was the decade of maturation, the imposition of fascism, the alteration of the population by colonization and the attempt to completely impose and appropriate the space through large-scale interventions in the built environment.

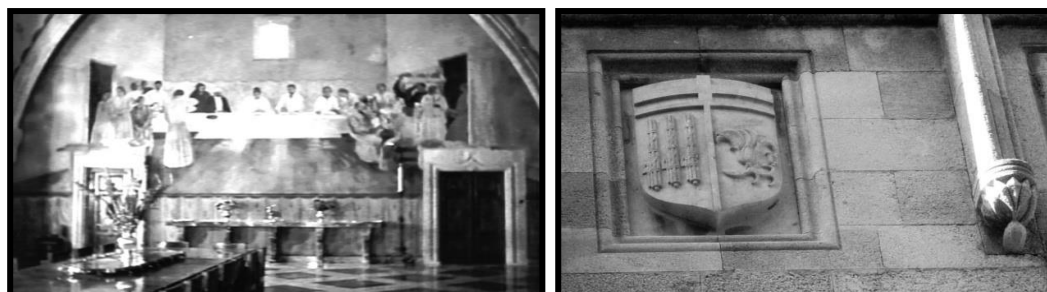
Government buildings were designed to meet the ritual needs of the cultural enforcement of the fascist version of the Italian monarchy



Images 41, 42, 43. Rhodes : The Government House in Rhodes in official receptions for the Italian Monarch in 1929. Quaternary Italo Balbo makes a speech on the platform out of the House of the Colonial Government during his visit to Rhodes next to De Vecchi and under the commanding presence Mussolini's portrait (Duce), 1936.



Images 44, 45, 46. Rhodes: parade of Italian army units on the beach boulevard in Madraki in 1937. Governor De Vecchi on horseback, in front of the armed forces club building, gives fascist salute. Religious event of the Catholic clergy for the Congresso Marian, September 1931. Event in the Piazza del Impero in front of the Palace of the Fascist Federation (Palazzo della federazione fascista) or Littorio Palace, in 1937.



Images 47, 48. Rhodes: Inside the Palace of the Grand Master, "The bread room" by the painter Gaudenzi Pietro. Embedded fascist symbols in the old city of the knights.

The year 1940 marked the beginning of the end of Italian expansionism in the Balkans. After a brief peak of occupying most of mainland Greece, most of the Aegean islands and the Ionian islands, in 1943 the Kingdom of Italy renounced its fascist version resulting in the dismantling of its military machine which, no longer able to dominate in the region, he left control to the Germans and the fascist Italians (R.S.I.-Rerubblica Sociale Italiana) until 1945, weakening any element of colonial cohesion. The so-called stone policy was implemented as a means of quickly appropriating historic buildings or totals of the city and the modernization as an enforcement tool.

The end of italian colonialism - the damages of war



Images 49, 50, 51. Rhodes – Leros – Kastellorizo

The built environment, regardless of its original purposes, can be maintained by redefining, however, preserving its historical memory. The buildings of this period, as a means of imposing colonial spirit and appropriating space, completed their cycle with the end of colonialism. As symbols of liberation and vindication, they were reuse, now serving the new non-colonial organization and structure of society. The buildings as units or as urban units with the authoritarianism of their structure, form and style constitute entities with memories of imposition of a colonial authority with and fascist character, and despite all their subsequent "political exoneration" by demolition or the removal of initial structural elements which declared the underlying political aims of their integration. Today the buildings are called to be the monuments of the collective historical memory of the colonial imposition and not to negotiate their preservation within the framework of a neutral historical landscaping. They can be the museum spaces that will host historical archives, exhibits from the Second World War, from the resistance against colonialism and even all those archaeological findings that concern our history and which remain hostage in Italy until today.

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AI Archeologies for Downtown Urban-Scaping: Photonic Lucidities and Political Memory at Terra-scale

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Extended Abstract

This paper expands on my previous Changing-Cities conference explorations of *urban scalability* while interfacing here with early notions of *Artificial Intelligence* affecting architectural form and space-making. Spanning from labyrinthine microscales of pre-existing urban fabrics to novel regeneration agendas with a focus on collective memory and politicized histories, a case study charrette project that contextualizes contemporary cultural programming is studied in response to a series of theoretical concepts.

The Gwangju (City of Light) Asia Culture Center (ACC) is situated in the environs of the South Korean Democratic Movement uprisings (May 18th 1980), locus of intense memory at a collective scale, and was the outset of a UIA-approved open international competition almost two decades ago, in 2005. At once a Memorial and Citizen's (public) Park, the ACC was tentatively envisioned as an uninterrupted outpouring of civic energy into a historic site of significance. Our submitted project announces, two decades before it became mainstream, an uncanny world of obsessive interfacing with Artificial Intelligence; a novel – even now – reality of tremendous prominence, dissolving barriers between *fictional* and *natural*, or phenomenal.

The urban scheme realizes *virtuality*, pragmatically. Through *photonics*, an allegedly utopian world of illusions comes alive; bonds between reality and chimera become tighter for the emergent era of *meta-virtuality*. Design agendas, as outlined, hover between the antiphrasis of *intangible actualities* – the presence of absence – as to explore *persistent dualities* – diptychs.

Exploring here a scalar territory beyond bigness, the text undoes the common problematic of architecture that simply evaporates under the pressure of immense service requirements, fire regulations, mechanical plants and *procedural* space – transitory areas. Typological questions are addressed by studying an Anti-Pompidou notion for 'shelled' elevated massing as smooth topography, rather than impenetrable objects.

Keywords: *scalability, urban memory, memorial, concourse, contextualization, landmarking, photonics.*

Protecting Built Heritage from Changing Waterscapes: Lessons from Cyprus

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Abstract

At the easternmost corner of the Mediterranean Sea, Cyprus has numerous heritage sites currently threatened by the effects of climate change especially as it relates to changing water levels and other changes in waterscapes. This paper highlights the urgency of safeguarding built heritage sites from the changing waterscapes within and around the island of Cyprus, aiming to draw larger lessons regarding the protection of cultural heritage in the Mediterranean from sea level rise (SLR) and flooding. Drawing on archival and field research, the authors crafted a map that shows the proximity of heritage sites to threatening bodies of water in Cyprus. The paper focuses on two paradigmatic heritage sites on that map, which exemplify diverse challenges caused by SLR and flooding events intending to explore adaptive interventions for future water threats. The first site is the Grecian Hotel, a decaying structure in the coastal area of Varosha, that has remained abandoned for half a century due to the political conflict in Cyprus. The second site is the ruined Saint Nicholas Church situated inland, on the banks of a major water infrastructure, the Kouris Dam. Each heritage site is tied to unique aspects of the island's recent history. They are also intertwined with the environmental realities of the changing waterscapes (the Mediterranean Sea on the one hand, and a Water Reservoir on the other). To protect these sites from water-related threats, the paper draws on Charlotte Lake's proposal for 'environmental' and 'monitoring' buffer zones. It interprets these zones spatially and uses architectural design insights to outline strategies for physical interventions. These interventions aim to protect the sites from water threats while enhancing the spatial experience of both the built structure and the surrounding water. Our conceptual proposal for the creation of physical buffer zones is a versatile solution against flooding and SLR. It can be adapted to other similar contexts and serve as a design framework to guide stakeholders and heritage managers.

Keywords: *flooding and sea level rise, Cyprus built heritage, environmental and monitoring buffer zones, protective buffer zones, changing waterscapes*

1. INTRODUCTION

Our investigation focuses on the threats to heritage sites posed by water, specifically sea level rise (SLR) and flooding. We refer to water-adjacent sites as heritage sites that border significant bodies of water, including seas, rivers, reservoirs, lakes, and similar aquatic features. These water-related threats are particularly pressing in the case of islands and coastal regions where the effects of climate change are already quite evident. An analysis of the latest forecasts provided by the Intergovernmental Panel on Climate Change (IPCC) on SLR within the Mediterranean Basin, as presented in the Sixth Assessment Report (AR6), indicates a projected rise ranging between 0.52 meters and 1.22 meters by the end of the century in the region [1]. In their research in 2024, Vecchio et al. developed models that indicate that approximately 19,000 km² of the Mediterranean shorelines face an increased risk of inundation [2]. Furthermore, a 2018 study by Reimann et al. found that 37 of the 49 UNESCO World Heritage Sites (WHS) in low-lying Mediterranean coastal areas are at risk of 100-year flooding, and 42 are threatened by coastal erosion [3]. The study includes a map of WHS within the Mediterranean Low Elevation Coastal Zone (LECZ), showing extreme sea levels for each coastal segment under a

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high-end sea-level rise scenario for 2100. These findings highlight areas in the Mediterranean where urgent adaptation is needed to protect WHS. In addition to this critical scenario for the Mediterranean, recent research provides natural disaster forecasting, risk assessments, site digitization, and interactive climate scenario maps to protect built heritage sites. New digital tools and models, combined with innovative adaptation and conservation practices, can address the effects of the climate crisis on waterscapes.

To better understand present and future challenges, we examine two heritage sites on the island of Cyprus: The Grecian Hotel in the coastal area of Varosha and Saint Nicholas Church, which stands on the banks of a human-made reservoir at Kouris Dam. These sites were selected because they encapsulate the complex and rapidly increasing challenges posed to heritage by their setting. To suggest spatial interventions aimed at safeguarding the Grecian Hotel against SLR and at protecting the church of Saint Nicholas from periodic submersion, we turn to a particularly helpful scholarly work: Charlotte Lake's exploration of UNESCO's buffer zones [4, 5], specifically her proposal for 'Environmental buffer zones' and 'Monitoring buffer zones', which directly addresses the risks posed by environmental pressures to heritage sites. We explore Lake's reinterpretation of the buffer zone concept for WHS in the context of climate change to guide the development of protective buffer zones for sites beyond World Heritage status. Finally, we assess this idea in the sites from Cyprus and demonstrate the use of protective buffer zones as a strategic spatial intervention for water threats.

2. CONNECTING CHANGING WATERS, BUILT HERITAGE, AND THE RECENT HISTORY OF CYPRUS

At the easternmost corner of the Mediterranean Sea, and dense with antiquities that reach back to the Neolithic era, the island of Cyprus is replete with coastal, inland, and mountainous archaeological sites, including UNESCO WHS as well as several traditional villages and significant examples of modern heritage. To assist our research, we created a map showing the location of heritage sites, bodies of water (e.g. sea, lakes, rivers, dams), and areas susceptible to flooding near rivers (Figure 1). This map provides a comprehensive view of the cultural heritage sites in Cyprus and their proximity to water features. This map serves as an important illustration of the multitude of coastal heritage sites at risk from SLR and flooding across the island. From this collection of sites, we selected two with particularly intricate relationships with water for further exploration: the Grecian Hotel and Saint Nicholas Church.

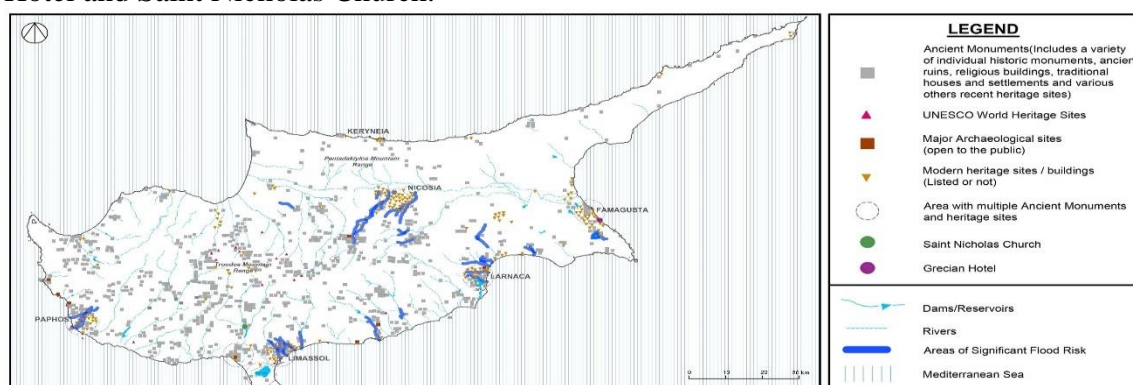


Figure 1. Map of Cyprus with legend showing heritage sites and areas with possible flooding episodes. Created by Anastasia Psoma [The information is sourced from the Department of Antiquities, Cyprus: List of ancient monuments, Board A and B, September 2022; Department of Lands and Surveys, Cyprus; Water Development Department, Cyprus; European Directive 2007/60/EC; and the Cyprus Law on Floods.]

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These sites relate to two major aspects of the island's recent history that have created exceptional, circumstances. The first is the recent political history of the island, which explains the abandonment and ruination of the Grecian Hotel (Figure 2); the second is the history of the rapid development of infrastructure, including dams, which provides the context for the Saint Nicholas Church (Figure 3-4). We explain each of these two recent historical circumstances, which contributed to accelerated physical decay in our paradigmatic examples. Let us begin with the political context, as it particularly affects the present and future of the Grecian Hotel.



Figure 2. Grecian Hotel from the beachfront, approx.1965. PIO [Cyprus Press Information Office] Photographic Archive.

Figure 3. Saint Nicholas Church, June 2021. Photographs by Anastasia Psoma.

Figure 4. Saint Nicholas Church, January 2020. Photographs by Anastasia Psoma.

Cyprus entered modernity as a British colony, and after it gained its independence in 1960, it channelled much of its efforts for socioeconomic modernization and nation-building toward tourism development. The beach of Varosha, on the southeastern coast of the island, was the fastest-growing tourist attraction; in a short decade, it transformed into such an international hub of tourism that it was even celebrated by the *Chicago Tribune* as a ‘mini-Miami’ [6]. All this changed dramatically in 1974 when a long-standing inter-communal conflict between Greek and Turkish Cypriots escalated to the point of a coup d’état by Greece and an invasion by Turkey, resulting in the division of the island along ethnic lines. This division, which lasts to this day, caused the forced movement of population, and long negotiations, under the auspices of the UN, which aim to resolve what has been called the ‘Cyprus Problem.’ The coastal strip of Varosha is a special part of this problem at the peace negotiations as it was fenced off and remained off-limits for almost half a century. This sublime urban ruin of luxurious hotels on the waterfront has become one of the most important modern heritage landscapes of the island [7]. This situation recently began to change with the unilateral appropriation of parts of Varosha by the Turkish Cypriot administration, which aspires to revive it as a tourist attraction. Regardless of the directions these new developments take, the modern heritage of Varosha is under threat [8], and its long abandonment has accelerated the decay of coastal buildings that can be instructive for this study.

2.1 Heritage by the water: The Grecian Hotel

The Grecian Hotel (35.098614°N; 33.967281°E) stands on the coastline as one of the most emblematic examples of the golden era of Varosha (Figure 2). Built in 1963 by the most renowned Greek Cypriot architect of the time, Neoptolemos Michaelides (1920–1993), it is among the most significant examples of Cyprus’s modern heritage [9]. Each component of the hotel was characterized by elegant concrete elements, formal simplicity, and the expressiveness of its structural elements. The nine-story reinforced concrete frame structure was strategically oriented perpendicular to the waterfront to ensure that every room offered majestic sea views that were complemented by private patios. The hotel was accessible from the west via a small vehicular road that led toward a glazed entrance beneath a slender canopy lettered with the hotel’s name. After entering the hotel, visitors

found a spacious reception hall, two lifts, a bar, lounge areas, dining rooms, and covered patios. An alternative route to the hotel was through the lower level, from the seaside where guests could access the area with 'pilotis' situated beneath the ground floor.

The composition of the overall volume can be divided into distinct architectural forms that were masterfully combined to create the hotel's complex. A substantial base supported by concrete columns anchors the base of the hotel to the landscape. Elevated a few steps above the sand, the base blended with the natural environment. Beneath the base were changing rooms and covered patios for bathers that opened towards the sea [10]. The tall six-story volume contained the rooms; from the first to the fifth floor, each level featured fifteen double rooms [11]. The crowning feature on the upper floor was a rooftop bar partially covered by a small canopy and pergolas. On the hotel's north side, a curved roof introduced a synthetic contrast to the rectangular lines of the hotel, highlighting the plasticity of the concrete and the modern construction techniques used on the island. This feature rested on concrete frames set in a grid and extended via a pergola to protect a vaulted lounge area with a veranda on the elevated ground floor. On the west side stood the main entrance to the hotel, featuring an impressive 'butterfly roof' (inverted pitch roof) in the form of a sculpted concrete canopy. Circular columns provided support for this canopy, leading visitors to the entrance through a glazed screen. The hotel incorporated a variety of shading elements, including overhanging slabs, pergolas, and canopies, all masterfully integrated into the design to prevent harsh sunlight from entering through the glazed surfaces. The metal frames of the glazing and balcony railings provide an additional layer of minimalist detailing that extends across all facades.

Today, the Grecian Hotel is a unique example of a built landscape that, due to its fifty-year abandonment and proximity to seawater, has experienced accelerated decay. A future examination of this degeneration will precisely offer insights into the pathology of concrete structure degradation in coastal environments at other sites, but this is outside the context of this study. What we focus on is the risk from SLR. 'Climate Central' has developed sea risk maps based on global warming scenarios, highlighting future coastal regions susceptible to SLR [12]. Notably, these maps show that the beachfront area around the Grecian Hotel is projected to be below the tideline, indicating significant changes in the dynamics between the site, the beach, and the sea. This proved the need for strategic adaptations to mitigate the effects of SLR, a topic that will be discussed further below after we present the other example.

2.2. Heritage in the Water: Saint Nicholas Church

While the above example of the Grecian Hotel exemplifies a case of heritage located near water, our second example demonstrates the case of built heritage already immersed in water, namely the dam's water. To understand the context of Saint Nicholas Church, let us zoom out once more to the larger processes of Cypriot modernity. In addition to the tourism development described earlier, Cyprus also advanced the creation of water infrastructure, including dams, which was deemed particularly important for the drought-stricken island to advance its tourism and agriculture. After the island's independence and up until the early 1990s, the United Nations funded a series of dam projects and other water infrastructure, with technical assistance from various countries. The most ambitious was the 'Southern Conveyor' project, completed in the early 2000s [13, 14]. One of the darker sides of this development project was the flooding of an entire village that involved forced relocations and the intentional destruction of cultural heritage. The example of Saint Nicholas Church is one of many monuments worldwide that were destroyed due to modernization and techno-politics.

Saint Nicholas Church (34.756725°N; 32.921105°E) was built in 1936 in the village of Alassa, in the southwestern part of the Limassol district. Constructed on the southeast side of the village, the small church offered more than a sacred space for the Christian Orthodox community of Alassa; like most village churches, it also constituted an emblematic reference to the overall spatial and social fabric. The plain design was characteristic of the building traditions of early ancient Byzantine churches in

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Cyprus, which are still found in rural areas and villages. The single-story basilica had a semicircular apse at the east end; a slender belfry with a cross on the top stood at the building's southeast corner. The floor plan emphasized the longitudinal axis, creating a clear, orthogonal shape extending from the entrance through the nave. The church was built with a locally sourced stone, with dry-stone walls and white plaster rendering, and topped by a pitched wooden roof with ceramic tiles. Carved stone frames, finished with light blue colour, embellished the openings, and created arches above the doors and windows, while decorative iron bars with small ornaments enclosed the glazed windows. An irregularly shaped perimeter wall, 1–2 meters tall and aligned with the old dirt road leading to the site, enclosed a small yard.

The church's role as a locus of Alassa ended in 1984 when the construction of Kouris Dam, the largest dam in the country, caused the gradual displacement of the community to a nearby hill, at a higher altitude. Over a decade, from 1985 to 1995, the villagers were forced to relocate, and the original village, including all built structures, was demolished except Saint Nicholas Church, which was left within the bounds of the new dam [15]. The church still stands within the dam's impoundment, and the fluctuating levels of water over time have caused its partial and periodic submersion. The varying water levels at times submerge the church, leaving only the bell tower to rise above the water (Figure 4). The submersion of the church has profoundly changed the site's setting and largely destroyed the building's structure (Figure 3).

Saint Nicholas Church forms an ideal site to study the effects of water, flooding, and the periodic submersion of heritage sites, offering insights into the interaction between building materials and the freshwater reservoir of the dam. The structure's response to the destructive forces of water unfolds along three key dimensions: the structural damage caused by water pressure; the progressive decay and corrosion of materials immersed in water; and the fluctuations of water levels that continually affect the saturation levels of the structure. These categories can effectively serve as a framework for examining other partially submerged heritage sites, in coastal areas, along riverbanks, or near inland seas. Therefore, the church serves as an informative model for identifying the effects of flooding, whether it is anticipated, as in the case of the construction of the Kouris Dam, or unanticipated, as with extreme weather events prompted by climate change. The site provides valuable insights into future flooding or periodically submerged sites.

3. 'ENVIRONMENTAL' AND 'MONITORING' BUFFER ZONES

To develop adaptation strategies for protecting the Grecian Hotel and Saint Nicholas Church we draw inspiration from Charlotte Lake's proposal for 'environmental' and 'monitoring' buffer zones, to then interpret them through architectural and spatial insights. Charlotte Lake's article in 2016 on 'buffer zone typology' based on contextual factors for World Heritage Sites (WHS) serves as a crucial reference for our exploration of adaptation strategies [16]. She illustrates the UNESCO buffer zone concept as one tool for protecting heritage sites through their settings while stating that multiple or tiered buffer zones found in some cases may offer better protection. Lake's study categorizes buffer zones into various typologies to address specific threats and contextual factors, including visual, environmental, human activity, affiliated elements, opportunity, administrative, and monitoring buffer zones. These typologies aim to address specific external threats posed to each site by the setting itself.

We particularly focus on what she outlines as an environmental buffer zone that addresses the physical and geological characteristics of a site's environment. Such buffer zones are intended to protect against natural disasters, to regulate natural resources, and to preserve flora and fauna that may affect the registered site. What Lake defines as monitoring zones, serve as areas to monitor, and record potential threats to cultural heritage sites [17]. Both categories (environmental and monitoring buffer zones) offer an opportunity to contextualize her proposal within the framework of climate change.

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We propose that a combination of Lake's environmental buffer zones and monitoring zones, can establish a novel framework for actively designing buffer zones that effectively protect cultural heritage sites from current environmental threats. Monitoring zones on the one hand could provide data recording programs and early warning systems to identify changes in the environment that may threaten the values of a site and simultaneously protect the site from various environmental threats. Environmental buffer zones, on the other hand, could be expanded to include spatial/physical interventions meant to adapt to changing conditions to protect a site. While Lake's concept of environmental buffer zones addressed a broad range of natural disasters, we find her analysis particularly insightful for examining water threats like the rising issue of SLR on built heritage sites.

4. PROTECTIVE BUFFER ZONES THROUGH SPATIAL INTERVENTIONS

The interaction of the Grecian Hotel with water is quite different from that of Saint Nicholas Church. The periodic fluctuation of the water level within the dam sometimes leaves the church partly or fully immersed in water; conversely, the hotel merely has a proximity to water, and this proximity is gradually decreasing. The intriguing fact that connects the two cases is that, in the face of climate change, each of the two sites can shift to experiencing the situation of the other. In other words, the Grecian Hotel may experience partial immersion in water in the future due to SLR, while Saint Nicholas Church might end up on dry land, and no longer suffer from flooding, due to drought. This possible reversal reminds us to be attentive to the dynamic relationship between built heritage and water. It also suggests that both sites could benefit from a spatial intervention that protects them from the threat of water damage in the present and proves adaptable enough to offer protection in a future that promises even more environmental changes.

When addressing the contextual challenges of a site, the aim is to minimize the effect on the overall aesthetics and spatial configuration. Certainly, the very creation of physical buffer zones can alter a site's visual character, and for this reason, it is imperative that the design and construction of buffer zones be viewed as a necessary adaptation to meet new needs while prioritizing solutions that respect the site and ideally offer reversible options.

To demonstrate our proposal for physical buffer zone, we describe two conceptual proposals for protecting the Grecian Hotel from predicted SLR and the Saint Nicholas Church from water-level fluctuations and flooding. The protective buffer zones described below are at this point a design framework to guide stakeholders and heritage managers; they are not to be seen as literal design solutions, as those would need to be reformed and adapted for each site and context. The proposed design framework outlines key principles such as adaptive design, sustainable materials, monitoring methods, and continuous reassessment, all of which serve as fundamental elements in creating protective zones regardless of the site.

The gradual rise of water in the case of the Grecian Hotel, first necessitates initiative-taking measures to prevent water from overflowing the hotel's structure and expedite its deterioration. One could imagine a new adaptable pier with seawalls that prevent seawater from entering (Figure 5). Functioning as a 'breakwater' these protective seawalls would serve as a physical barrier against SLR, and they would be placed a few meters away from the main hotel structure. They will gradually be integrated into the sandy beach towards the hotel's entrance. The seawalls would stand higher than the projected SLR for this area. An integrated overflow mechanism would direct excess water into a moat for storage and other applications. This would create a controlled, water-filled moat, maintaining the connection of the hotel with the sandy beach and the sea while alleviating the danger of flooding. In terms of seawall construction, the Climate Technology Centre & Network can provide valuable insights that can be useful for such projects [18]. In terms of the experience of users, the encircling rectangular pier could offer a corridor for guests to explore the hotel from sea level, allowing for a comprehensive tour that highlights the hotel's connection to the water—and would also

demonstrate the protective measures that have been taken to address the effects of climate change on site.

This adaptable pier would provide an adaptable boundary that would serve as an environmental buffer zone for water corresponding to the constantly changing needs of the seawater levels while offering unobstructed views and access to the hotel and the beachfront. This should be a minimal structure that aligns with the perpendicular lines of the hotel, constructed with resilient materials and contemporary building techniques, capable of enduring water pressure and aligns with sustainable design principles. Additionally, we propose the implementation of a monitoring buffer zone that collects data and analyses them to notify stakeholders and site managers of potential threats and extreme weather events. This can be achieved through the installation of a sequence of sensors strategically placed on the base columns of the hotel and on both sides of the surrounding seawall to monitor fluctuations in temperature, humidity, and water levels.

The above proposal is a starting point and requires further interdisciplinary development, including a conservation and restoration strategy for the concrete structure, which falls outside the scope of this research. Such further research would not be possible without an in-situ investigation and documentation of the current state of decay, and at this point, this is not impossible for the Grecian Hotel due to the ongoing political conflict. Furthermore, it should be noted that any measures to protect the Grecian cannot be adequate if they are pursued in isolation, and they must be accompanied by a comprehensive strategy towards the larger urbanized coast of Varosha, where the Grecian sits. Nonetheless, at this point, the above proposal for a buffer zone can be a springboard for managing the modern cultural heritage on the coasts of Cyprus, or even beyond.

A similar concept can be applied to Saint Nicholas Church, because here too, the establishment of an environmental and monitoring buffer zone would provide crucial protection for the ruined structure. In this case, the protective buffer zone would again take the form of a physical boundary with walls constructed to prevent water from flooding the church. The space between the church and the barrier would become a 'dry zone,' further enhancing its protection. The new structure should again be minimal, to avoid overshadowing the church itself. A circular design for the boundary not only offers a protective embrace to the church but also allows for an uninterrupted tour around it, enhancing the visitor experience (Figure 6). This structure must be created with state-of-the-art, sustainable materials resistant to water, capable of withstanding water pressure and adjustable to changing water levels. Such a structure would prevent fluctuations in saturation levels that endanger the stone and other materials of the church. A new drainage system suitable for flood management should be installed in the dry zone, in case of overflows within the reservoir. Lastly, the new boundary could be used as a platform for visitors to observe the monument within the water of the dam. This solution seeks to combine the spatial experience of the water around the church while preserving the site and materials from it, as we saw at the site in Varosha. Also, as described in the proposal for the Grecian Hotel, a monitoring station could be placed within the circle's perimeter to record the water levels and to identify potential environmental threats to the site. This monitoring process could provide valuable insights into the adaptive transformation of the structure and protection of the church.

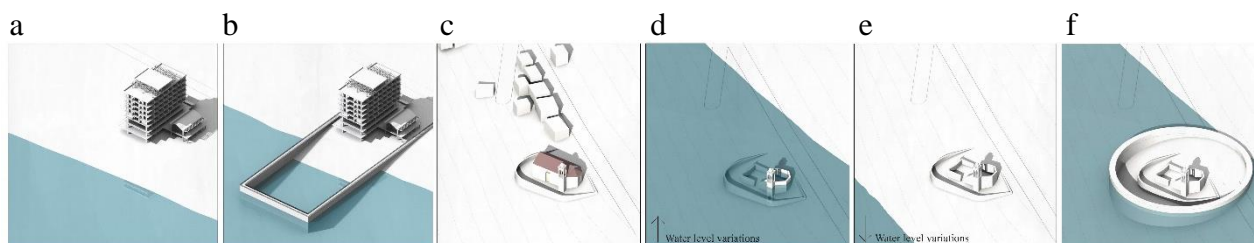


Figure 5. The Grecian Hotel after its completion in 1964 (a); conceptual proposal (b). Images created by Anastasia Psoma.

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Figure 6. Saint Nicholas Church and the village of Alassa prior to dam construction, 1963 (c); the church submerged as a result of high-water levels in 2019 (d); the church at a point of low-water levels in 2014 (e); conceptual proposal (f). Images created by Anastasia Psoma. [The information presented is sourced from aerial photos from the Department of Lands and Surveys, Cyprus]

Because of its geographic location, the examination and documentation of the church is a somewhat easier operation than in Varosha; in times of drought or low water levels within the reservoir, when the church can be accessed, researchers and practitioners could document the site, conserve the structure, and implement a physical buffer zone for the protection of the site. As mentioned above, the accelerated decay of the structure calls for future multidisciplinary research, focusing on the structure's pathology and degradation that moves beyond the frame of this article.

The above experimental proposals for physical buffer zones are at this point conceptual and can be generalized to other cases, where the details of the design, materiality, and geometry of each intervention can vary. Multiple other heritage sites found in Cyprus are in danger from SLR and flooding—coastal sites as well as sites near riverbanks, dams, and lakes across the island can benefit from this strategy. Heritage sites of the island that will be affected by SLR can be spotted using the online tool from the 'Climate Central' Program on Sea Level Rise based on their elevation and proximity to the sea. Additionally, areas and specific heritage sites of the island that are likely to be affected by flooding can be observed from the WDD (Water Development Department) [19] 'INTERACTIVE Flood Risk Maps.' These maps offer scenarios for the near future and project outcomes for the year 2080, considering the impacts of climate change and flooding episodes.

For example, the Medieval Larnaca Castle, a historical testament to Cyprus's fortifications and coastal defence, faces an environmental threat from climate change. Due to its proximity to the sea, it is vulnerable to SLR and saltwater exposure, necessitating careful preservation efforts to protect it. Furthermore, Cyprus is home to numerous ancient maritime sites like the ancient harbour of Amathous and shipwrecks, which face various challenges from climate change. These submerged sites are threatened by SLR, coastal erosion, increased acidity, salinity, and warming of the waters, all of which can accelerate material erosion and cause further destruction [20]. Other examples from Cyprus and the Mediterranean basin could benefit from the implementation of such interventions.

5. CONCLUSION

The lessons drawn from the Grecian Hotel and the Church of Saint Nicholas can guide the strategic design of buffer zones that protect from water threats while preserving the spatial experience and heritage value of buildings [21]. Building on this initial framework, further research is crucial to refine the strategy for water-related threats like flooding and SLR. Additionally, exploring its effectiveness against other environmental threats not covered in this study is paramount. The proposed integrated 'environmental and monitoring' buffer zones can emerge as a promising tool for integrating climate adaptation strategies into heritage management practices, ensuring the resilience of built heritage. Additionally, tools, methods, and strategies that international experts and relevant international organizations have developed could be integrated into a larger framework for the protection of the cultural heritage of the island and other coastal sites. The examples from Cyprus resonate with other sites on the island and elsewhere that are facing similar threats. Our focus on water is not by any means assuming that climate change is the sole threat to heritage sites, but rather, we present this climate emergency to emphasise the multiplicity of dangers that heritage professionals need to account for in the protection of built heritage. As we confront the challenges of climate change, a multidimensional perspective that incorporates spatial interventions and adaptive strategies can pave the way for a more sustainable and resilient future for our built heritage.

Acknowledgments

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Reassessing Varosha: A Research Agenda for Heritage Sites in Conflict Zones

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Extended abstract

This article aims to systematically map and analyse the intertwined pressures affecting heritage sites in the coastal area of Varosha in Cyprus. This area contains rich heritage from various historical periods of Cyprus, including the modern era; for half a century now stands as a ruinous urban waterfront. Varosha's beach quickly became a bustling tourist spot during the 1960s-1970s, earning praise as a 'mini-Miami' by the Chicago Tribune. In 1974, a longstanding conflict between Greek and Turkish Cypriots led to a coup d'état by Greece and an invasion by Turkey, dividing the island along ethnic lines and prompting population displacement and ongoing UN-mediated negotiations. Varosha's coastal strip, emblematic of this conflict, remained fenced off and inaccessible. Over the last 5 years, recent efforts to reclaim parts of Varosha, notably the Turkish president's announcement of the partial opening of the area, have triggered international reactions and raised concerns among local communities. According to press reports from Turkish and Turkish Cypriot sources, nearly 400,000 visitors, have visited Varosha since 2020, when a section of the area was opened, establishing it as an 'alternative tourism destination'. Concurrently, ongoing efforts to document and classify properties have been undertaken in collaboration with the T/C Chamber of Architects and Engineers. Numerous groups and individuals have researched potential strategies for Varosha's waterfront. Suggestions vary from developing it for tourism, to transforming it into a museum. Rather than presenting a competing proposal, this paper advocates for mapping all the pressures at play. This approach aims to enable the formulation of more informed proposals in the future. We present the following themes for a research agenda to uncover the multitude of ongoing pressures shaping the uncertain future of this modern urban coastal landscape:

- Geo-political local and international pressures and recent debates regarding the area's future.
- Environmental factors, specifically water-related pressures, such as the imminent threat of sea-level rise endangering Varosha's coastline.
- The detrimental effects of the harsh coastal environment on concrete structures, are exacerbated by 50 years of neglect and the absence of legal protection.
- Socio-economic and development pressures from the Turkish administration, aiming to 'revive' Varosha as a tourism hub, amidst the rapid tourism growth in other cities of the island.
- Sustainability concerns related to potential redevelopment and demolition, conservation challenges, and opportunities for adaptive reuse.
- Ownership issues and conflicting agendas among stakeholders.
- Conflicting memories and aspirations for the area from the Greek Cypriot and Turkish Cypriot communities.

This article highlights how the array of pressures on Varosha provides an opportunity for a comprehensive reassessment of the intricate dynamics shaping this urban landscape, signalling the importance of further research with potential implications for future decisions concerning the site.

Keywords: *Varosha; conflict; urban waterfront; pressures on heritage sites; research agenda*

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The search for identity - Transformation of Novi Pazar's historic city centre

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Extended abstract

The connection between culture and identity is based on a spatial level, not only on social relations. The concept of urban identity reflects people's perception of being uniquely connected to a particular place. Over time, the physical environment will change the social life and thinking of the city. Therefore, the concept of urban identity is such that the process of change affects it. Urban heritage defines the identity of cities that develop over time, including the symbolic meaning of people, whether citizens or visitors, due to historical events related to it. Because of this, urban heritage is considered to be of great importance because it signifies the identity of the city. Nowadays, we frequently confront the issue of cities undergoing a transformation that leads to the loss of their original identity. As cities undergo constant change and redevelopment, they risk becoming less recognizable, posing challenges for residents in terms of perception and memory. That is why it is more difficult to preserve historical and cultural heritage, local originality and identity in that city. In the context of Novi Pazar, *Stara Čaršija* represents a historical-cultural complex that is struggling to maintain its identity. The history of Novi Pazar showcases the complex interactions of different cultures, religions and political forces over the centuries. Its specific and unique character represents an amalgamation of these influences, creating a city with a rich and diverse heritage. The historical core of the city, functioning as its bustling business and commercial center, along with the Fortress of Novi Pazar, which was once a vital part of the market, represents one of Serbia's most well-preserved urban heritage complexes of its type, and has been recognized as a spatial cultural-historical entity of great importance within the Republic of Serbia. *Stara čaršija* is deeply connected with the identity of Novi Pazar. It defined Novi Pazar as a trading town, and shaped its urban development to a great extent. Its specific architecture is what makes it an exceptional cultural heritage and ambient entity. The theoretical framework of the research in this paper is the urban development and transformation of Novi Pazar, with the main focus on the period from the 20th century to the present day. The focus of the study is on examining the urban, cultural and historical factors that defined the identity of the *Stara čaršija* complex throughout history, as well as on determining the factors that are causing its gradual collapse.

Keywords: *urban identity, culture, heritage, Novi Pazar, Stara Čaršija*

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The urban project for Santa Maria Capua Vetere, between contemporary city and digital archaeology

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Abstract

The research proposes an integrated cultural approach between urban design and the enjoyment of heritage assets, with the aim of rededicating archaeological areas to contemporary city life through the use of digital technologies. The community, due to the principle of economic circularity, will benefit from the enhancement of public spaces resulting from innovative methods of land use that encourage cultural tourism and the promotion of activities. Therefore, the aim is to involve citizens during all phases of the project with different approaches: qualitative research, surveys, interviews and living labs. The research takes full advantage of the potential of digital technologies to reach a wide audience in the process of re-appropriating the places of the contemporary city.

Keywords: *archeology; participatory mapping; phygital reality; digital technologies; digital twin; altera Roma, public spaces*

1. ARCHAEOLOGICAL HERITAGE AND URBAN DEVELOPMENT IN SANTA MARIA C.V.

Santa Maria Capua Vetere, a city of approximately 33,000 inhabitants located in the district of Caserta, nearby Naples in the South of Italy, represents a peculiar case of planning for medium-size cities, embedded between urban development, the rural component, and cultural assets. The city of Santa Maria C.V. has a dual cultural identity linked both to the evident built heritage and to the archaeological substratum of ancient matrix, currently mostly not visible [1].

The municipal plans of the city in the past century focused to providing for an ordinal design of local interests of an incremental type, parameterized to the economy of their territories and aimed simply at the development of building areas. Thus, no account has been taken at all the landscape and historical-cultural values present within the territory as potential incubators of local development, but instead reference has been made solely to land rent, reducing urban planning to an exclusive determinant of land use for building purposes [2].

A lot of urban experiments developed over the past two centuries have often create a threat to the historic character of cities and the sets of material and spiritual elements that are an expression of their image. This threat, which we find mentioned within the 1987 Washington Charter, has had its field of implementation in the last sixty years on the territory of the city of Santa Maria C.V.

The International Charter for the Preservation of Historic Cities (Washington, 1987) is a document drafted by the International Council on Monuments and Sites (ICOMOS) with the aim of complementing the "International Charter on the Conservation and Restoration of Monuments and Sites" (Venice, 1964), defining the principles and objectives, methods and tools to safeguard the quality of historic cities, to promote the harmony of individual and social life and to perpetuate the set of even modest assets that constitute the memory of humanity [3].

Regarding to Santa Maria C.V., the physical transformation guided by the city's previous urban plans, was mainly explicated through private interventions based on the renovation of existing buildings, implemented through demolition and reconstruction in compliance with the indices and parameters

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of the relevant implementation rules. It is amply demonstrable the high negative incidence of this kind of intervention in historical cities [4].

The observation of the changed relationships between existing heritage and new recent construction (figure 1), for example, is an emblematic expression of the loss of quality and historical identity of the historical centre, based predominantly on the continuous spread of typological features consolidated over time that are expressed predominantly through a set of building units articulated around a common open space and connoted by the sequence of doorway, hallway, staircase and courtyard.



Figure 1. The historical centre of Santa Maria C.V. showing the dense urbanization that cancelled the archaeological identity of the city.

The city of Santa Maria C.V. possesses not only its own cultural identity related to the evident built heritage but also an archaeological identity referring to the submerged latent heritage of ancient Capua. The northeastern part of the current administrative boundary of the city under consideration largely includes the territories of ancient Capua that lies submerged and were represented in many pictures and paintings since the 16th century [5] [6].

From the ruins of the Roman and Longobard city that survived the Saracen fury unleashed in 841 A.D., which also radically and irreversibly destroyed the political and socioeconomic history of the ancient city, in the Middle Ages, around the most important Roman monuments, some civic aggregations gave birth to the three hamlets of S. Erasmo, S. Maria and S. Pietro, to be considered as a whole the origin of the urban core of Santa Maria C.V.

The spaces between the three small medieval towns became rapidly urbanized while some surviving structures of ancient Capua, such as the Amphitheatre located extra moenia, were assigned the role of military garrisons related by location to the nearby rural villages. Although distant from each other, the three villages preserved the large open space already the site of the ancient Forum of the People in pre-Roman and Roman times as a place of confluence and socioeconomic exchange. In addition, the urban scene of the three hamlets was characterized by the imposing environment of ruins marking the original urban topographic footprint. Profound territorial transformations occurred during the seventeenth century when the reorganization of properties and the demolition of ruins erased the contours of the ancient insulae and determined new directions of development (figure 2). In the eighteenth century there was the urbanization of the area of the ruins encompassed by the three hamlets contemplating the construction of convents, barracks and numerous stately buildings of landowners and clergymen whose facades contributed to the perspective backdrop of the major

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alignments of the urban structure. During the nineteenth century there were also several renovations of religious buildings and important existing palaces, which were also joined by new private buildings of the nineteenth-century bourgeoisie. In 1844 the railroad reached S. Maria C.V. marking the beginning of its economic revival. After the construction of the Villa Comunale, completed in 1926 acting as a counterbalance to the railroad, the main urban route of Santa Maria C.V. would be strengthened, indicating urban development in a longitudinal direction accompanied by the construction of late nineteenth- and early twentieth-century buildings in eclectic style and the reorganization, arrangement, and reclassification of the existing mobility system.

The features of the physical structure of the city are thus configured through a typological homogeneity although with different sizes and styles, participating in the formation of a specific urban scene where the street and the square are defined by the continuity of the facades of the buildings. The building volumes, organized in a courtyard, occupy a limited contour strip of the blocks within which are enclosed large areas of private greenery, vegetable gardens and gardens that will represent for a long time an important indicator of environmental quality and that will make Santa Maria C.V. deserve the nickname "city of gardens."

In the post-World War II period, there was an urban sprawl that, overcoming typological rules and spatial ridges, will contribute to the formation of the suburbs, not being able to build new completed parts of the city but only fragmented expansions, mainly social housing neighbourhoods lacking urban equipment and public buildings.

In the last twenty years many historical buildings have been demolished and rebuilt in screaming conflict with the rules of urban layout and overall values. In addition, the courtyards that characterized the typological tradition of urban blocks have often been saturated; in this way the only spaces that historically had contributed to elevating the environmental quality of the city of Santa Maria C.V., even if not directly visible and accessible from the street, have been erased, leaving the scene to new buildings with a very poor architectural language and weak accessibility.

In this regard, the repercussions of such operations have reduced the quality of architecture, public space and, above all, create a strong risk to delete the archaeological identity of the city [7].

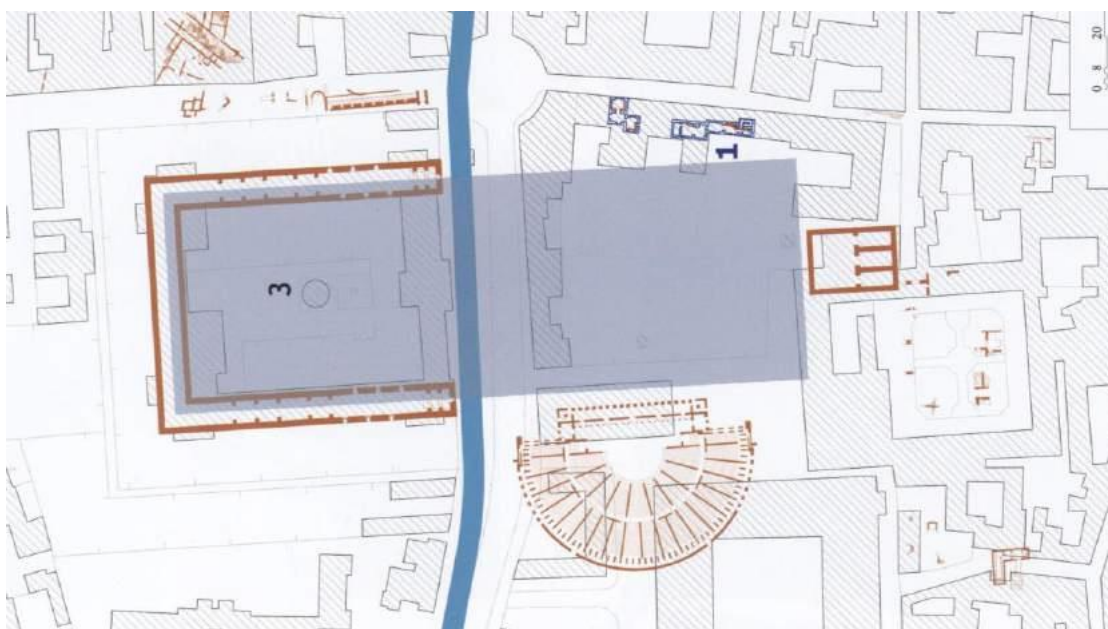


Figure 2. The ancient forum area of the Roman city incorporated into the existing buildings.

2. STRATEGIES FOR THE VALORIZATION OF THE HISTORICAL CENTRE

In the new Municipal Urban Plan (Piano Urbanistico Comunale) of the city, approved in December 2023, special care was taken to extend the area of historical protection to a large part of the urbanized territory, which largely includes the land of ancient Capua as represented, enclosed by defensive walls, in many historical pictures.

In implementation of the directives of the Municipal Urban Plan, a Renewal Plan for the Historic Centre is being drawn up in recent months, which has already developed specific direct surveys to recognize and establish to what extent, beyond dating, in the permanence of the encroachment of that particular ancient urban fabric lies an equal permanence of values of historic-artistic and environmental interest on which to orient urban planning decision-making. As many as 1400 buildings were analysed and catalogued by collecting the main administrative, historical, functional, morphological, aesthetic and maintenance characteristics as well as the presence of archaeological traces, processed within a GIS system.

The direct survey of the characteristics of the urban territory of historical layout identified by the new PUC of Santa Maria C.V. considered the subdivision of the urban and building fabric into blocks. The buildings inside each block were subsequently numbered, identified by observation of the roofs detectable in updated orthophoto maps or recent aero photogrammetry and subsequently verified in the direct field survey.

For each building, which was assigned a unique identification code, a survey form was compiled where not only typological and dimensional characteristics, state of maintenance, static consistency, age of construction and intended use were recorded but also evaluative comments and critical judgments in the form of scores.

The database thus constructed was used by exploiting the analysis and representation capabilities of GIS tools, which, by linking to georeferenced vector layers, made it possible to derive integrated readings between the different features and return thematic tables from which to deduce the most appropriate categories of intervention (figure 3).

The surveyed features constitute the cognitive base on which the permissible transformation interventions of each building were identified with a view to the preservation and enhancement of historical and architectural values. The classification considered the presence of archaeological remains, usually found in the subsoil a few meters below street level, or sometimes incorporated in the wall structures in elevation.

Especially in function of the new urban roles of the contemporary city, the Renewal Plan aimed at the definition of innovative conservation strategies, as well as recommended by UNESCO (Recommendation on the Historic Urban Landscape, 2012), which invites to discard the idea of conservation to the bitter end that does not contemplate metamorphosis processes that respect the spirit of the historic fabric in which they are located [8].

According to the well-established principles of restoration and integrated preservation of the historical heritage, to identify the modalities of conservation intervention on the existing buildings, different rules were applied, in each case placing the centrality of critical judgment at the basis of each choice [9].

The research, currently ongoing, aimed to identify approaches of intervention and urban planning choices for the municipality of Santa Maria C. V. that, on the one hand, are consistent with the historical and archaeological identity of the territory and, on the other, propose modern languages capable of integrating and framing urban heritage conservation strategies within the broader objectives of general sustainable development of the territory based on liveability, mobility, accessibility and, sustainable urban regeneration.

In addition, the Renewal Plan has identified all buildings dating from after World War II that qualify as environmental detractors for which vertical and horizontal thinning actions will have to be planned, specifying incentive and relocation mechanisms to free up improperly occupied areas. Specific

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reference is made to historic rural gardens and courtyards to be recovered, redeveloped, and networked where possible, also contemplating urban restoration and redevelopment to recover the archaeological identity.

The enhancement of the historical, landscape and archaeological resources of Santa Maria C.V. aims first and foremost to expand the liveability and knowledge of the cultural values of the local community but also and above all of tourists with a view to the economic development of the city. This strategy was also based on the suggestions of the main international guidelines on sustainable tourism such as the manual "*Achieving the Sustainable Development Goals through Tourism - Toolkit of Indicators for Projects (TIPs)*" drafted by the World Tourism Organization (UNWTO, 2023) [10] and especially of "*The European Tourism Indicator System. ETIS toolkit for sustainable destination management*" [11]. The latter represents a voluntary management tool that collects data, grouped according to sets of indicators, to build a monitoring and self-assessment system. The indicators are useful for defining strategies and actions for the development of sustainable tourism that can enhance resources, avoiding indiscriminate consumption, and manage tourism activity effectively. The ETIS is based on 27 main indicators and 40 optional indicators divided into four main categories: tourism site management; social and economic impact; economic value; and environmental impact. The toolkit prefigures a process built in seven steps: raise awareness; create a destination profile; Form a Stakeholder Working Group; Establish roles and responsibilities; Collect and record data; Analyse results; Enable ongoing development and continuous improvement. The process steps are also supported by strictly operational tools, from data sheets to information databases that support strategy implementation.

The process is only in the conception stage, but the basis of the strategy is to expand the knowledge of the area by potential tourists and the city's residents themselves.

Fundamental supporting activity for expanding knowledge of the area is the use of digital technologies to ensure at least virtual accessibility of the city's exceptional archaeological heritage. The archaeological sites that can be visited are extremely limited in comparison with the wealth of finds as catalogued and protected by the Superintendence of Archaeological Heritage. The application of such technologies is described in the following paragraphs and constitutes the backbone of the enhancement of Santa Maria C.V.'s cultural heritage.

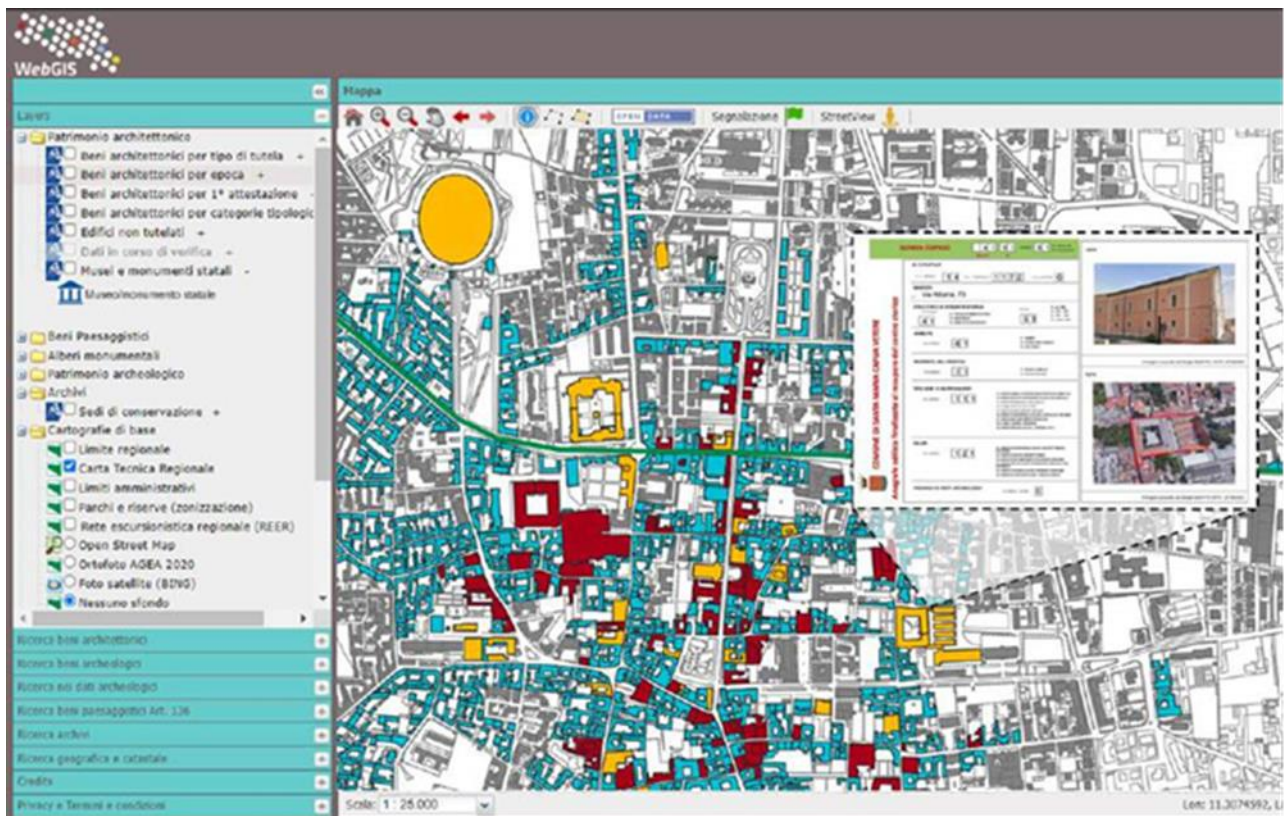


Figure 3. The GIS, collecting the main architectural and functional data of the historical buildings, aims at developing strategies for the restoration of the archaeological identity of the city.

In addition, combining these activities with the more general ones contained in the objectives of settlement rebalancing, realization of social housing, development and optimization of the commercial and tertiary network, enhancement of the environmental heritage, urban greening and environmental design policies will structure the future scenario of the city of S. Maria C.V. by recovering the neglected identity of a city of nature and culture, a city made up of monuments, cultural heritage, gardens, parks, cyclopean paths railway lines, residential fabrics recovered and integrated by public services and facilities [12].

3. DIGITAL TECHNOLOGIES FOR THE CULTURAL ACCESSIBILITY OF ARCHAEOLOGICAL HERITAGE (A.P.)

A proper understanding and valorization of ancient Capua, the "Altera Roma", as the second city of the emperor once was called, need an integrated cultural approach that focuses particularly on the area's specific features. The archaeological remains from the Roman period are numerous and widespread, yet many are partially or entirely buried, thus inaccessible for the main part.

In addition, the vast archaeological heritage of Santa Maria Capua Vetere faces challenges in valorization due to the difficulty in expropriating private buildings and excavating buried remains. Organizing an accessible system for the main archaeological sites, some of which are excavated but encompassed within private properties, also presents difficult organizational and management issues. Archeological heritage is also not properly estimated for its potential value by private owners that sometimes conceal archaeological remains out of fear that their properties could be classified as constrained by the Superintendency.

Culture must thus become the primary strategic tool, addressing the inhabitants' inability to assign proper value to their sites. a necessary driving force to trigger a positive process of knowledge and

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appreciation of the widespread archaeological heritage as a common good and a factor of uniqueness of the city of Santa Maria Capua Vetere. This value should first be recognized by local communities, and only later offered to cultural tourism, as a symbol of their collective memory. To trigger this effect the ancient Capua must be perceived as an active presence in the modern city. It is necessary to identify the significance of these archaeological sites within the contemporary city to enhance their value and redefine their mutual relations. The project for the enhancement of archaeological sites must not, therefore, be resolved in the definition of appropriate ways of fruition and musealization of the findings, but must set itself the ultimate goal of rededicating the areas of interest from archaeological excavations to the life of the contemporary city, giving the vestiges of the ancient world dignity and value, through a conscious enjoyment of these assets, assisted by innovative techniques (and technologies) of communication, which allow an active and emotional experience of the archaeological heritage.

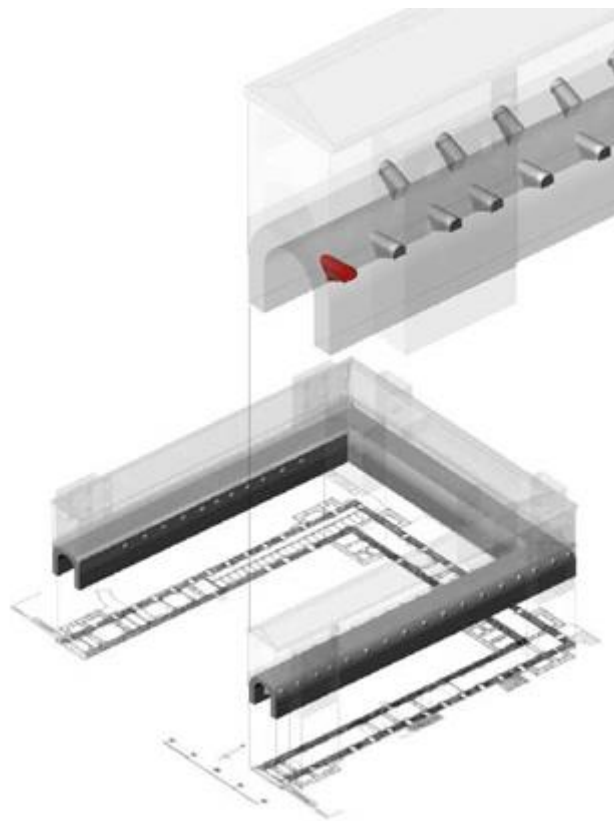


Figure 4. Ancient Roman cryptoporticus incorporated into the former Bourbon prison building: a 3d model to unveil their intimate static-morphological relationship

Digital technologies play a crucial role in solving accessibility problems (both physical and cultural) and offering alternative experiences through digital storytelling to engage local populations. Virtual archaeology has played an educational and popular role in recent decades, reconstructing monuments, cities, and territories to communicate ancient cultural heritage to different audiences. It enables a correct and immediate understanding of the past, even elements that are not accessible or have disappeared, through user-friendly fruition tools.

Information and Communication Technologies (ICTs) enhance our ability to access data, information, and knowledge, shaping new forms of interactive experiences not only in terms of knowledge but also in urban performance. This research aims to establish a new relationship between

the modern city of Santa Maria and the ancient Roman city of Capua Vetere, still buried underground, through digital technologies.

In recent years, the link between representation, drawing, and 3D digital surveying has become increasingly vital in Digital Cultural Heritage. Technological developments in surveying, 3D modeling, and advanced representation techniques have allowed researchers to improve their analyses of archaeological remains. 3D models generated can support analysis and interpretation, enabling the creation of information tools and Virtual Reality models for the promotion and narration of archaeological heritage, especially inaccessible ones.

Additionally, GIS and web-based platforms can provide scientific information to scholars and local communities, raising awareness of the quality and consistency of archaeological assets, including those hidden or inaccessible.

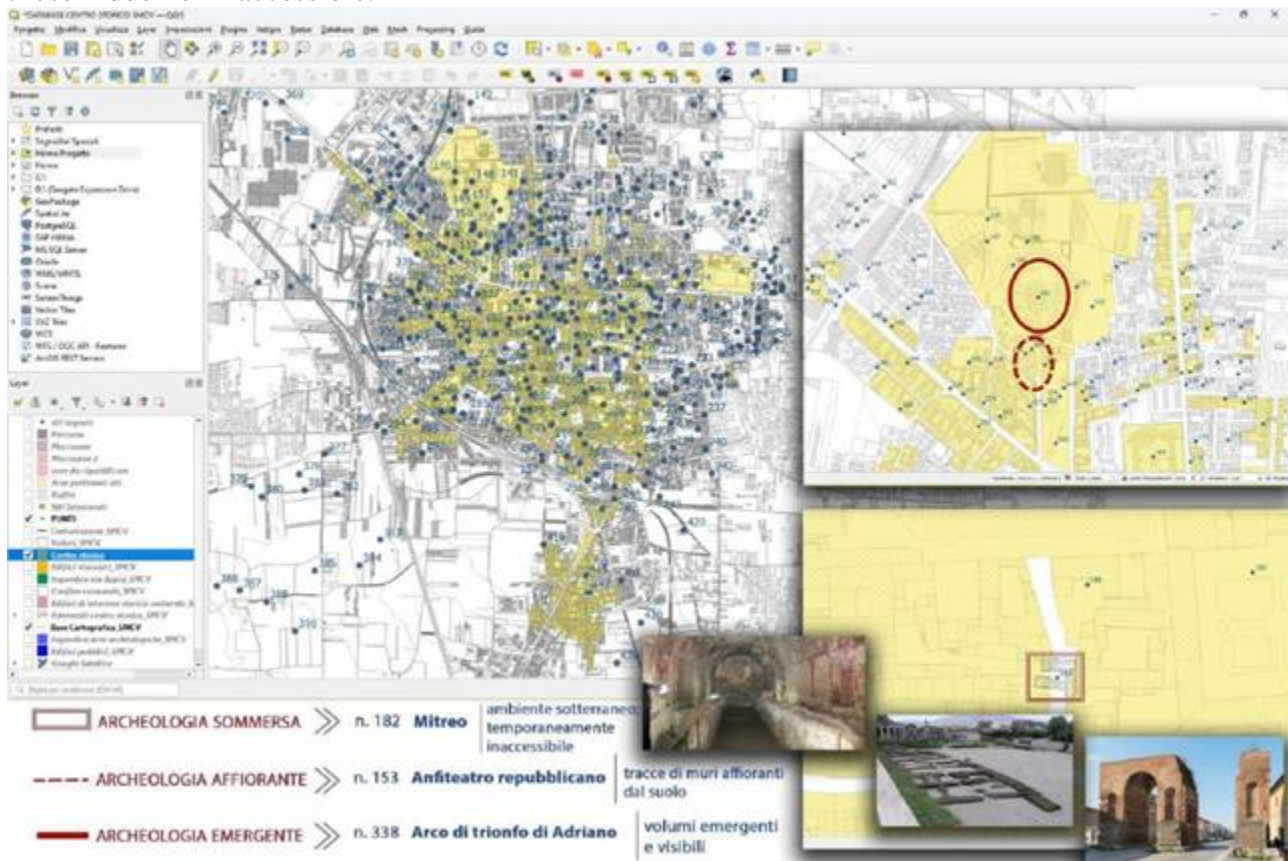


Figure 5. Mapping the archaeological remains in the historical center of the modern Santa Maria Capua Vetere.

The use of digital technologies for surveying and representing archaeology has a significant communicative and learning impact, enhancing understanding and appreciation of archaeological sites. Virtual Reality (VR) transports observers into virtual environments, overcoming physical limitations and reconstructing the original buildings and structures. It enables greater information sharing and accessibility to archaeological sites for tourism and research purposes. Both Virtual Reality and Augmented Reality (AR) promote interactive and engaging representations, increasing the observed-observer dialogue and relating tangible and intangible values of buildings with a human-centric approach into a “phygital reality”^[13-14-15] able overcome what impossible to be solved just in the physical dimension. An integrated approach is proposed, combining digital surveying for knowledge and preservation with advanced digital representation techniques for enhancing and experiencing inaccessible ancient heritage assets.

The goal is to reintegrate archaeological areas into the life of the contemporary city through digital technology utilization. A GIS mapping of the entire submerged archaeological heritage is proposed, alongside the creation of a narrative web GIS, using user-friendly storytelling techniques (ArcGIS StoryMaps), to disseminate knowledge and attract even non-expert audiences to the archaeological assets lying beneath the modern city (figure 5). The first step in overcoming the physical and consequently perceptual fragmentation of the archaeological heritage sites of ancient Capua was the construction of thematic maps, explorable and questionable, with recognizable paths of knowledge capable of connecting even very different archaeological sites by linking them to a common identity. In the case study of Santa Maria Capua Vetere, the creation of a GIS map is useful for a consequent hypothetical reconstruction of a reliable urban simulacra that represents, even to the large public, the real extension of the vanished roman city. The aim is to give a fast and self-explanatory evidence of the real large extension of the ancient Capua, thus providing to the inhabitants the awareness of them consistency and of their potential.

The reconstructive hypotheses we propose are based on accessible asset to be surveyed, historical documentation and archives: 3D models of key archaeological assets (such as the Triumphal arch, Amphitheater, Mithraeum, Catabulum, and the Cytoporticus), placed on the hypothetical map of the ancient Capua are just the first step to trigger immersive and augmented experiences, digital storytelling, and appropriate site-specific installations, including exhibition panels and/or street art murals near the assets, to allow for experiencing the contemporary city as a place of learning and archaeological site exploration where traditional museum strategies are impractical, creating a hybrid ancient-modern space based on the archaeology-architecture blend.

Figure 6. The so-called Catabulum, embodied in a private building.

The issue is the re-signification of the archaeological heritage thanks to the possibility new forms of digital experiences, allow us to overcome the current isolation of archaeological areas in the city. The design of an infoscape [16] to unveil ancient Capua is based on the coexistence and integrated use of different digital technologies, which together foster effective forms of communication and interaction between the physical and digital worlds, in a network of physical places and narrative routes. From

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fragments to clusters by means of narrative plots: each archaeological site, thus, becomes a node in a larger network, made by the intersection of thematic routes traced from the area's major attractors and aimed at redefining a new landscape, made up of onsite visits and immersive experiences in digital spaces, physical relationships between places and/or connections only of a cultural nature, to produce information and knowledge. According to this goal also «the concept of space is considered here in its multiple possible declinations that include both physical aspects- in this sense, experienced, in situ, situated and embodied places- and virtual aspects, understood as two- and three-dimensional, immersive, simulative and virtual (AR, VR, XR) digital places where technology is the experiential medium, hybrids, i.e. where systems (cognitive and instrumental) contaminate each other to the point of blurring and collapsing [17]. The proposed infoscape is an integrated project that tends to configure new spatial relationships, between physically distant places (through thematization of paths), between lost buildings and real remains, between real and digital spaces, in order to generate a new model of an accessible diffuse museum, in which digital information is not only attached to the single object or place, but is recombined, remixed and recontextualized, creating ever new physical and semantic geographies by means of a narrative plot involving the experiential capacities of the visitors.

Conclusions

The research developed so far on the historical center of the city of Santa Maria C.V. has highlighted the considerable archaeological heritage present underground, analyzing the data provided by the Superintendence of Archaeological Heritage and gathering information, through direct inspections, about the characters of the buildings and the technological, architectural and landscape conditions that characterize the urban spaces close to the archaeological resources. The conditions of extreme urban density and historical stratification of architecture as well as building demolitions and replacements applied in recent years prevent access to archaeological sites by the public, whether tourists or ordinary local citizens. The prevailing private ownership of the buildings limits the necessary and appropriate enhancement that is possible only in the few accessible archaeological sites or acquired by public administration.

The analysis developed on the cultural assets and the knowledge of the boundary conditions have provided basic information that will be processed, through appropriate tools, for assessment of the degree of transformability of the buildings to design the conditions of physical access. However, the time and cost for an adequate transformation for physical accessibility prompts the priority use of digital technologies for virtual accessibility and dissemination of knowledge of the archaeological heritage, also in view of the promotion for tourism purposes of the city. It is necessary to highlight the city is a candidate for nomination as “European City of Culture 2027” and aims to attract a large audience of tourists who today visit the city in a very marginal way and only as a reflection of the close Vanvitelli's Royal Palace of Caserta.

Finally, we have proposed an integrated cultural approach between urban planning and the enjoyment of heritage assets, with the aim of rededicating archaeological areas to contemporary city life using digital technologies. The community, due to the principle of economic circularity, will benefit from the enhancement of public spaces resulting from innovative methods of land use that encourage cultural tourism and the promotion of activities. Therefore, the aim is to involve citizens during all phases of the project with different approaches: qualitative research, surveys, interviews and living labs. The research takes full advantage of the potential of digital technologies to reach a wide audience in the process of re-appropriating the places of the contemporary city.

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The perception of Mediterranean cities through walking. The Landscape of Béjaïa in Algeria and Loulé in Portugal.

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Abstract

Walking is the simplest and most effective way to perceive the landscape. It is a way to stop and think about the values we recognize in the surrounding spaces. Walking is considered both a practice and a phenomenon, a dynamic that is happening here and now and that shapes the city landscapes of Béjaïa in Algeria and Loulé in Portugal while we experience them. In the article, two case studies are shown to present the act of walking as a relevant way to understand Mediterranean cities, especially those landscapes. The result involves reasoning through walking journals that help us to reconsider the importance of landscape values, including genius loci, architecture, culture, colors, rhythm, and more. The reading of a landscape leads to different levels with both scientific and humanistic approaches. As a living structure, the landscape is constantly evolving; therefore, its analysis must also consider the dynamic elements of the landscape. The text discusses the importance of maintaining a walking journal as a research method in the two case studies. A popular tool among academics worldwide, particularly those who use qualitative approaches, the walking diary enables the documentation of characteristics seen when exploring areas, both inside and outside of cities. In this research, special attention is given to sketching and drawing as methods of recording perceptions and making sense of the landscape as a whole. Artistic sensitivity is something extra, sometimes unnecessary, but it can make a difference in contemporary design that is increasingly conscious, researched, but also open and communicative. The article aims, therefore, to show the results of that practice of analysis through a sensory exploration of two different Mediterranean cities by walking.

Keywords: *Walking, Perception, Mediterranean Cities, Landscape, Genius Loci.*

1. WALKING AS A METHOD OF RESEARCH AND A TOOL FOR PERCEIVING LANDSCAPES

Walking is a natural act that allows us to explore, absorb, and immerse ourselves in the landscape we traverse through the full engagement of the body and senses. In a chapter titled *Walking the Past in the Present*, published in the book *Landscapes Beyond Land*, Christopher Tilley emphasizes that it is insufficient, in the study of landscapes and environments experienced by humans, to rely solely on external knowledge - such as reading landscape and historical maps, interpreting aerial views, analyzing photographs and narratives, etc.; he suggests instead using walking as a research method and a tool to reveal the features of environments. Walking provides internal knowledge acquired through perception at a human scale. *"Walking in the landscape is an attempt to understand it at a human scale. The limits of this knowledge are the limits of my own body and how this body limits and facilitates my perception. The goal is to acquire an 'internal' knowledge of archaeological sites such as megalithic monuments and settlements in their landscape contexts, as opposed to knowledge gained through mediated representations that can only provide an 'external' perspective"* [1]. Walking is also regarded as a participatory research method; it allows experiencing real situations within societies and being in direct and close contact with people, to understand their culture, way of life, social dynamics, and their impact on the spatial structures of environments [2]. This approach is

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known as ethnographic walking. This type of walking is widely used by anthropologists, including British anthropologist Tim Ingold, who teaches at the University of Aberdeen and authorizes several books and scientific works in this field. Ingold is particularly interested in perception; he argues that any interaction with the environment stems from a set of present elements and cannot be carried out independently of the world [3]. In the field of art, walking is approached in three different ways: sometimes as a main subject, sometimes as a medium, and sometimes both as medium and subject. For decades, numerous artists have used walking to create works reflecting social phenomena or describing individual situations. This practice allows artists to immerse themselves in the space around them through movement. This natural act, often performed spontaneously, allows artists to enrich themselves with new ideas and to imagine and design representations of the spaces they traverse. Among the famous artistic works created through walking is that of Richard Long, who traverses natural landscapes, leaving marks on the ground to signify his passage, like alignments of stones or tracks on the earth. One of his most well-known works, which has significantly influenced contemporary art and connects three main concepts: Landscape, Culture, and Art, is titled *A Line Made by Walking* [4]. This work is also considered a participatory act. Similarly, Canadian artist Janet Cardiff works with participants using AudioWalks, where people are guided through urban spaces while listening to surrounding sounds or music [5].

1.1 Sensory perception through walking

To understand the sensory aspects of the landscape, the researchers must wander and explore all facets of the site. They must smell, observe, touch, listen, and even taste later to interpret these elements through their sensory perception [6 ; 7 ; 8]. The smells and aromas encountered, the heat or cold felt when moving from one place to another, the sounds, the wind, the textures - all these are elements that allow for a sensitive understanding, forging a bodily relationship with the site, a process possible only by walking [9]. Yannis Hamilakis, an archaeologist and professor at Brown University, introduces an important concept related to walking: sensory memory. In his book *Archaeology and the Senses: Human Experience, Memory, and Affect*, he critiques the superficial vision traditionally attributed to archaeology, which overlooks the often forgotten affective characteristics. He argues that mere physical engagement is reductive and does not allow for a complete understanding of ancestral heritage. In a study on Minoan palaces, the author proposes a new way to approach historical sites, based on bodily engagement through walking and founded on the principle of multi-temporal and sensory archaeology [10].

2. WANDERING AS A MEANS OF REDISCOVERY AND INTERACTION WITH THE URBAN LANDSCAPE

In his book *Urban Wanderer*, Xiaohui Lin argues that getting lost in the urban environment enhances our interaction with it, thus offering us the opportunity to travel through its different facets via an enriching experience. According to Xiaohui, wandering allows us to connect the body, mind, and land; indeed, during the act of wandering, we are freed from all pre-established considerations and judgments that can be associated with the environments we traverse, allowing us to perceive them differently [11]. Meanwhile, Bradley Garrett emphasizes the importance of urban exploration through wandering, considering it a way to rediscover, explore, and even reinvigorate abandoned or neglected spaces in the urban environment. Garrett focuses on urban explorers who practice wandering, viewing them as highly significant figures in the city. He develops the concept of infiltration, meaning traversing urban spaces that are forgotten or marginalized and considered weird - places no one would imagine exploring or simply passing through. This is also considered a political and cultural act and a form of engagement in the city. In his study presented in *Undertaking Recreational Trespass: Urban Exploration and Infiltration*, conducted with a group of urban explorers in London over four years, Garrett highlights the importance of free and spontaneous urban exploration that alters our perception

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of environments. The explorers observed by the researcher transgressed all conventional and natural boundaries in city exploration. They traversed on foot through the London underground networks and sewers, old buildings, cranes, etc. [12]. This is crucial for us, as it allows for a profound interaction with the city, ensuring we do not overlook many elements, even those that might sometimes seem subtle or mundane to our minds.

3. TWO CASE STUDIES: BEJAIA IN ALGERIA AND LOULÉ IN PORTUGAL

3.1 Case study: Bejaia, Algeria

Bejaia, also known as Bgayet in Kabyle (local language) or *Bougie*, is a crucial city in Algeria and the Maghreb region. It is located in the southern basin of the Mediterranean Sea and occupies the heart of the North African coastline. Situated 230 kilometers from Algiers, the capital, Bejaia enjoys a strategic position in northern Algeria thanks to numerous features, including its easily accessible natural site and port, one of the country's foremost. Its geographical location has attracted the interest of many civilizations that have traversed the Mediterranean region. Several writers and historians, including Louis Salvator, have written about this city. In his book *Bougie la perle de l'Afrique du Nord*, he describes the iconic symbols and captivating history of Bejaia [13]. Many traces of these civilizations, which have shaped the city's landscape, are still visible today. The urban fabric of Bejaia consists of two main parts: the old city or medina, which includes all the precolonial urban configurations, and the lower city, built primarily after Algeria's independence in 1962.

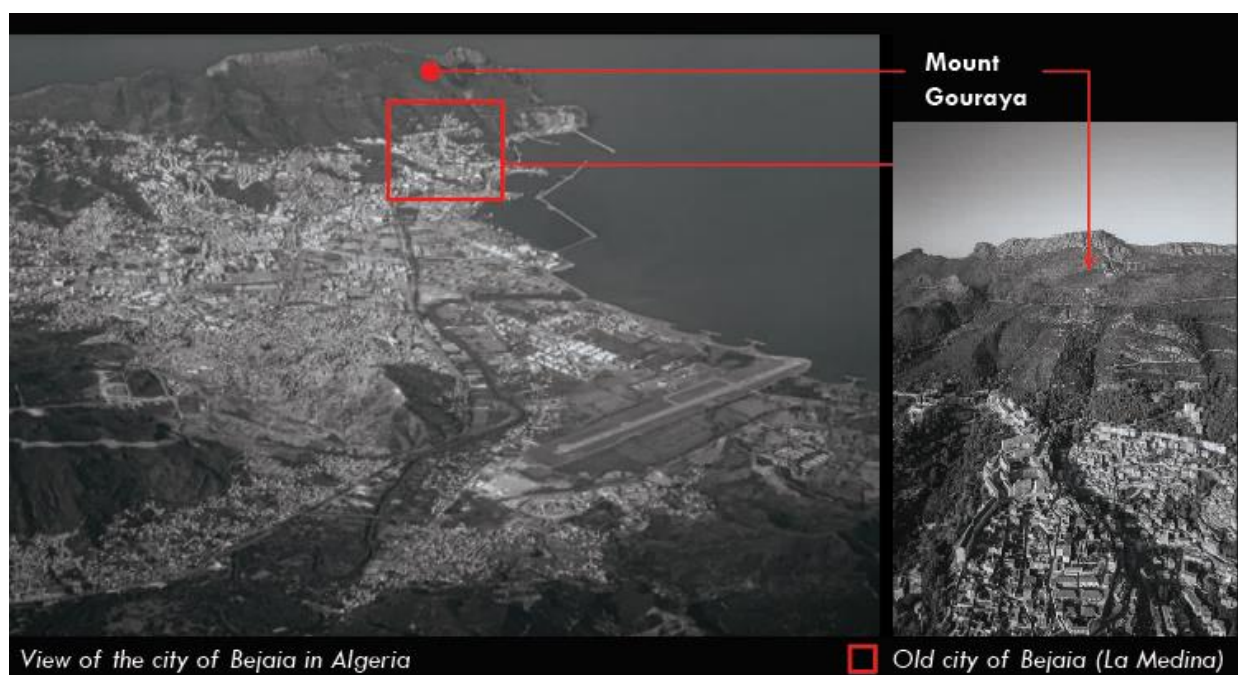


Figure 02: Aerial view of the city of Bejaia. Source: www.skyscrapercity.com. Accessed on: 18-02-2021

3.1.1 Exploring the cityscape of Bejaia by walking

To begin our framework of study, wandering constitutes the first step in our field research. During this initial phase, we explored the urban fabric of Bejaia, which is divided into two main parts: the old city and the lower city. We wandered freely to gain an initial contextual understanding. Guided primarily by our natural curiosity, we posed various questions as we moved through the city's different neighbourhoods. Thus, we could appreciate, through our perception, several "spatial qualities" related to the physical and sensory characteristics encountered. Furthermore, we interacted

with the inhabitants and observed the urban scene" and the activities there. We used participant and non-participant observation to grasp the cultural aspects and anthropogenic characters of Bejaia's urban landscape. During this exploration, we climbed to the city's heights, up to Mount Gouraya, passing through the historic neighbourhoods of the old city. We descended to the sea and the fishing port. We traversed the lower city, exploring the plains and heights of the ZHUN of Sidi Ahmed and the peripheral areas and spontaneous urban fabrics of Taghzouit and Sidi Ali Lebher. In parallel, the morphological study allowed us to trace the various transformations that have shaped the city's urban landscape. Through this study, we identified the paths used by walkers in the past, which gave us an insight into the routes that have persisted and evolved over the years. This morphological analysis is combined with the sitological study of the landscapes of the old city and the lower city, organized according to three main frameworks: primary, secondary, and tertiary. On the other hand, iconographic analysis was used to interpret many old photos and engravings collected throughout our research, employing the denotative code method [14 ; 15] and the connotation method [16]. Several routes in both parts of the city have been identified and explored at different times of the year, using the walking journal as the primary tool for data collection.



Figure 03: Photos taken in the old city of Bejaia. Source: Taken by Yacine Mansouri, 2023.

3.1.2 Landscape values between the old city (medina) and the lower city of bejaia. What impact on the urban and sensory experience?

The sensory experience in the old city of Bejaia (medina) is particularly interesting. Our walking explorations revealed that this part of the city is very rich in landscape qualities, significantly influencing the perception and attachment of both residents and tourists. However, several urban elements need to be addressed and could be revitalized to enrich the city's landscape, including old stairs dating from the precolonial period. It is also important to note that ongoing restoration work must consider sensitive and affective aspects to provide an enriching experience.

The lower city of Bejaia exhibited a wide variety of spatial configurations, with spontaneous fabrics (mainly containing illegal constructions) and planned fabrics (such as Zones Urbaines Nouvelles - ZHUN). The created spaces show a certain visual homogenization and uniformity of landscapes due to the standardization and application of typical models, mainly in the construction of residential cities. This monotony, observed in many parts of the urban landscape, results from the need for more consideration of sensory elements, which reduces the immersive experience. On the other hand, discontinuities in the urban experience and breaks between different landscape components are observable, such as the disruption of the city-sea relationship in a significant part of the city, creating a sense of disconnection, especially towards the rear port of Bejaia. Moreover, the disregard of identity and cultural elements in the design has generated meaningless spaces that do not preserve

collective memory. Many lessons can be learned from the urban landscape of the old city and applied in the processes of requalifying the urban spaces of the lower city.

3.2 Case study: Loulé, Algarve (Portugal)

The Algarve (literally "the west" from Arabic) is the southernmost region of Portugal. It faces south and east towards the Atlantic Ocean and is characterized by a typical Mediterranean climate. The center is represented by Albufeira, the Barlavento zone is west of Sagres, while the Sotavento zone is east to the Spanish border. There are three geographical belts in this area: the serra, the barrocal - where Loulé is located - and the littoral. The serra is a unit of shale boulders rising to more than 500 meters, the peaks being Serra de Monchique and Serra do Caldeirão. The rocks are dark and the vegetation dense, with oak and chestnut groves. Terracing is abundant in that area. The barrocal, at the foot of the limestone hills, has reliefs of shale; almond, fig, and carob trees cover the ground in such quantities that, seen from a high point, they look more like dense spontaneous forests than crops in which man intersperses cereals, broad beans, and peas. The barrocal is identified by slight limestone hills on which almond, fig, and carob trees grow. In contrast, the littoral is made up of clear limestone rocks, with whitewashed constructions of limestone, dark patches of tree groves, clumps of mastic trees, oleanders on the water's edge, and low fans of dwarf palms [17 ; 18].



Figure 04: Photos taken in the city of Loulé. Source: Daniele Stefàno, 2015.

3.2.1 Exploring the city of Loulé by walking

The walks lead to an understanding of how the landscape changes. The Conselho de Loulé encompasses all three geographic belts, with a very diverse landscape. In contrast, the city of Loulé is located in the vicinity of the Algarvian beaches, which are renowned for a large influx of tourists. For this reason, and for possessing a remarkable historic center, it is an important point of passage for many people.

Services are concentrated in the northern part. The historic center of Loulé represents a major cultural identity for the region; rich in artistic and architectural assets, it is defined by a very compact mesh. The city, in which a salt mine is also located, is laid out horizontally on a slight ridge and is visibly structured in three parts: The Santuario da Nossa Senhora da Conceição, which constitutes a landmark to the west, the historic center, and the peripheral area in which the mine is located to the east.



Figure 05: Sketch of the historical center of Loulé. Source: Daniele Stefano, 2015.

3.2.2 Drawing to acknowledge landscape values

What emerges from the drawings and sketches made by walking, on the one hand, is the richness of the flora of the surrounding landscape and, on the other, a very identifiable typically Algarvian architectural style. Bright colors between deep blue and yellow predominate, recalled in turn by the endless graphic patterns of the azulejos. The city of Loulé is a centrality with its strategic location near the tourist beaches. Despite this, its interior is sharply divided between the historic center, modern fabric, and recent expansion. In the latter part lies the mine: with a passthrough role between the countryside and the city.

The arid, undulating land of the Algarve contours Loulé's recent expansions. Among the Mediterranean plants, mostly grasses, the mine's elevator-tower stands out. The mine, on the other hand, is a rather neglected area, defining the eastern edge between recently constructed buildings. On the surface, it is an uncultivated field of grasses, while the underground rooms are the reddish-yellow color of rock salt, the ore mined here. The Loulé rock salt mine arose because of the geological mutation that came about from the separation of Europe and Africa that created the Mediterranean Sea 250 million years ago.

By drawing, it was possible to collect all these data and put them together in an overall image that resituates the complexity of the Mediterranean landscape made up of historical and natural stratifications. In particular, it turned out to be a way to highlight the distinctive values we recognize in the landscape.



Figure 06: Sketch between the city and the countryside. Source: Daniele Stefàno, 2015.

4. THE IMPORTANCE OF USING A WALKING JOURNAL FOR OUR RESEARCH

The walking journal has proven to be a highly relevant tool in the context of our current research. Used globally by many researchers, mainly those who adopt qualitative methods, it allows for recording qualities encountered during wanderings, whether in urban environments or beyond. In our study, this tool served a dual purpose: On the one hand, as researchers, we used the walking journal to record all our impressions and sensations, as well as our emotional and affective reactions to the different characteristics perceived in the spaces we traversed, in the form of texts, drawings, photos, and even sound recordings.

The two case studies are the result of two separate works and compared here by analogy. The walks through the selected urban routes were carried out several times over the year, during different seasons and in varied weather conditions, to account for temporal variability and to provide a complete and nuanced understanding of the city's qualities. Moreover, walking was practiced both during the day and at night, allowing the capture of the diurnal and nocturnal dynamics. Alongside our subjective experience, researchers also recorded their sensations and perceptions throughout the predefined routes and locations. They thus compiled several walking journals during guided walks.

CONCLUSION

This research demonstrates the crucial importance of walking as a research method and a tool allowing for total immersion in the environments traversed. Thus, walking surpasses being merely a means of transportation to become a powerful tool for discovery, requalification, and valorization of our landscapes and urban spaces. As demonstrated in this study of two Mediterranean cities, Bejaia in Algeria and Loulé in Portugal, this practice reveals all layers of complexity in our living environments. It enables the integration of operations that take into account all characteristics of the landscape and primarily prioritize the human, cultural, and sensory dimensions during the implementation of planning and development operations, thus promoting richer and more suitable living spaces adapted to our needs. The walking journals used in this study prove to be a powerful tool for capturing all multisensory elements and interactions during the walk. Using this tool allows researchers to reveal aspects often missed by other methods used in urban and landscape analyses. On the other hand, the study highlights the exceptional richness of Mediterranean cities in landscape

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qualities that now require deep exploration to be valorized through the implementation of studies that place the practice of walking at the heart of the methodologies used.

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Digital Sound Installation as a strategy for the cultural reinforcement of the Historical Roman Baths at Kyllini, Elis

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Abstract

Starting from the common assumption that Public Space is important for a society because it is (potentially) the focus of its cultural life, the concern on which the present text develops upon is: do we have the Public Spaces we deserve and if not, what do we do about it? Concurrently; is it possible that we can redefine abandoned semi-urban, or open-air areas of historical significance considering Digital Art Installations, by means of raising awareness or creating novel significance, as an added value to their existing circumstances? Indeed, once a Digital artwork is installed within a Public Space, the latter ceases to be simply the material essence of its built forms, or the permanence and non-permanence of its architectural elements and details. Instead, a new condition develops, as space and artwork combined change our understanding of the existing reality and affect our perception of what such an environment is.

The present paper discusses the potential of using a Digital Sound Art installation as a strategy for the reinforcement of the Roman Baths of Kyllini, Elis, in the Western Peloponnese Region: a significant Historical, relinquished place of exquisite natural beauty, with rich archaeological and cultural heritage connected to thermal bathing. Following a visual and auditory mapping of the area, we examine this device as a coetaneous experiment upon how an audio-visual material is created through a critical interpretation of place; and how the transformational power of Digital Art can affirm conscious behaviors on culturally important, public open spaces. The concomitant research is inscribed within the research project "LOUTROTOPOS: Critical mapping and visual narration of thermal springs in the Hellenic Territory", which investigates a wider network of places of thermal resources in the Hellenic periphery upon these methodological and conceptual premises.

Keywords: *Sound Installation; Culture; Public Open Space; Abandoned Places; Ancient Roman Baths; Kyllini, Elis.*

1. INTRO: WAITING

The paper discusses the conceptual framework for a sound installation project proposed for Kyllini Roman Thermal Baths. This is part of the funded research project "*Loutrotopos: Critical mapping and visual narration of thermal springs in the Hellenic Territory*", that investigates networks of places of thermal resources in the Hellenic periphery. The objective of the research project aligns with the regional planning policies for remote places in the Hellenic periphery, based on the preservation of the cultural identity and the promotion of endogenous local resources, highlighting the fact that thermal springs are geographical places with a unique physiognomy and developmental potential. Kyllini's ancient Roman Baths lie in a peaceful but neglected area at the northwest of Peloponnesus, 9km from Kyllini cape. The proposed sound installation is conceptualized as a strategy for the cultural reinforcement of the specific area of the Baths.

A sound installation consists of both the material components that constitute the sound composition, and also, it refers to a model-of-an-action, which this organization sets. Henceforth, an analysis of a sound installation takes into account two aspects, that which refers to the material and that which refers to the kind¹ [1]. A sound composition can be firstly examined in terms of what it is *per se*, secondly in terms of the form it takes in order to be transmitted and thirdly in terms of its relation to the space it appropriates once it is installed. Sound is vibration that bears no shape or volume, at least, not a visual or haptic one. Despite its invisible nature it composes and articulates a certain language producing its own symbols. Within this language the system is sensually and cognitively presented. The essence of language is the 'account', which is a unit of knowledge that holds a cerebral quality, a sensual quality, and an emotional quality. Intellectuality, sensation, and emotion are parts of the same intellectual whole. Such a language also serves the kind cause. The cognitive appreciation of the sound serves its material cause, which is related to the dimension of real space. Moreover, sound is associated to the 'real time' and 'real space'. It is not enclosed in any kind of meaning other than the one its receiver specifies. Although the 'meaning of the sound' is bound, it does not separate itself from the environment to which it is transmitted and belongs.

We are ultimately surrounded by sound sources, that occur simultaneously, so how do we sort out all these information? Our brain carries out the task of reconstructing and sorting them using the functions of attention and working memory. The analysis of an auditory scene depends upon the properties of binaural hearing, which also processes the frequency information that comes from different sound sources. Due to the function of memory, sound provides knowledge about spaces by literally moving us, because sound is a vibration and as such it penetrates and resolves through the human brain in the human body. A great number of visual and sound artists are working upon the subject of the knowledge the audition brings to our perception. Jez Riley French's works are focused on this intermediate space between the digital and the physical space making evident the reciprocal relationship between spatial environment and digital artworks. "Waiting" (2014-2017) is the title of a multi-media art project developed in eight parts, where each part includes still images as projections of a more or less familiar, rather indifferent, black-and-white natural environment where nothing happens. It also includes a composed arrangement of sounds that resonate above and below our range of hearing, which are standing in contrast to those that images conventionally hint at. Sound suspends the immobility of what we see meanwhile, our memory rearranges the dimension of the *real* [1].

2. ABANDONED PLACES: ANCIENT ROMAN BATHS, KYLLINI, ELIS

Travelling along the West Peloponnesian coast we arrive at Kyllini's Roman Baths where we clearly see the need to make a record, as complete as possible, of such a unique landscape. Our recording is based upon an audiovisual cartographic approach regarding:

- 1.A. The wider features of the landscape; its flora and fauna
- 1.B. The specific natural/geomorphological features that attributes to the identity of the space and
- 1.C. The details regarding the "memory of space", for example, particulars that are connected to its historical aura.

This type of recording offers some interesting traces, which concern:

- 2.A. Architecture and the environment of Kyllini's Roman Baths
- 2.B. The present state of Kyllini's Roman Baths.
- 2.C. Sound Installation as a strategy for the reinforcement of the extreme significance of the place.

The concomitant research has provided the following observations:

¹According to system of classification by Aristotle, there are four major indispensable parameters that a work of art should fulfil in its essence : The material cause , the kind cause , the creative cause, and the terminal cause.

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1.A. *The wider features of the landscape; its flora and fauna:* At the northwest of Peloponnese, a coastal region extends from the area of Kalogria beach to the headland of Kyllini cape, along an inland region of captivating beauty, characterized by diverse geomorphology, rich biodiversity, and historical significance. The interplay of natural elements and cultural heritage renders this landscape a veritable microcosm. The substrate along the coastal region is sandy and not very deep (max. depth 15m), hosting the beds of “*Posidonia oceanica*”. These sandy beaches are potential nesting areas of the loggerhead turtle “*Caretta caretta*”. The beach from Kalogria to Manolada is backed by a dune system with typical vegetation such as “*Ammophila arenaria*” and “*Euphorbia paralias*”. Further up the dunes, there is a strip of “*Juniperus phoenicea*”, “*Pistacia lentiscus*”, etc. After the dunes the coastal forest of *Strofilia* starts, which is gradually substituted by agricultural land.

Further south, towards the end of the gulf of Patras, the beach is comprised of fine sand, backed by low-lying dunes down to the mouth of Kotichi lagoon where the sand-strip becomes narrower. The “*Posidonia oceanica*” beds are extensive and have a high density of plants. This marine phanerogam hosts great numbers of both animal and plant organisms. Many epiphytic macroalgal species and many species of gastropod use the leaves as substrate for their growth. The seagrass “*Cymodocea nodosa*” grows in the very shallow waters of the area. It is the characteristic vegetation of the lagoon and it replaces the “*Posidonia oceanica*” beds at the Kyllini harbour.¹ On the sand dunes of the beach, during the summer months, sand lilies grow. We are in the westernmost tip of the Peloponnese. Moving from this point towards the inland, at coordinates 37° 56' 0" N, 21° 9' 0" E we find the beginning of the Kyllini Peninsula Landscape Zone. The interpenetration of the zone of the Chelonitis gulf and the zone of the Kyllini gulf create a common place/landscape, roughly delimiting it, from the route of Pinios river and its estuary to the cape of Kyllini and the salt flats of the Lechaina area².

To the east, the area of the peninsula is flat. The rural cultivated landscape is a continuation of the rural landscape of the plain of Elis with the name Kampos of Gastouni. In this particular zone, vines, olive trees, fruit and vegetable crops dominate. Few parts of the area can be characterized as a non-purely cultivated landscape because there are also extended green houses and some industries. A distinguished feature of the area is the agricultural cultivated landscape of the hills with predominant types of citrus fruit and olive trees.

1.B. *The specific natural/geomorphological features that attribute to the identity of the space:*

Further east, after 9km from the Ionian coast at Kyllini cape³, we are finally reaching the ancient Roman Baths. They are located in the middle of a wooded area of an amazing beauty, interrupted by large pieces of arable land. It is the area where the forest reaches all the way to the beach, ending in rare sand dunes with dense vegetation of large tamarinds and cedars. Ancient Roman Baths are placed in an indeed beautiful green area, with an ancient pine (*Pinus halepensis*) forest, centuries-old eucalyptus (*Eucalyptus globulus*), plane trees, oaks (*Quercus macrolepis*), beeches, lindens, figs, willows, combined with large areas of arable land with olives, vines and citrus. Specifically, the area is characterized by a genuine Mediterranean diversity of ecosystems and habitats that combines

¹ <https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=GR2330007>

² Ibid. The Kyllini gulf includes three areas of national value and three landscapes of regional value. The land, water and sea areas of the Kotychi lagoon, the *Strofilia* forest and their wider area (Achaia - Iliia) were designated as the “Kotychi - *Strofilia* Wetlands” National Park because they are distinguished for their great biological, ecological, aesthetic, scientific, geomorphological and pedagogical value. The purpose of this distinction is the protection, preservation and management of the landscape, as a natural heritage and a valuable national resource.

³ Ibid. The wider area has been designated as protected, in “Places of Community Importance” (Directive 92/43/EC) in the Cir. of Western Greece in accordance with the Commission Decision of 19 July 2006, concerning the approval of the list of sites of Community importance for the Mediterranean biogeographical region from south to the north [notified under number E (2006) 3261] (2006/613/EC) the “Coast Sea Zone From Cape Kyllini to Toumpi - Kalogria”

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coastal wetlands (lagoons, marshes, salt marshes, marshes, reed beds, riverside tree stands) with extensive systems of coastal forests and limestone hills with typical Mediterranean vegetation (mainly phrygians and sparse stands oak).¹

The anaglyphic land-form of the area does not offer strong fluctuations. It is mainly characterized by very low to zero slopes, while the soils are quite fertile, which leads to the intensive cultivation found in the area. This is precisely the characteristic that reigns the area of the Roman Baths with the sense of peacefulness, that endows the ambience of tranquility to the experience of the thermal baths. The harmonious blend of fragrances, gentle variations of color and the amalgamations of sound-frequencies arriving through the forest, make palpable the exquisite beauty of the Roman Baths area. The landscape is characterized as an area of hilly/semi-mountainous landscapes. Geographically, the region showcases an interesting variety of geological formations, ranging from gentle undulating hills to rugged mountain ranges. Almost flat lands prevail in most of the area. Between them emerge the limestone hills Mavra Vouna (240m.) and the small hill Kounoupele (47m.). The verdant valleys, nourished by perennial streams and rivers, sustain a plethora of flora and fauna, fostering ecological diversity. Dominant features include the olive groves, interspersed with vineyards and citrus orchards, which contribute not only to the scenic charm but also to the region's agricultural productivity.

1.C. *Its relationship with the possibility of the "memory of space" to contain more information than that found in the visible order of things, such as, for example, its historical aura:* Kyllini is mentioned for the first time in Homer's "Iliad" where Otos from Kyllini was killed during the Trojan war. According to Pausanias, Kyllini was founded by the Arcadians who had migrated to the area of Mount Kyllini. In ancient Greece, it was one of the most important ports of the Peloponnese, because it was the main entrance to ancient Ilios. With the arrival of the Franks in 1204, a new town called Glarenza was created, which together with the rebuilt port of Kyllini, gave the area great development. In the Middle Ages, Kyllini was particularly known for the export of its products, such as raisins, wine, oil and cotton. In 1428, the area passed to the reign of Constantinos Palaiologos, the last Byzantine emperor, yet, he was forced to demolish the port to prevent it from falling into the savages of the pirates. Since then, Kyllini turned into a simple settlement².

Heading from Kyllini to the ancient Roman Baths we shall meet the Chlemoutsi (also known as Chateau Clermont) a medieval Castle built within the early 1220s by the Crusader rulers of the Territory of Achaia as their primary fortification. It is maybe the most important fortress of the early period of Frankish rule in Greece. Chlemoutsi remains as one of the foremost imperative and best-preserved castles in Greece, keeping up its Frankish character intaglio³.

A quite narrow provincial road, crossing a woodland of eucalyptus trees that were planted at 1890-1892, relocated from France with the help of the company SPAP that exploited the Baths at the time, lead us to Loutra Kyllini, which was an independent settlement until 1912. After the recognition of the Municipalities and Townships, the village Kastro was recognized as a Township and Loutra became a part of the Kastro Township. Nonetheless, next to them we find another settlement of warm

¹ <https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=GR2330007>

Based on this rare diversity, the Landscape Zone of the Kyllini Gulf includes three (3) areas of National Value and three (3) landscapes of Regional Value. In this zone, the land, water and sea areas of the Kotychi lagoon, the Strofilia forest and their wider area (Achaia - Ilios) were designated as the "Kotychi - Strofilia Wetlands" National Park because they are distinguished for their great biological, ecological, aesthetic, scientific, geomorphological and pedagogical value. The purpose of this distinction is the protection, preservation and management of the nature and the landscape, as a natural heritage and a valuable national natural resource.

² <https://visit-olympia.gr/en/listing/kyllini>

³ Ibid. Chlemoutsi castle has been declared a Cultural Heritage Monument by UNESCO and soon inside the castle it will be housed in a model museum.

springs and showers called "Litzi" (the word *Litzi* means *Bath* in Latin). We finally have arrived at the large complex of carefully constructed Roman baths (thermae), which, in the past years, as well as nowadays, attract numerous guests.

Overall, the Kyllini Baths have been known since ancient times for their thermal springs, whose waters, fumes and mud are therapeutic. The sulfur compounds found in the water are responsible for the beneficial qualities of the lychee spring water, which aid in the prevention of numerous illnesses, including those pertaining to the digestive tract, skin, joints, and respiratory systems. Furthermore, the spring waters have an antibacterial and anti-inflammatory impact due to their high amount of "hydrosulphide". Some of the visitors take "mud baths," which involve covering their bodies with the ameliorative mud and then being washed with the therapeutic water that naturally emerges in the same location [3].

2.A. Architecture and the environment of Kyllini's Roman Baths: The abandoned Roman Baths stand as a witnesses to a bygone era, where echoes of ancient indulgence and societal sophistication resonate throughout the tranquil landscape. Nestled in the middle of verdant hills of dense natural growth, this once-grand bathing complex were a testament to the opulence and engineering prowess of the Roman Empire. Renowned for their mineral-rich waters, the baths served as communal spaces for relaxation, socializing, and wellness rituals. Approaching the site, weathered plinths fenced by thin metal net emerge from the surrounding vegetation, hinting at the grandeur that once defined these thermal sanctuaries.

As we approaching the metal fence which frames the Roman Baths, we encounter a network of interconnected rooms and corridors, each serving a specific function within the bathing ritual. From the caldarium, with its heated pools and steam rooms, to the frigidarium, offering respite from the summer heat, these spaces provided a holistic experience for body and soul. Despite the passage of centuries and the ravages of time, the abandoned Roman Baths retain an aura of mystique and elegance. Amidst the decay, traces of the baths' former splendor still linger, offering a glimpse into a world where leisure and luxury were paramount.

Sadly, nature has begun to reclaim the site, with ivy creeping up weathered walls and wildflowers blooming amidst fallen stones. The main chamber, with its soaring ceilings and arched windows, once echoed with the sound of cascading water from ornate fountains, is now covered with a thin carpet of mosses and lichens. Fragments of marble benches and alcoves bear testament to the meticulous design and meticulous attention to detail that characterized Roman architecture underneath the eternal blue sky. Long black plastic sheets layered over the ancient construction; hence, this is the only protection towards the irreversible deterioration of the valuable ruins.

2.B. The present state of Kyllini's Roman Baths: Once more, nestled within the topographical era of West Peloponnesus lies an inland region of captivating beauty, characterized by a diverse geomorphology, rich biodiversity, and historical significance. The interplay of natural elements and cultural heritage renders this landscape a veritable microcosm. Archaeological vestiges punctuate the landscape, bearing witness to the region's old history. Ancient ruins, including temples, theaters, and fortified citadels, provide tangible links to the significant past of the area, inviting scholarly inquiry and cultural exploration. These remnants serve as repositories of knowledge, shedding light on the social, political, and artistic dimensions. The specific countryside is comprised of traditional villages characterized by their whitewashed dwellings. The relevant settlements serve as bastions of local heritage, preserving age-old customs, artisanal crafts, and culinary traditions. Their habitants are the permanent visitors of the Killini Roman Baths. Weather allowed, mingled with other national and international visitors, they all offer some insight into the sociocultural fabric of the population that overcrowd the specific place.

Even so, neglect is always present: Some parts of the Roman Bath's yard shrouded in a cloak of tangled undergrowth. Nature, undeterred by the absence of human care, has woven a tapestry of putrefaction. Amidst the encroaching wilderness, span the sluggish therapeutic waters, on the soil of

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which patches of swampy, marshy earth by the overflow waters is making our staying quite difficult. Plastic cords out of use are freely looping underneath faunas, whereas a metallic tube is in use, pouring water for the visitors to collect it, using their own paraphernalia. As we approach the metal fence which frames the Roman Baths, we encounter a network of interconnected rooms and corridors, each serving a specific function within the bathing ritual. From the caldarium, with its heated pools and steam rooms, to the frigidarium, offering respite from the summer heat, these spaces provided a holistic experience for body and soul. Sadly, nature has begun to reclaim the site, with ivy creeping up weathered walls and wildflowers blooming amidst fallen stones. The main chamber, with its soaring ceilings and arched windows, once echoed with the sound of cascading water from ornate fountains, is now covered with a thin carpet of mosses and lichens. Fragments of marble benches and alcoves bear testament to the meticulous design and meticulous attention to detail that characterized Roman architecture underneath the eternal blue sky.

2.C. Sound Installation as a strategy for the reinforcement of the extreme significance of the place: Then, there's a question that remains: Is it possible to awake the interest for an abandoned, open-air area of historical significance, using the power of art to stimulate our brain and as such, being appreciated as a value over the existing redundant situation? We took under consideration the fact that the form of art, which would be allowed to be placed in an area under authoritative protection protocols should not infringe but append to the cultural experience of a visitor. Under the certain circumstances, a Digital form of art appears as the ideal, intangible intervention into the place. Indeed, once a Digital artwork is installed within a Public Space, the latter ceases to be simply the material essence of its built forms, or the permanence and non-permanence of its architectural elements and details, along with its state of preservation. Instead, a new condition develops, as space and artwork combined change our understanding of the existing reality and affect our perception of what such an environment is.

3. FOREST (FOR A THOUSAND YEARS...): CONCEPTUAL STRATEGIES FOR A SOUND INSTALLATION AT KYLLINI'S ROMAN BATHS

The recordings made during the audiovisual mapping of West Peloponnesian era, gradually focused on the specific site of Roman Baths, led us to examine the hypothesis of creating a Digital Sound Installation in situ, according to our thought of casting attention to the cultural importance of the specific place. Considering that Sound installations are closely related to the site on which they are situated, we foremost propose a study on the architectural, sociological, historical, and other contextual data that is gathered under the term *site-specificity*. The material following the present proposal is gathered from the sound sources of the greater and the liminal environment of the Roman Baths, as it is previously described in detail. It is aspired from Lacey's three methods for producing sound installations [4]: elemental (installations driven by the elements, or those that use elements to generate sounds), resonant (using resonant features or structural vibrations), and electro-acoustic (loudspeakers).

In order to understand the impact of sound to human's perception we need to briefly discuss the auditory function. Once sound-waves reach our ears, they are converted into electrical signals, reaching the sensory receptors of the auditory system. The pattern and intensity of stimulation encode the auditory-information, which consists of three properties; *pitch*, *timbre*, and *loudness* (that gives us indications about *spatial location*). Then, the information is sent to the auditory cortex via the auditory nerve, where the electrical signals are processed and interpreted. Pitch refers to the perceived frequency of a sound, allowing us to differentiate between high and low tones. Timbre, is what gives different sounds their unique qualities; it allows us to distinguish between the sounds of 'coastal wetlands (lagoons, marshes, salt marshes, marshes, reed beds, riverside tree stands)' and the sounds of 'coastal forests (phrygans, oaks)', even if they are sharing the same tone. Spatial location refers to

our ability to determine where a sound is coming from. This is made possible by the brain's ability to analyze the slight differences in sound arrival time and intensity between our two ears [5].

By stimulating brain function, sound activates our emotional centers. Certain frequencies and rhythms can trigger an almost instantaneous emotional reaction. The scientific field of psychoacoustics, involves the study of how humans perceive and interpret sounds, incorporating elements of psychology, acoustics, and neurology to understand the auditory experience. Psychoacoustics has given us a numerous piece of research, explain how and why the brain releases different chemicals in response to various auditory stimuli, influencing human's mood and emotional state. The perception of sound regulates a critical stand in our everyday experiences since it formulates an interpretation of the complexities of the sounds we are exposed to, moreover it dictates their psychological effects upon us.

Nonetheless, while we analyzed the material of the era (most possibly any auditory material collected from any similar places), we distinguished two kinds of sounds: the simple and the complex. Most of the natural sounds are complex, a mixture of sounds, which are characterized as fundamental sounds of greater volume and some simple ones characterized as higher or harmonic sounds. The categories were identified, in order to supposedly arrange the sound theme of the sound-piece's parts. The relevant taxa describe the specific feature and application of a sound Installation, constituting the sonification. By definition, sonification represents changes in data with changes in one or more sound attributes [6]. Manipulatable perceptual dimensions of sound are mapped to correspond to changes in data at the stage of orchestration. Before this stage, any changes are included in the synthesis of digital sound, which are depend on the creator's decision at the stage of data arrangement.

A taxonomic classification system regarding integrated/site-specific/background, where the new sounds blend in with the background ambience, and oppositional/borrowed/foreground, where the new sounds stand out as separate entities from the background, will be useful. Synthesis may use attributes of both classes in order to align the audio material and its arrangement with respect to an auditory interpretation of place. Such a practice comes in accordance with the thought that sound stimulates the cerebral function of memory to recognize elements of the environment that we are in and affirm sensations.

In order to design a sound Installation, we need to understand how our ability sustains auditory information, to 'see' why sound affects us in such unfathomable ways and face how less we know about auditory world. Considering our poor knowledge on auditory function, in a site-specific sound Installation, the work proposed is arranged on the idea that the composed sounds are incorporated, yet, amplify the already 'heard' or 'known' sounds. At a certain degree of abstraction, a sound-piece composed by the auditoria recordings of the area means that someone insists on something. Precisely, this persistence and the incomparable attribute of the sound to remind and represent in memory "rare sand dunes with dense vegetation of large tamarinds and cedars" commits its listener to an existential affiliation to the spatiotemporal circumstance. Hence, a sound artwork results from the creator's intention to situate a listening relationship unique to the site and its visitors, including its concept, content and form.

To forward the idea in respect, at the arrangement of a sound-piece for a Sound Installation to an open landscape, certain things should be taken into account such as:

- A. The physical characteristics of the auditory material; spatial proportions, eigenfrequencies of materials and the environmental humidity.
- B. The cultural characteristics of the auditory material; the voices and the sounds from distant activities that were audible in a specific space.
- C. Thus, (taking into account the wave nature and the frequency variety of environmental sounds) the sound-waves, when interposed by natural bodies or artificial objects, undergo spectral distortions (in terms of their temporal spectrum, intensity and frequency composition). Subsequently, sound shows

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differences in intensity, due to attenuation both in the atmosphere and in the material substances they dash against.

In any event, sound is a multidimensional stimulus, which presents particular features in its recording, its processing and its transmission. In order to create a sound Installation based on the auditory scanning of natural sounds (while it follows the sound mapping of the area), the recording process attains measurements in different spatial points and at different times. Then, the production of sound (since it is a pulsating vibration), and the form of its installation (since it requires an evaluation of the factors that interfere with sound propagation), acquires a mapping record of: a) the quality of the atmosphere, b) the direction and intensity of the wind, the nature of the soil and the type of plants that thrive in it and c) the sounds of human activity in the space of Installation or those that come from the surround area and blend within the space. An Installation of a sound-piece requires technical decisions regarding: the type of sound system that is going to be used, the relative calculation of the distance between the transmitter and the receiver's spectrum as well as the height and the angle of the speaker's placement [7].

Technology allows sound engineers to create a three-dimensional soundstage that surrounds the listener with a so called 'auditory experience'. Certain innovations contribute spatial auditory experience, mainly: a). The binaural recording, which uses specialized microphones placed inside ear-shaped molds that capture audio with an enhanced sense of depth and accuracy, b). The amplitude panning, which is based on the manipulation of the amplitude of audio signals and the control of their position in a stereo field, supports the recreation of the spatial characteristics of a sound source, c). The wave field synthesis, an advanced technique that involves using an array of speakers to create precise wave-fronts, resulting in a truly enveloping soundscape that can be experienced from different vantage points [8].

Additionally, software and creative audio technologies have made it possible to accurately control sounds in order to create any desired brain response. An interesting approach, in order to generating immersive creative experiences is the application of ambisonic audio technology. Through the use of ambisonics, three-dimensional audio scenes can be created, employing a system of several microphones and direction recording. As an aftermath, digital sound installations elicit particular feelings and immerse listeners in multisensory realms through the meticulous design and engineering of aural aspects within their installations. Sound may influence the story told in an artwork, whether it's the soft rustle of leaves in a forest or the sound of footsteps echoing in a eucalyptus' leaves covered pathway [9].

In their sound Installation *Forest (for a thousand years...)* (2012), Janet Cardiff and George Bures Miller obfuscate the boundaries between art and location. They welcome us to a forest's entrance, to sit on a wooden bench and just listen to the natural environment. The sound was released from thirty speakers that we are unable to define where they are placed. A near synchrony of recorded and natural sounds at the same moment, making it difficult to tell which sound is live and which is recorded. On a bright day, we can clearly detect the impending storm, then serenity, then a loud branch snap above us (as captured in the recording). The sounds are those of a war: large explosions, machine gun fire and whistling screeches. Next, vocalists approach, then move away to allow us to hear the once more the sound of wind through the trees. Their sound-scape, genuinely affecting and frightening, soak us to the History [10].

4. STONE CIRCLE: OUTRO

A number of academics, historians and thinkers, have made an effort to determine the origin of sound art. For the contemporary west world, the field of "sound art" emerge in the begging of 20th century. However, since sound-art installations incorporate programming, audio-data, and audiovisual art, among other techniques, it has been determined as a multidisciplinary art field on a constant development. Within the sound-art field, Haroon Mirza presented recently the *Stone Circle*

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(2018), a sophisticated technology driven sound Installation in the landscape of Marfa, Texas, which remained at sight until 2023. The artwork consists of a circle of eight stones, placed around the ninth central stone, mounted with solar panels that charge a bank of batteries to power a sound and light score that is activated with each full moon. Complex patterns of electronic sound and light are translated from energy generated by the sun [11].

Crucial to our appreciation of sound Installation art is the science of psychoacoustics, which investigates the ways that sound patterns that affect cognition and reflect to human's behaviors. It also explores the effects of sound on learning and memory functions. For example, background music or particular aural cues can enhance focus and memory recall [12]. A perusal of psychoacoustic gives a precious insight to the knowledge acquired in order to create a sound installation for a public open (or not) space. Unimpeachably, the composition of a sound-piece acquires a wide knowledge both in theory and practice, adhered to the broad field of sound-studies.

The current paper discusses a proposal for a sound Installation to the abandoned place of Roman Baths at Kyllini, Elis, as an artistic, immaterial practice that will reinforce the cognitive appreciation of the place, thus, advance its cultural significance. It is based on the premise that sound installation generates auditory stimuli along with all the scientific and physical characteristics that surround them, aiming to make use of the emotional and physiological reactions they elicit. The concept addressed by the current paper stands in the reverse of the existing abandonment, in land and history as well as in human's activity and mindsets, following a case study. A mapping methodology generated the approach of a particular place that brought an extensive description of the inherent natural elements that can be used as sound-sources. It is organized according to a deductive reasoning, starting with a general and ending to a specific view of this historically important Greek region.

The methodological collection of data is followed by an auditory analysis, along with examples of relevant artistic sound Installations, to address the necessary concerns that an engagement with a sound Installation in situ demands. Beyond this project, the suggested framework is a helpful resource for describing and contrasting sound installations from several significant angles. In fact, the approach that the present paper suggests, might apply to any remote, open public space. A sound Installation's significance stands to its inherent power to affirm the complex relationship between individuals and public spaces, to greet more conscious attitudes and behaviors, for that cause, to composes mindful ethics and practices and dare us to re-think about an art-project planning as a hub for reevaluating our urban culture.

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DIVIDED CITIES

**CHANGING
CITIES**



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Between Legitimacy and Illegality: Informal Migrant Settlements as “Right to the City”? The Case of Sicily in Italy

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Extended abstract

The phenomenon of informal settlements in European cross-border Mediterranean countries, such as Italy, Spain and Greece, represents a complex issue from an urban planning perspective, addressing crucial issues related to squatting, land management and spatial conflicts. At the same time, it raises fundamental questions concerning citizenship rights and the 'right to the city'. In the specific context of the rural contexts of Southern Italy, the analysis of the spread and socio-spatial dimensions of informal settlements highlights gaps and inefficiencies in reception policies, contributing to episodes of social exclusion and marginality.

In this context, the need emerges to explore whether informal migrant settlements can be interpreted as forms of claiming citizenship rights and the 'right to the city'. The question arises as to the role of public institutions in recognising these rights and managing the phenomenon appropriately. Through an exploratory methodological study focused on Sicily, this work aims to understand the phenomenon of informal migrant settlements at the local level, trying to identify possible unwritten 'rules' of informality.

The analysis focuses on Sicily as a case study, using a scientific approach that aims to highlight the dynamics of the phenomenon and its interaction with public institutions. This exploratory approach aims to delineate the socio-spatial context of informal settlements, with a focus on the relations between migrants and local communities.

The aim is to contribute to a deeper understanding of the dynamics related to migrants' informal settlements in order to develop more effective and appropriate policies. The reading of this study provides a relevant interpretative key to address issues of spatial justice and the 'right to the city' connected to migratory phenomena, especially in the rural and urban contexts of Southern Italy. The research thus fits into a broader framework of analysis of social and spatial dynamics, offering significant contributions to orient future policy and urban planning interventions.

Keywords: informal settlements; migrant, Sicily

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Is Athens changing into a divided city? Growing inequality and its imprint on the city space

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Abstract

The notion of the “divided city” has been employed to describe a wide range of political, economic and socio-cultural antagonisms and conflicts and their spatial manifestations. During its trajectory as the capital city, Athens has endured many crises. In the decades 1930-1940, Athens has been, beyond doubt, a “divided city”. In the afterwar period, socially inclusive housing solutions, relying almost exclusively on private actors, self-promotion and homeownership, guaranteed social cohesion and upwards social mobility.

This paper, taking into consideration significant social and spatial changes from the late 2000s onwards, attempts to trace evidence that could potentially refer to a “divided city”. From an interdisciplinary perspective, it examines new forms of inequality, segregation and exclusion in the metropolitan area of Athens, especially in its central districts, and their impact on Athens’ urban development model and culture, on both the city image and the lived experience and quality of life.

The paper focuses mainly on housing issues, which are a crucial manifestation of inequality and conflict, and attempts to highlight their interweaving with international as well as inherent dynamics. Even in the post-crisis period, housing precariousness of the most vulnerable groups (either native or refugees and asylum seekers), indebtedness of households, the recession of homeownership (especially for younger generations), homelessness and other factors undermine social cohesion and peace. The paper will also address other crucial parameters such as continuing immigrant and refugee inflows, tourists’ and professionals’ mobility, ongoing urban regeneration projects and other strategic plans in progress.

Keywords: Athens; post-crisis; divided city; housing; inequality.

1. INTRODUCTION. THE NOTION OF THE “DIVIDED CITY”

Inequality is inherent to the modern metropolises. As Van Kempen argues “the undivided city is a myth and utopia at the same time” [1]. The notion of the “divided city” has been employed to describe a wide range of political, economic and socio-cultural antagonisms and conflicts and their spatial manifestations. It implies a great variety of definitions, approaches and methodologies; other -related- definitions for cities used in urban studies are “dual”, “fragmented”, “fractal”, “partitioned”, “polarized”, “quartered”, etc. [2]. In the last decades, the literature on divided cities anchors to a broader critique of globalization and the economic restructuring involved. Most theorists agree that, in contemporary urban contexts, new and diverse kinds of conflicts arise and old ones are intensified; more and more cities are becoming polarized, ghettoized and fragmented. Despite the homogenizing trends, the process is complex and varies between different urban contexts, while, in most cases, different kinds of conflict interweave. [2]

The term “divided city” implies the existence of different areas within a city and, most of the time, the dichotomy between prosperous and impoverished areas; a clear connection is also made between a divided society and a divided city. Social polarization and inequality result in spatial segregation [1]

Soja uses the term “metropolarities” in order to describe the intensified socio-economic inequalities inherent in the new urbanization processes; he adds that United Nations reports of the 1990s had

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foreseen that “urban poverty will become the most significant and politically explosive problem” of the 21st century [3]. Entrepreneurialism (often in the form of privatization of public spaces) plus intensified immigration (one of the constitutive processes of globalization) contribute to the swelling of the two poles and the squeezing of the middle classes [3]. On the other hand, compared to the past, social movements are organized around more pluralistic axes of inequality formation: class, race, ethnicity, gender, sexuality, age, residential location, immigrant status, housing, environmental justice, cultural identity, and so on [3]. Los Angeles dominates in literature on divided cities as a dystopia brutally divided between “fortified cells” of affluence and “places of terror” where police battle the criminalized poor [4]. As a consequence, cities are becoming places where far from encountering difference, people actively contrive to avoid it; “cities of difference” (as Stevenson describes them) are not places where diversity is celebrated on the ground, but places of watchfulness and suspicion, of enclaves of homogeneity, where mingling with strangers is to be avoided [5].

Most interpretive schemes in urban studies draw from the context of hypersegregated metropolises of the USA, and during the last decades, the dominant paradigm has been the socio-spatial polarization of global/world cities [6]. In Sassen’s model, places, such as London, New York and Tokyo, have emerged as the dominant “command centres” of the complex international urban network of finance, communication and information flows (5). Among other issues, Sassen stresses the denationalizing of urban space and the formation of new claims by transnational actors: global capital and disadvantaged (mostly immigrant) populations; they claim their rights to the city [7]. It is doubtful if Sassen’s model is suitable for metropolises of the periphery. The metropolises of Southern Europe, for example, including Athens, still do not fully comply with the North-European-American urban development model. For this reason, other theorists stress the interaction between global and local dynamics (glocalization) [6]. Nevertheless, neoliberalism tends to implement similar strategies around the world.

The complex nature of such phenomena requires multi-factor analysis, and each city should preferably be treated as an autonomous case study, avoiding reductionism to over-generalized models. This paper will concentrate on Athens as case study and -after a brief overview of the past decades- will examine the most significant social and spatial changes from the late 2000s onwards that contested the city’s urban development model and culture. Focusing mainly on housing patterns and related cultural issues, such as the lived experience of the city and life quality, it attempts to identify if contemporary Athens is gradually “changing” into a “divided city”.

2. LEARNING FROM ATHENS’ HISTORY

2.1. From interwar segregation to afterwar inclusion.

During its trajectory as the capital city, Athens has endured many crises.

In the decades 1930-1940, Athens has been, beyond doubt, a “divided city”, after receiving a large number of refugees from Asia Minor, as well as successive waves of internal migrants. As a consequence, the capital city experienced intense urbanization and urban expansion.

There was a sharp dichotomy between the refugee settlements outside the city limits, on one side, the central districts of the native middle strata and the peripheral “garden cities” (exclusively bourgeois communities), on the other side. Spatial segregation coincided with social and political polarization, and played a significant role -among other crucial factors- in the “Battle of Athens” (December 1944); the “red” (refugee) neighbourhoods remained stigmatized during the first postwar decades. [8]

In the afterwar period, Athens received massive migratory waves from other regions due to political reasons, rural poverty, and search for job opportunities. A substantial part of the housing stock and infrastructure was destroyed during the war. Intensive housing production in postwar Athens, based mainly on private initiative, followed a dual model: apartment building activity through the “antiparochi” (land for flats system) in the older districts, and self-built -often illegal- housing in the

new satellite settlements (with retrospective “legalization”); the authorities have tolerated and even stimulated these practices and many social groups made profits from the whole procedure [8] [10]. Socially inclusive housing solutions and homeownership guaranteed social cohesion and upward social mobility, and helped heal (or just covered) the wounds of the divided society. Although criticized, the state’s policy of “non-policy” functioned effectively against homelessness and social unrest and Athens had low socio-spatial division compared with many other European metropolises [9].

After 1967, the Dictatorship suppressed illegal building in the city periphery, so new working-class populations migrating to Athens were packed in dense inner-city areas, wherever old building stock was available for rent; this resulted in a mixture of social classes in vertically differentiated flats, while traditional working-class families remained fixed in their western area properties. [8], [10] In the late 1970s, the deterioration of the quality of life in the central area resulted in the suburban exodus of the upper and middle classes, which continued and intensified in the following decades.

2.2. The effects of European integration. Globalization trends

For Athens, the 1980s was a transitional period. Joining the European Economic Community was followed by an attempt to integrate European policy directions; at the same time the production of built space remained bound to existing practices and domestic individual interests, creating an almost homogenized urban environment [11].

The 1990s constitute a turning point for the neo-liberal restructuring of Greece to adjust to European and global standards. Athens saw the organization of the 2004 Olympic Games as an opportunity to rebrand and upgrade itself in the global hierarchy of metropolises, acquiring a focal role in the Southeastern Mediterranean. The Olympic transformation of Athens involved an unprecedented urban regeneration and public investment program; an aggressive expansion to the whole Attica region took place, to procure space for infrastructure and venues required [11]; [12]; [13]. The whole planning was implemented under a “state of exception”, ignoring environmental and social consequences, and failing to anticipate the future utilization of the venues [11]. Important flagship projects were also implemented in the centre of Athens, the most emblematic one being the Unification of Archaeological Sites. All projects emphasized the aesthetic upgrading of the city centre and the enhancement of tourist and cultural industries [14].

At the same time consumerism and lifestyle gained ground, transforming the cityscape for the needs of an emerging “creative class”: shopping malls, new museums, new cafés, art spaces and multi-purpose buildings, urban lofts, etc. [15]. During the Games, “clearance” operations took place in the central areas of the city, to improve its image; homeless, drug addicts, and even stray animals, were temporarily removed from sight [16].

Since the 1990s, the liberalization of the housing market and the rapid expansion of mortgaged loans from private banks made access to housing less socially inclusive and set the floor for household indebtedness. During this period the demand for high-standard suburban housing increased [10]. But cheap housing demand rose in parallel due to successive waves of immigrants and refugees of multiple origins. Athens gradually developed into a multi-ethnic metropolis; in 2011, immigrants represented more than 10.5 % of its total population, reaching even 21% in the Municipality of Athens [6].

Immigrants spread in the entire Attica region following job opportunities and were unevenly distributed across space. Significant differences exist amongst immigrants of different nationality and origin; Albanian nationals showed a capacity to spread across large city areas and this contributed to overall low segregation levels, while, on the other hand, immigrants from central and eastern European countries, as well as from Asian and African countries tended to concentrate in smaller communities [17]. Until the outburst of the financial crisis and despite the lack of welfare and integration policies, immigrants and refugees managed to find affordable accommodation in low-rent

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apartments in the densely built central districts of the city; this resulted in a socio-spatial mix in the neighborhoods around the city center, vertical segregation in apartment buildings (immigrants on the lower floors, even below ground floor level) and no ghettoization in ethnic enclaves [18]. The inflow of immigrants considerably increased the size of the lower socioeconomic pole [10].

3. ATHENS FROM THE LATE 2000s ONWARD

3.1. The socio-spatial aspects of the crisis

In December 2008, a wave of massive protests burst out for several days in Athens and many other Greek cities, as a consequence of the assassination of teenager Alexandros Grigoropoulos by a policeman. In these protests participated mostly young people (among them many migrants) with no previous experience in demonstrations; mass rallies were followed by the occupation of public buildings, “sieges” of police stations, attacks on banks, but also considerable damage to private property and some looting of shops [19], [20].

This outburst of anger is retrospectively considered as a prelude to the forthcoming crisis. It uncovered various underlying tensions and contradictions, not least in the consumption-led model of urban development [15]. Even in the 1990s and early 2000s, that is during a period of economic growth, 20% of the population was living at risk of poverty and Greece had one of the highest rates of youth unemployment and under-employment in the EU [20]. The young generation, codified as “Generation 700 Euros” before the crisis, would become much poorer in the forthcoming years and more than 400.000 would decide to leave the country.

In the late 2000s, the outbreak of the global financial crisis fiercely affected South European regions and cities in the form of debt crisis and internationally imposed economic adjustment strategies. In Greece, the IMF/EU/ECB loan enforced strict cuts in welfare and social provisions [21]. Greek cities (according to Eurostat 2014 data) faced the highest rate of poverty and social exclusion risk amongst all densely populated areas in the EU, that is 34,1% of their population. Indicatively for the wider metropolitan region of Athens, the proportion of the severely deprived population rose from 9.5% in 2010 to 20.0% in 2015 [22]. A shocking manifestation of extreme poverty was the increasing number of scavengers looking for valuable materials (usually scrap metals) or of people just searching for food in the city’s recycling or garbage bins [23]. The sharp growth of unemployment (27%, and over 50% among the youth) and decrease in salaries and wages (approximately 40%) [15] resulted in housing precariousness and deprivation of the most vulnerable groups (both native and immigrants) and a dramatic increase of homelessness [10]. Many tenants were forced to search for cheaper apartments or share dwellings with other family members or friends, while younger ones returned to their parents’ houses. Over-indebtedness, increased taxation, and a significant increase in housing expenses made homeownership less attractive and not affordable, especially for younger generations [10]. Athens’ urban development model was contested. A special law protected the first residence from liquidation, but the Workers Housing Organization (OEK) and the Public Agency for Planning and Housing (ΔΕΠΙΟΣ) were abolished in 2010 and 2012, according to the memorandum agreements [10]. In 2015 the housing overburden concerned 29% of urban dwellers, and 40% of poor households [22].

The crisis aggravated existing social inequalities and induced social and political polarization and conflict. Its spatial impact was manifest in Athens’ central area, as well as in its more distant neighbourhoods: closed stores, derelict spaces of consumerism that once thrived (e.g. Stadiou and Patisision Street), reduced economic and professional activity. Social mobilizations of various kinds originated “from below”; most prominent was the “movement of the piazzas” (2011), which began with the occupation of Syntagma Square (the focal point for the anti-austerity movement) by “indignant” crowds and spread rapidly to many other Athenian smaller piazzas, town squares in the rest of Greece, and as far as Thessaloniki [24], [21]. Anti-austerity uprisings, demonstrations, and battles with the police severely injured the historical centre: burnt buildings, even historical

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landmarks, and an urban environment hostile for its inhabitants due to the extensive use of tear gas. A legacy from the years of the crisis is the disproportionate presence of the police in public spaces [25].

3.2. Immigrant and refugee issues

During the recession, many immigrants were forced to repatriate or relocate, but for the newcomers -mostly undocumented immigrants and refugees- the living conditions were much worse [26]. Refugees and asylum seekers in particular (mostly from Afghanistan, Iraq, and Syria), among them many unaccompanied minors, found themselves in the most extreme deprivation and many deaths were reported during the “refugee crisis” (“a crisis within a crisis”, as reported by the media), which culminated in the years 2015-2016. Informal and spontaneous shelters appeared in the area surrounding the port of Piraeus, in Victoria Square, in Pedion tou Areos public park, and other central areas of the city. A large grassroots movement of solidarity -ordinary citizens alongside a wide spectrum of other agents- were mobilized to deal with the emergency and offered support (shelter, collective kitchens, etc.) [25].

During the multifaced crisis, refugee housing issues were managed by a system of international and local agencies and NGOs. A dual accommodation model has emerged: official refugee camps in the Attica region, on one side, which segregated refugees from residential areas, often in overcrowded conditions, and urban accommodation programs in free shelters or rented appartements (such as the ESTIA program), on the other side, which offered only a temporary (short-term) solution to the problem. [26], [10]. In many districts, there still existed low-rent houses, often low quality and less desired, that allowed refugee accommodation programs to be implemented [10]; these programs had positive effects on local economies and neighbourhoods, as well as on the integration of a part of the refugee population [14].

Another aspect of the crisis was the criminalization of immigrants. Representations of the centre of Athens as a ghetto dangerous for indigenous inhabitants, because of the high concentration of immigrant populations, appeared in the media even before the crisis [27]. Immigrants were accused of further degradation of already neglected and deteriorating central areas of the city, such as Gerani or Plateia Theatrou (near Omonoia Square), where petty delinquency, as well as organized crime, prostitution, illegal trade, protection circuits, and drug dealing thrived.

The hostility against immigrants gradually developed into a “social movement” from 2008 onwards and culminated in performances of racist violence in Ag. Panteleimonas and other central districts with intense presence of immigrants; the neo-Nazi organization named Golden Dawn, which even succeeded to enter the Greek Parliament in 2012, was the basic but not the only organizer of such violent acts [27], [28].

Police operations were organized to “sanitize” certain areas and buildings and reoccupy public space. For example, the “Xenius Zeus” operation (2012) evacuated several private or public buildings in the city centre, where immigrants -mostly young men from North Africa and the Middle East- found an inexpensive, although crowded and unsanitary, shelter. Some of these buildings were informally hired, others were squatted by their residents (with the help of NGOs) and transformed into informal community centers [26]. The “ghetto discourse” was intertwined with the inner-city revitalization agenda; the economic crisis together with the criminality discourse stigmatized neighbourhoods and created a very fertile ground for real-estate speculation and changing of ownership [16].

3.3. Restructuring urban space through neoliberal strategies

In the 2010s the centre of Athens underwent a double crisis: on one side the spatial manifestations of the recession and on the other side the consequences of decentralization of important activities and functions due to the great infrastructure works (Spata airport, suburban rail, new highways) constructed on the occasion of the Olympic Games [11].

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Structural readjustments towards neoliberal practices were intensified during and in the post-crisis era. During the period 2011-2014, based on the first memorandum Public Properties Company SA (ΕΤΑΔ ΑΕ) and the Hellenic Republic Asset Development Fund (ΤΑΙΠΕΔ) were established to promote the privatization of the Greek State's property [11]. Large and privileged tracts of land along the urban coasts of Piraeus, Hellenico, and Vouliagmeni (the so-called Athens Riviera) were sold to investors at very favorable terms [24]. The "Ellinikon" Project, in the place of the former airport, the largest urban development project in the history of the Greek State has raised severe criticism [11]. Several plans had been developed, formally announced and then abandoned in the past. According to the Lamda Development plan the site will be transformed into a new town within the city, with 25,000 residents and 20,000 workers and visitors per day; it will include a park, luxury homes, hotels, a casino, a marina, shops, offices, and, among others, towers up to 200 meters high [29].

Another major plan in progress (of public character but with financial support and guidelines from the Stavros Niarchos Foundation) is the Faliron Bay Metropolitan Park. It aims to restore the communication of the urban tissue with the seafront, and is supposed to provide generous public space, including cultural, educational, sporting and recreational facilities [11].

Such major projects are called upon to find the balance between global competitiveness and local sustainability and identity [30]. They raise issues related to the use of the public space and the degree of its appropriation. For example, will these public spaces on the coast be "open", to whom, and under what conditions? [30] Will the redeveloped area be an organic part of the city or a playground for affluent Greeks and foreigners?

Another project intensely discussed in the period 2011-2014 was "Rethink Athens", an attempt to revitalize centrality through the pedestrianization of the central Athens boulevard, Panepistimiou. The project was criticized by a large part of the scientific world and was finally suspended because the EU denied financial support [11], but revived in another form in 2020 as "The Great Walk of Athens" (it also didn't work out as planned and marketed). Inner-city and neighbourhood regeneration programs, in general, focused mainly on pedestrianization, redesigning and cultural projects neglecting, on the other hand, social initiatives, though in a context of increasing poverty and socio-economic polarisation [16].

Another tool of the neoliberal agenda aiming to regenerate the central area of Athens is gentrification (the "dirty word", according to Smith [31]). Alexandri argues that gentrification in crisis-stricken Mediterranean cities is driven by free-market housing policies, accompanied by new entertainment and nightlife uses, alternative art and cultural projects, plus tighter control of the public space [32]. In Athens, suitable for gentrification were areas where the system of antiparochi was not extensively developed, mostly enclaves of the working class (Thissio, Psiri, Gazi, Petralona, Metaxourgio). In Metaxourgio gentrification began in 1995, and operated gradually and softly, based on private initiative, and not fiercely, by the state or by corporate capital, banks, and investors [33]. During the crisis, the return of the middle classes to the collapsing city centre became a major goal among dominant political circles. Key to the success of urban intervention in degraded areas is the creation of a safe environment; police surveillance contributed to the displacement of "unwelcome" groups (mostly undocumented immigrants), while, at the same time, poorer households were excluded from incentives given to gentrifiers [32].

3.4. New challenges in the aftermath of the crisis

In the late 2010s, Athens gradually turned into an all-year destination for tourists and, during the pandemic, into a preferable residence for digital nomads; these new prospects for profit attracted the interest of foreign investors and real estate funds [10]. A combination of gentrification and touristification concentrated housing property in the hands of speculative agents, reducing the affordable stock mainly in the city centre. The majority of new transactions involved foreign buyers, many of them benefiting from the Golden Visa Scheme, one of the cheapest in Europe. The

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devaluated housing stock of the city (even lower floor apartments) is being renovated to be used by middle-class tourists and gentrifiers. Many investors buy whole buildings and gain profit from the rent gaps. The short-term rental sector (via platforms such as Airbnb) has disproportionately grown, affects rents and prices (even in peripheral areas of the city), and causes displacement of lower-income groups. [10], [9]. The most affected areas are the Historical/Commercial Centre, Koukaki, Exarchia, and Metz.

As a consequence, access to affordable housing is getting more and more difficult for tenants, especially for newcomers such as students or refugees. Extremely high rents and housing prices go together with inflation, energy crisis and increasing cost of living, while salaries and wages remain extremely low compared to European standards. Most affected are younger generations, who have reduced access to mortgage lending and present declining home-ownership rates; this imbalance between generations is also linked to the country's demographic decline [14]. Furthermore, urban accommodation programs for refugees are no more available. The problem is not exclusively Greek or Athenian. Madden and Marcuse suggest that "housing is under attack" everywhere, especially after the global economic meltdown of 2008, and it is "caught within a number of simultaneous social conflicts"; the most immediate is the conflict between housing as lived, social space and housing as an instrument for profitmaking [34]. Affordable housing has become a major concern in EU too.

The prolonged confinement and other governmental measures during the COVID-19 pandemic have deepened systemic inequality, segregation and social, spatial and environmental injustice in the city and have imposed unprecedented restrictions on people's democratic rights [35]. Housing inequality, in particular, became more evident as family members were obliged to work, attend school lessons on line, and perform household simultaneously, sometimes in very limited space and with poor digital equipment and skills. The pandemic affected the most vulnerable social groups, aggravated psychological and other health problems, contested human relations and bonds, and encouraged abusive behaviour; all these effects seem irreversible as we see in everyday incidents of violence against women, among teenagers, etc.

In prior periods the popular strata found solutions to ameliorate their housing, living and working conditions. Efforts to regulate housing policies on a long-term basis were absent until the present, but current socio-spatial challenges cannot be addressed either with the policies of the past or with emergency haphazard measures [9]. The policy of "non-policy" is no more relevant; on the contrary, there is a growing need for decisive policies, that take into consideration the society, not only the economy of the city. There are various suggestions for reclaiming affordable habitat. State-procured social housing for rent is a well-known practice in many European countries, but absent in Greece today. Cooperative housing and collective ownership models have proved effective in other European countries (there are already such initiatives in Greece). Most recently the state has implied measures to control the short-term rental sector and further restrictions are discussed. Programs, such as "Renovate and rent", intend to encourage house owners to renovate their houses for long-term rental. Special programs are also designed to facilitate the accommodation or homeownership of young couples. Low incomes and the constantly rising cost of living undermine such initiatives.

Intensive construction activity both in central Athens and the suburbs might give the false impression that the city has recovered from the crisis. Old hotels are restored, office and commercial buildings (some of them abandoned for years) are being transformed into hotels or luxury residences, devitalized spaces return to urban life, and commercial uses connected to tourism (restaurants, cafés, bars, mini-markets) proliferate. On the other side, professionals, artisans and small-scale trade are displaced from their traditional spots; all these mixed uses and activities that contribute to the lively and attractive character of the city centre become gradually expulsed. Consequently, the identity of many central areas is contested and risks being monopolized by tourist and leisure activities; at the same time, in many neighbourhoods favoured by the short-term rental sector the life quality of the inhabitants progressively degenerates.

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The new dynamics have not yet crystallized, but a most important issue is that the emerging urban development model, based almost entirely on tourism, may prove less resilient to future crises (e.g. climate crisis, a new pandemic, wars and new refugee flows).

4. CONCLUSION

21st-century Athens is decentralized and at the same time re-urbanized. The old division between East and West Athens, with the central area of the city functioning as a point of encounter, seems to be gradually replaced by multi-fractured urbanism, where different social groups reside and move in different areas of the city, without meeting each other anytime and anywhere [11]. The suburbs seem more and more disconnected from the centre; in the Southern burbs, in particular, a new city of affluence (in public discourse compared to Dubai) is developing, that has little reference to the history and culture of the Greek capital. On the other hand, central Athens is being touristified and -simultaneously- gentrified, which means that most users of public space are visitors.

The current image of Athens is marked by sharp contrasts: luxury new hotels and renovated apartment buildings stand in proximity to ruins from the crisis era, and euphoric tourists stroll beside homeless and drug addicts. Athens does not comply with the socially and spatially polarized global city model as this was depicted by S. Sassen, because it lacks a substantial upper social pole which comprises members of the international corporate elite [16]; it might also be exaggerated to describe it as a “revanchist city” [31]. However, Athens is experiencing important socioeconomic inequalities and marginalized populations, among them poorly integrated migrants [18]. Additionally, the rapid touristification of the city and the uncontrolled real-estate market reduce the margins for the implementation of socially just urban policies and produce further inequalities and exclusion [14]. Sharp inequalities erode the social fabric and may produce social conflict.

Considering all the above issues, we conclude that Athens is potentially developing into a “divided” city unless decisive long-term policies are implemented to fight social inequalities and injustice, as well as their spatial manifestations.

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Temporary Architecture: The Paradox of the Refugee Camp

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Extended abstract

In 1948, the year of the Nakba, more than 800,000¹ Palestinians were displaced from their villages to the West Bank and Gaza and other neighbouring Arab countries. Many refugees settled in the Jordan valley, staying as close as possible to their hometowns in hopes of returning back to their villages. The year 1967 yet marked another Nakba for the refugees in the Jordan Valley – home to almost three hundred thousand Palestinians at the time, of which a large number was Nakba refugees – Israel occupied the rest of the West Bank and Gaza, and forced thousands of Palestinian refugees in the Jordan Valley eastward toward Jordan. The Israeli occupation aimed to have as few Palestinians as possible in the region. Many communities were depopulated and destroyed in preparation of the Israeli settlement expansion and the exploitation of the agricultural lands and the natural resources. This paper explores the emergence of these refugee camps and other communities/new ‘villages’ that were intended for settling Palestinian refugees while renouncing their right of return. Palestinian refugees were forced to reconstruct the tent into a more durable structure, and reshape the spaces around them to accommodate their perpetual needs - their attempts at peacemaking and ensuring their unforgotten citizenship. It sheds the light on the architectural dilemma of temporariness that is expressed in the permanent status of refuge and their life in limbo. It will further explore the emergence of Aqabet Jaber refugee camp, the Arab Development Society and Marj Na’jeh as case studies. Aqabet Jaber was a desert like area lacking adequate infrastructure for any human settlement thus the living conditions were dire. The Arab Development Society was a Modern scheme developed by a Palestinian philanthropist as a model village prior to 1948 in order to assist the farmers and strengthen their presence and resilience, and was later inhabited by orphaned refugees. Marj Na’jeh was built as a permanent community for Palestinian refugees in the 1950’s, and the refugees were allowed to cultivate the land and settle permanently. They represent the urban and architectural experimentation in the Jordan Valley after 1948 and the unformulated urbanism that resulted at the time, 1967 and the current conditions of these structures.

Keywords: *refugee camps, permanence, temporality, architecture, urban development, Arab Development society, Marj Na’je, Aqabet Jaber*

¹ https://www.pcbs.gov.ps/Portals/_pcbs/PressRelease/nakba%2060.pdf

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The Urbanity of Transients: Architecture as a Tool of Community Destruction

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Extended abstract

This research investigates the emerging architectural configurations of Jerusalem northern and eastern villages, and their role in transforming these villages into transients' zones that serve the change of the demographic balance of Jerusalem city from one hand, and the creation of an in-between transient zones on the other hand. The research emphasizes the power of architecture in the superimposition of new political realities and its ability of transforming communities' life's. This may take place by shedding the lights on the emerging architectural mutations of these villages, caused by planning policies and tools of spatial segregation implementation, and the emergence of new exceptional zones in these areas. The research suggests that these transformations lack the ability to offer a sustainable social life, wither physical environment, for both nature and the emerging community. The physical transformation of these areas, and the replacement of the social groups there, have transformed the zone into a transient urbanity.

Due to the implementation of "Greater Jerusalem 2020" plan, a wave of migration takes place, where many of the east Jerusalem Palestinian inhabitants, under the impact of economic circumstances and the planning policies restrictions, are forced to move from the city central zones to outskirt villages. These villages, which still considered as a part of the Greater Jerusalem borders, have been segregated from Jerusalem central parts, by the implementation of the spatial forced tools, the segregation wall and the checkpoints. Due the dramatic rise of the population densities in these areas, the limited ability for urban expansion, and the absence of planning policies and architectural standards, a rabid transformation in the physical environment took place. The formerly rural environment has been transformed into new urban settlements typical for very high densities, vertical and huge mass-buildings inward/ introvert architectural topologies, the superimposition of a continues 'stone carpet', the absence of green and open spaces, and the emergence of mixed land uses. The transformation of the area's physical character has attracted new social groups and causing a dramatic change of its social identit

The research aims at studying this phenomenon. First it emphasizes the reasons that led to the transformation of these zones; it unfolds the role of architecture in shifting the area from a rural to a transient urbanity. It analyses the characteristics of the emerging architecture and how it functions as a tool of exclusion. Two villages are taken as case studies: Anata (located to the east of Jerusalem) and Kofur Agab (located to the north of Jerusalem).

Keywords: *transient urbanity; architecture mutations; social groups; spatial composition; Jerusalem*

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