BEYOND METROPOLIZATION

Exploring new hybrids

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10th International U&U PhD Seminar

Eurometropolis Lille-Kortrijk-Tournai

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U&U SEMINARS

After successful editions in Leuven, Venice, Barcelona, Paris, Delft, Lausanne and Ghent, the 10th edition of the Urbanism & Urbanization International PhD Seminar will be hosted in Lille, France. The LACTH (Laboratoire de recherche de l'Ecole d'Architecture et de Paysage de Lille) and the LAB (Louvain Research Institute for Landscape, Architecture and Built Environment, UCLouvain) are responsible for the scientific direction and organization of the Seminar.

U&U seminars seek to bring together students writing their PhD dissertations in urbanism, working within very different disciplinary traditions, combining historical research, design research and different forms of urban research. The community supporting this seminar series over the years shares an interest in work that tries to speak across the divide between urban studies and the city-making disciplines, seeking to combine the interpretation of the process of urbanization with the commitment and care for the urban condition in all its manifestations.

The seminar welcomes all PhD students working in this mixed field. The call for papers foregrounds a set of themes that will be given special attention. We invite students to respond to these thematic lines, however, papers addressing other themes and concerns will also be taken into consideration.

BEYOND METROPOLIZATION

Exploring new hybrids

HYBRIDIZATIONS...

It is increasingly difficult to use boundaries and perimeters to define 'territories', whether we are talking about physical or political, disciplinary or professional, economic or cultural ones. For these delimitations are constantly being overstepped and contradicted: by contemporary forms of urbanization, by the life, training and jobs paths of people, by the flows of resources involved in our economies, as well as the diversity of the 'circles' that now constitute our plural identities.

As a consequence, over the last decades, urban theories have already embodied three major paradigm shifts, even if they are percolating more slowly into the dominant practices and visions of urban policies. In the early 1980s, urbanized territories started to be analysed in terms of lines and *networks*[1], rather than surfaces and *functions*; this was mainly about infrastructures, but more recently the role of network actors (such as those managing services, energy, water, waste, etc.) in the organization of territories has also been highlighted[2].

At the same time, urbanism and urban planning research has also focused, in addition to *static* spatial descriptions, on *dynamic* approaches, investigating the trajectories of resources required by different urbanized forms, such as the territorial metabolism[3]. And consequently, we have become aware of the importance of the secondary effects that an urbanization process in *one place* produces *elsewhere*, sometimes very far away. The agglomerated city, a model of sustainability for some, in fact consumes resources produced in "operational landscapes"[4] on a global level, generating widespread interdependence on a planetary scale.

In many fields, we are already thinking in terms of links, and interactions: *inter*-disciplinarity between two different defined scientific methods, cross-border cooperation between two distinct territories, short food circuits between urban and rural areas, partnerships between public issues and private finance, etc.

But beyond making the link, we would like today to question its result, what is produced as new hybrids, as "third terms", when we go for *trans*-disciplinarity. When ecology focuses on the *lisières*, or ecotones, it is because they put in contact distinct domains, but it is mainly because that allows hybridizations, thus biodiversity. Similarly, the richness of *métissage*, for the creole poet Edouard Glissant, is to generate new identities. And in the philosophy of science, several forms of hybrids have already been conceptualised, between the scholarly and the profane[5], or humans and non-humans[6], etc.

... BEYOND METROPOLIZATION

The crucial questions that our territories in transition are facing today - energy, mobility, health, water, food, soil artificialisation, access to healthcare, fair remuneration of work, spatial equity, etc. - are often envisioned in polarized models, that can freeze positions. In order to better address these issues, we postulate the need to dismantle categories, to break out of univocal patterns, to build new coalitions along different dividing lines. To this end, this 10th U&U seminar wishes to explore the potential of hybridization, between different theoretical models, between diverse urbanized forms, between various working methods, etc.

Metropolization particularly - as a process of political concentration, economic accumulation and spatial differentiation - has been the dominant urban model since the 19th century. And in these three areas it in terms of spatial injustice or lack of representativeness. Moreover, this model has been able to develop thanks to a historical regime of abundant cheap energy, conditions which are now declining. What are then the alternatives to current trends? S. Marot[7], for instance, identifies four scenarios which challenge our

1   Dupuy G. (1991), *L'urbanisme des réseaux. Théories et méthodes*, A. Colin, Paris.
2   Vanier M. (2015), *Demain les territoires. Capitalisme réticulaire et espace politique*, Hermann éd., Paris.
3   Duvigneaud P. (1974), *La synthèse écologique : populations, communautés, écosystèmes, biosphère, noosphère*, Doin, Paris.
4   Brenner N. (ed.) (2014), *Implosions/Explosions: Towards a Study of Planetary Urbanization*, Jovis, Berlin.
5   Callon M. *et al.* (2001), *Agir dans un monde incertain. Essai sur la démocratie technique*, Seuil, Paris.
6   Latour B. (1991), *Nous n'avons jamais été modernes. Essai anthropologie symétrique*, La Découverte, Paris.
7   Marot S. (2019), *Taking the country's side. Architecture and agriculture*, Lisbon Architecture Triennale : *The Poetics of*

current categories, whether they be planning tools, urban strategies, practical action modalities, or societal paradigms.

This seminar therefore wishes to welcome contributions that explore the potential of different forms of hybridization (we suggest some possibilities below), grounded on the idea that, in light of the current climatic, energetic, geopolitical and economic crisis, urbanism and urban planning need to cross multiple thresholds. We believe that it is possible, in this way, to collectively contribute to renewing current theoretical models.

TRACK 1

RURAL AND URBAN HYBRID

Nowadays urbanism necessarily finds itself dealing with a context where boundaries between city and countryside are not delineated, and where habitat, production, leisure, services and agriculture merge into a single landscape. While many works have already contributed to the description of these fabrics - *città diffusa, zwischenstadt, nebular city*, etc.[8] - today, actors are also considering them from the point of view of the project, whether on a local[9] or territorial scale[10], or by soft densification.
Indeed, ecologists have shown that the forms of habitat in suburbs, mixing garden plots, vegetable gardens, backyards, crafts and small industries, are intermediate environments with much higher levels of biodiversity than those in the city or the countryside. The fact of increasing the contact line between inhabited areas and cultivated plots also makes it possible to facilitate local agriculture, in terms of production by growers (easier access to land), of local distribution through short circuits, and of education of the inhabitants.

This track welcomes papers that analyse the potential of mixed fabrics in terms of quality of life, ecological diversity, social opportunities, local economies but also what the costs are, and for which communities.

By studying forms of values less clear-cut distributed between centres and peripheries, (economical, symbolic, cultural, political values, etc.), these papers explore alternative forms of metropolization, in the sense that the latter implies a selective policy that concentrates attractiveness in what are sometimes called 'poles of excellence', from which only spill-over effects are expected.

TRACK 2

TERRITORIALIZING POLITICAL HYBRIDS

Inter-territoriality is an increasingly important issue, as there is nowadays a growing disconnection between the perimeters of public competences and life trajectories (professional mobility, multi-residentiality, multi-culturalism), or the flow of resources that are necessary for our lifestyles. For some authors, it is even the duty of political districts today to reflect on the modalities of a shared inter-territorial power, because "it is only in the complementary of the resources of each territory (...) that we will be able to be at the same time attractive (even competitive), equitable (even supportive), and economical (even sober)"[11].

Cross-border territories[12] in particular are interesting situations for experimenting with inter-territoriality because they raise all the issues at stake in an enhanced manner. Unlike the classic model of the metropolis, which organizes its relations with its neighbours in terms of dependence and decision-making hierarchy, these conurbations are living areas with horizontal inter-dependencies. They are places of opportunity (for trade, leisure, employment or services) and of negative externalities (waste deposits, different regulations, disconnection from networks, lawless areas), with no real citizen counterparts and no democratic representation in their governance.

In order to engage a project perspective, many of these hybrid territories, under the impulse of European programs, have used the "vision" as a tool for bypassing both policies and physical borders in order to promote a long-term image of the future. Nevertheless, how it can effectively guide the more traditional "strategic" and "operational" dimensions is still to be investigated. The urban

Reason, Polígrafa, Barcelona.

8   Barcelloni Corte M., Viganò P. (eds) (2022), *The Horizontal Metropolis. The Anthology.* Springer Link.

9   Mariolle B., Léger J.-M. (eds.) (2018), *Densifier dédensifier. Penser les campagnes urbaines*, éd. Parenthèses, Marseille.

10   Cavalieri C., Viganò P. (eds.) (2019), *The Horizontal Metropolis: a Radical Project*, Park, Zürich.

11   Vanier M. (2008), *Le pouvoir des territoires. Essai sur l'inter-territorialité*, éd. Anthropos, Paris, p.64.

12   As for example the NWMA-North West Metropolitan Area or the conurbation Lille Kortrijk Tournai.

project in particular is identified as a "blind spot" in cross-border cooperation.

This track is therefore interested in articles presenting and analyzing forms of experimentation, whether citizen or public action, proposing specific collaborative mechanisms for implementing joint projects, aiming to overcome the objective difficulties of performing policies and operational tools, in a situation of inter-territoriality.

TRACK 3

RESOURCES HYBRIDIZATION

"Urbanizing in place" : some scholars[13] propose to consider urbanization no longer as a linear process of land consumption but as a process 'in place', cumulative rather than extensive. This is clearly also an alternative to metropolization, in the sense that the latter corresponds to a mode of urban growth by sprawl, *a priori* unlimited, linked with the principle of constantly maintaining attractiveness.

This change of perspective implies keeping up the resources and grey energy that have been invested locally (infrastructures, cultures, constructions, work time, etc.), and valorizing them through circular approaches. Today, the application of the Zero Net Land Take directive (ZAN in France, Stop Beton in Belgium, etc.) raises questions throughout Europe, and one of the options announced (in the Flemish BRV, for example), is the hybridization of activities in the same space. On what scale is it fair to measure the "net" artificialisation balance? What should be considered as an artificialized area? How can we avoid the risk of suffocating already dense environments and blocking the development of others?

Another contemporary theoretical field that involves forms of hybridity is that of the commons. As described by Elinor Ostrom (1991), one of the *sine qua non* conditions for the sustainability of these self-organizing systems is the interweaving of actions (of appropriation, provision, monitoring, conflict resolution, etc.), but also the indistinguishable interweaving of everyone's interests, and the interweaving of several complementary resources in the same system[14]. Still, this

is also the principle of permaculture, not to exploit each resource in autonomous and parallel channels but to favour each one by the presence of the others, by interweaving their cycles, their inputs and their outputs[15].

This track is therefore interested in works that analyse experiences in the organisation of territories, ways of life and production, which go beyond zoning, sectors and linear exploitation; it questions what a "perma-culture", applied to the fields of urbanism, could produce.

TRACK 4

HYBRID DISCIPLINES

Town planning has always been interdisciplinary; it is historically grounded in economic, geographical, and social sciences. In the 2000s, urban and landscape designers find themselves working on the same scales and frameworks, blurring their boundaries, which has already given rise to the 'landscape urbanism', movement that some have already defined as a 'hybrid' of the two disciplines. Today, we can expect tools from new fields - pedology, hydrology, forestry, agronomy, archaeology, etc. - to structure urban planning, for example according to soil types, their water permeability, their topographical situation, their fertility, etc. And certain contemporary research objects, such as energy, can themselves be considered as 'hybrid' objects, since they belong to different regimes (material, virtual, organizational, socio-cultural, political).

But it is also the working methodologies that are now being hybridized in urban studies, by mixing different practices that have always been epistemologically sealed off until now, such as research and design, but also artistic research (video, narratives), collective action (associations, activists), fieldwork (self-construction), etc. This transdisciplinarity can be expected to produce new results, which each separate approach could not have achieved in isolation.

This track welcomes then papers working on transdisciplinary researches, coping with complex territorial structures urbanisms (environmental sciences such as ecology,

13 Dehaene M. (2013), *Tuinieren in het Stedelijk Veld / Gardening in the Urban Field*, A&S/Books, Gent University.
14 Grosjean B. (2018), "La huitième condition : l'imbrication.

Usages du territoire dans les communs d'Elinor Ostrom", *Les carnets du paysage* n° 33, Actes Sud, pp.131-143.
15 Holmgren D., Mollison B. (1978), *Permaculture 1 : A Perennial Agriculture for Human Settlement*, Corgi Books, London.

agronomy, forestry, water engineering) and/ or associating a variety of investigating practices, connected with action research, engaging communities, participative processes, etc. (social sciences such as sociology, anthropology, artistic research...).

TABLE OF CONTENT

II.a | New insights into History: building and planning

Construction History meets Planning History (p.156)
Verstraete Robrecht, ULBruxelles (BE)

The anarchist thread of urban planning history: Reconstructing the continuous influence of anarchist ideas on the history and present of urbanism (p.162)
Kuzmanić Jere, UPCatalunya (ES)

Immanent Monuments or transcendent instruments? Four Roles for Post-war Churches in Sustainable Neighbourhood Transition. (p.173)
Ardui Charlotte, KULeuven (BE)

Qualitative datascaping for historic cities in conflict: A grounded theory analysis for spatial sustainability. Case of Jaffa, Israel. (p.185)
Potdar Komal, TUDelft (NL)

Urbanisation as land consumption, commodification and parceling out: Hybridities in spatial occupation in Bukavu (p.197)
Gulain Amani Mushizi, ULBruxelles (BE)

II.b | Foodscapes : from farmlands to agro-parks

Agricultural islands in Paris metropolis. An investigation into possible interactions and complementarities between urban and food landscapes (p.210)
Thierry Axelle, ENSP Versailles (FR)

Agro-social parks: an analysis of planning and design projects for Italian periurban areas (p.223)
Salvador Antonio Jose, Politecnico di Milano (IT)

Reintegrating Urban Agroecology in the Cape – An Urban Design. Investigation of Inclusive Landscape Strategies for Urban Food System Transformation in the Western Cape (p.235)
Truter Georgina, KULeuven (BE)

Plots on hold: hybrid landscapes in rural Tamil Nadu through ordinary farmland conversions (p.244)
Frantz Marine, Univ. Paris1 (FR)

Foodscapes: from soil to policies. Food as a design tool for landscape and territory (p.252)
Ambrosi Amerigo Alberto, IUAVenezia (IT)

II.c | Water urbanisms

Imagining Public Space beyond metropolization (p.260)
Begum, Salma, KULeuven (BE)

Gradients of wetness: a wet experiment towards wet transition (p.276)
Aragone Andrea, IUAVenezia (IT)

Water & sand: chronicles of collective trajectories from the valley of Bumbu river, Kinshasa (DRC) (p.286)
Manaresi Pietro, UCLouvain (BE)

Developing Spatio-Temporal Mappings of the Polder Landscape in the Yangtze River Delta based on Educative Speculations (p.298)
Lei, Wei, KULeuven (BE)

Water as ecosystems driver for the Ecological Transition in the Vietnamese Mekong Delta
Nguyen Sylvie, EPFLausanne (CH) *(p.312)*

II.d | Social actions : from sharing to appropriations

III.a | Between soils and sub-soils : Mining landscapes

III.b | Commons and nature

III.c | Socio-ecological movements and configurations

I.a

Inhabiting urban rural hybrids

Towards a framework for village urbanism: the village imaginary as a guiding image for the praxis and discourse on the transformation of peri-urban villages in Flanders.

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The village imaginary explores methodologies, representation and processes that are used in constructing collective visions by and/or with local actors to guide the village transformation. The constellation of the residential villages in Flanders, cannot be addressed from the perspective of the supposedly lost autonomous village, and its transformation and ongoing hybridization as peri-urban morphology requires an explicit village imaginary. Responding to the ideological dimension of villages identities (as opposed to the urban), and its implicit patterns of exclusion, urban design can bring to the forefront the guiding images that represent the context and aspirations of its current and future inhabitants. This guiding image operates as a double figure, rooting itself in the recognizable and rendering the possible attractive. It is one of the key elements of a framework for village urbanism resulting from a practice-based PhD research, articulated in two spatial components: the garden pattern and the village chatter.

The ongoing transformation of peri-urban villages in Flanders.

In Flanders the urbanization of the rural population and the associated spatial transformation of villages into a peri-urban hybrid has been an ongoing process, that can be traced back to at least the construction of the densest railway network of the continent in the 19th and 20th century. But even in the preceding centuries the historically densely populated Flemish territory as a whole has undergone consecutive iterations of population growth and urbanization. These dynamics have produced an assemblage of urban patterns, scattered on the territory in a seemingly haphazard manner. The resulting loose and fragmented disposition of urban structures, various settlement types and landscape patches have produced a peri-urbanity that contains fragments of everything, in which the distinction between rural and urban is difficult to make. The rural urban hybrid is also described as a phantom metropolis (De Meulder 1999): a patchwork of elements such as villages, ribbon developments, allotments, business parks, infrastructure, landscape and so on, with major towns and cities never further than 30 minutes away, operating as a metropolis, but never taking on the appearance or intensity of one. Moreover, the rural urban distinction is an ineffective dialectic model for reading, conceptualizing, and intervening in this specific territory of peri-urban villages. The question put forward in this paper is whether a territory that has blurred the urban-rural delineation for centuries, also brings forth a specific urban design practice with distinct, context responsive design strategies, spatial concepts, methods, and vocabulary.

[fig.1] Zoom on the architecture of the ongoing village transformations in Kessel, Nijlen where new apartment buildings are nested next to old farmhouses. Source: BKP Nijlen, PLUSOFFICE, 2017, image by Pieter Vandenhoudt.

In the Flemish peri-urban condition, the village – both as spatial and societal construct, and in relation to both the rural and the urban – requires a closer look. The village is one of the more significant patterns within that patchwork, as a space, an idea, and a social construct, and able to relate to both the urban and the rural. While we can argue that the spatial component of villages in peri-urban Flanders has eroded over time, as an idea it lives strongly in the minds of people, practitioners, and policy makers, often in relation to a rural idyll. As a historical figure the village is deeply rooted in a rural context in which both the spatial, economic, and social logics accumulate in the concept of the autonomous village. In the contemporary peri-urban context, the village takes a more complex position, as part of a territory that over time has acquired multiple additional logics that coexist with and often dominate the rural system. Evolutions in societal structures have changed the village. What remains is a complex interplay between factual and imagined space of the transforming and transformed villages.
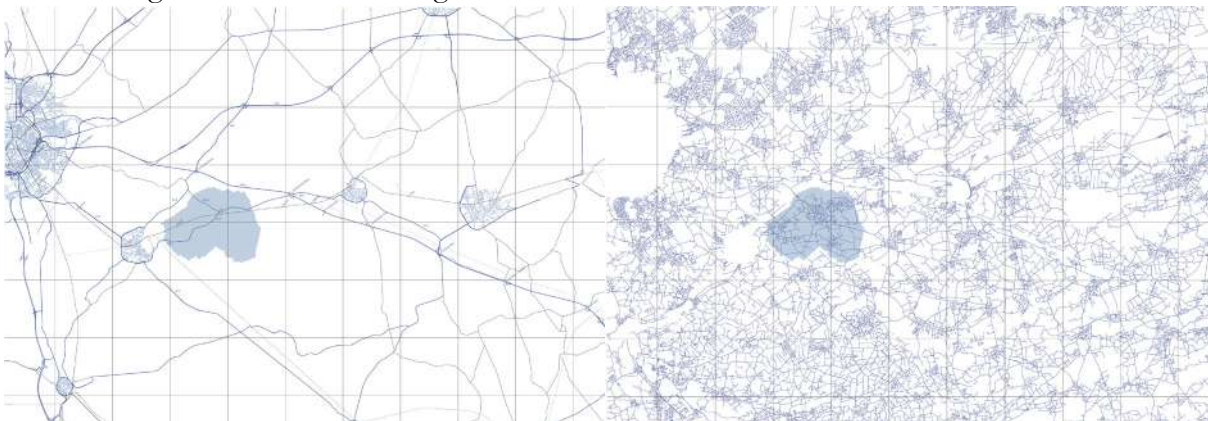
[fig.2] Two maps reveal the road infrastructure of the peri-urban condition of Flanders. The first shows the logic of major towns, cities, ring roads and major connections, whereas the second shows the dispersed logic of non-hierarchic small road network of the peri-urban territory. Source: BKP Nijlen, PLUSOFFICE, 2017.

The villages of Flanders offer a substrate on which a particular urbanism is practiced. The hypothesis of the PhD research by Ward Verbakel investigating seventeen years of PLUSOFFICE urban design practice in about a hundred Flemish villages, is that Village Urbanism, can be approached as a subgenre of the domain of urbanism, with a reflection on the praxis and discourse

that emerges from urban design at the village scale. Setting itself apart from the dominant and conventional planning discourse in Flanders to evolve towards more dense and intense urban fabrics, urbanization and centralities, the Village Urbanism as emerging from the practice studied is deduced from the context responsive practice mentioned. It relates to a renewed interest in the intermediate environments in general and villages in particular as demonstrated by several recent international publications (Marot 2019, Koolhaas 2020, Fernandez Per 2020, Kajdanek 2021); as explored in initiatives by numerous Flemish actors that structure the debate in the field such as Ar-Tur and KU Leuven in the *Kempenlab Dorpse Architectuur* [Campine Lab Village Architecture], the *Vlaams Bouwmeester* [Flanders State Architect] with the thematic of *Dorpelijkheid* [Vilageness], the *Vlaamse Landmaatschappij* [Flanders Land authority] with their initiative on *Dorpse Ruimte* [Village Space]; as the topic of ongoing academic discourse (e.g. subtheme of the 2023 U&U symposium 'Beyond Metropolization, exploring new hybrids'[1]).

[fig.3] One of the resulting images form the summerschool on Dorpelijkheid [Villageness] organized by the *Vlaams Bouwmesster* [Flanders State Architect] who chose the villages as one of the research agendas of his mandate. Source: Summerschool Dorpelijkheid, September 2022, Vlaams Bouwmeester, co-tutored by Ward Verbakel.

The autonomous village, the residential village, and the rural idyll.

During the 21st century – and this applies to Flanders as much as to other western European contexts – urbanisation processes, the transformation of national economies and an expanding personal mobility have changed the meaning of villages for their inhabitants. "The consequences of the transition from a productivist order towards a consumptive order for the meaning of the village as a local context can be described as a transition from relatively autonomous villages towards villages with primarily a residential function. Changes in the wider society with respect to the dominant economic sector and changes in the mode of transport changed the scale of the productive and consumptive order and the ranges of economic, social, and recreational activities." (Loopmans, Thissen 2021, p. 424). Maarten Loopmans and Frans Thissen warn us how powerful the reference frame of the autonomous village still is. When the last café closes, when the old school is sold or when the church is decommissioned, the inhabitants can respond with strong visceral emotions. A few decades ago, the village pump of Boutersem was moved from the centre

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1 The 10th Urbanism & Urbanization PhD symposium, taking place in Lille, June 2023, questions metropolization, as a hegemonic model. One of tracks of new hybrids put forward by the scientific committee of the symposium is titled Urban & Rural and explores the potential of mixed territories in dealing with climatic issues, related to soils (groundwater, food, fertility, short circuits, etc.).

of the church square to the edge of the same square, an action that a local inhabitant tried to obstruct with a two-barrel hunting gun, although that pump had lost its function as drinking water provider since long[2]. The importance given to empty churches, the local school building, an old tree on a crossroad, an abandoned pastor house, a field chapel… are all recurrent examples of the strong sentiments and sense of loss that is associated with the disappearance of the autonomous village. This image of autonomy is also what directs specific investment and policy making as part of the urban design practice. Several villages have and still are commissioning public space projects to redesign the main street and village square. The intentions are noble and can help producing better quality public space, that allows for more bicycle users, trees, or permeable soils. However, the underlying assumption is often focused on the event potential of these spaces and the possible resurrection of consumption in bars, restaurants, and shops, and on the other hand on the assumed causal relation between number of residences, number of facilities and the quality of life. It builds on the idea that those functions are needed, desirable and must be locally embedded for the village to be viable, a logic tied to the persistent reference frame of the 'autonomous village'.

Another aspect is the desire and resulting policy to attract additional inhabitants to the villages by delivering permits to several apartment buildings being built at random throughout the existing fabric. Permits for these projects are almost exclusively motivated by the expected additional income and real estate tax they might bring, perceived as necessary by local administrations to keep their finances healthy. In a series of newspaper articles on the real estate tendency in Flanders titled *Betonwoede* [concrete rage], Ine Renson explains how a surge of apartments is flooding rural and peri-urban municipalities (Renson 2019). Statistical data for Flanders during the decade 2009-2019 indicates how the share of apartments in the total housing stock doubled from 6 to 12 percent in non-urban areas in Flanders (Ryckewaert 2018). The major critique on this phenomenon is that these buildings do not fit the village, lack spatial and architectural quality, and destroy what is perceived as the 'image' of the village. What that so called disappearing village is, however, remains elusive. The social and economic construct of the autonomous village where inhabitants spend most of their time, labour and resources belongs to premodern times. Meanwhile villages have developed in diverse types of residential environments within a regionalised world, where the act of making home is the dominant activity. Loopmans and Thissen argue how the decline in services and facilities is not directly related to numbers of residents, and secondly that the village characteristics have gained importance in how villagers evaluate their quality of life. This is an interesting observation especially in the light of the ongoing cycles of transformation where the focus on residential numbers (densification) and the need for new facilities (investing in commercial space, community spaces, sports infrastructure…) outshines most attempts to focus on qualities and defining characteristics (historical landscapes, heritage buildings, architectural articulation, safe walkways, viewpoints, materialization…). The meaning of the village has changed for its' inhabitants during the previous century while research and policy – and design frequently too – tend to dwell on powerful images of villages past, obstructing adequate responses. A focus on the quality of life through the improvement of residential quality and a regional approach towards accessibility to services is more in line with the notion of the 'residential' village, according to the scholars. Within the practice of urban design, one can choose to invest time, energy, and resources in strengthening the village autonomy, one that may or may not exist in the present day, but one can also choose to focus on the residential aspect and target the quality of living.

When introducing the importance of quality of life in combination with villages, the rural idyll comes in to play (Yarwood 2005, Schucksmith 2018). The idealized image of the village as a small, close-knit community with direct links to picturesque and tranquil landscapes, is a major component of the rural idyll, in which people supposedly live in harmony with their surroundings and engage in meaningful authentic activities. This nostalgic image can refer to an indetermined past and the heyday of an assumed ideal societal and spatial model, one that fails to recognize other aspects of rural life in the village such as poverty, low quality of housing, mechanisms of exclusion, powerful elites, repressive normativity, restricted landownership… Rural life and the villagers are mostly cast as traditional, conservative, and non-diverse. And although diversity of rural and village

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2 Boutersem is one of the villages in the *Hageland* [hedge country] east of Leuven. This account of local oral history, perhaps a myth, was recorded on May 26, 2023 when Lowie Steenwegen introduced the local context of the village. This guided walk was part of the briefing to the selected design teams for a competetion with the intention to redesign the church square.

population in Flanders is increasing in terms of cultural background, income levels and education (Van Damme 2022), the dominant discourse in media is in line with the nostalgic conservative reflex in which the 'newcomer is a threat to rural idyll'. The rural idyll can also refer to a future perspective, a desired vision on life, aspired by outsiders that have the luxury to imagine a more frugal life that only takes the picturesque aspects in to account and serves as a counterbalance to the challenges of urban life. The encounters with the villages throughout PLUSOFFICE practice, aligns with the observation that the rural idyll is persistent as an image and both forward and backward looking at the same time. It can be part of a design projection (e.g. a new meaning for an old fallow as village centre, a pedestrian or bicycle path along a historical important passage) or exactly what is holding back the potential for intervening.

Resistance to new developments and especially social housing projects illustrate how a perceived fear of the other and identitary politics are a large part of the projection on the village as a repository of 'good' and 'authentic' values. They come into play when major decisions need to be made on the transformation of public spaces, how densification can be guided, what architectural ambition apply and who can participate in the decision process. As long as the ongoing process of urban transformation continues to rely on the strong image of a village gone by, without being able to produce new imaginations that can incorporate the existing and new dynamics, the village that is reproduced remains ambivalent. Transformations guided by these residual imaginaries are not able to address the change in demographics, understand the shifted meaning of the village itself and consequently develop the urbanism that is needed to respond adequately to pressing challenges in these villages.

The village imaginary as a design method.
The village as physical form is still recognisable in the morphological study of the territory. As a social construct less so. The village does not operate as autonomous societal model, where production and consumption align. But as an image it lives strongly in the way we discuss and organise ourselves as a society, and dwells on powerful images of villages past, obstructing adequate responses (Thissen, Loopmans 2013). In order to explore methodologies, representation and processes that are used in constructing collective visions by and/or with local actors to guide the village transformation, the notion of the village imaginary deserves a closer look. The constellation of the residential villages in Flanders, cannot be addressed from the perspective of the lost autonomous village, and its transformation and ongoing hybridization as peri-urban morphology require an explicit village imaginary. While responding to the ideological dimension of village identities (as opposed to the urban), and its implicit patterns of exclusion, urban design needs to bring to the forefront the guiding images that represent the context and aspirations of its current and future inhabitants.

[fig.4] Cartography of the BKP interventions for the villages of Landen. Source: LANDenSTAD, PLUSOFFICE architects, 2012.

Since the early 2000s, borrowing from the Dutch planning practice, Flanders started to import the term 'Beeldkwaliteitsplan' (BKP) [Image Quality Plan] not as a way to imagine what new neighborhoods could look like, but as a tool to respond to existing images and the way their transformation can be guided (Verbakel 2008). The BKP adds a focus on spatial quality and the care for the resulting image of a new district or transforming fabric, on top of the more traditional zoning planning and regulatory restriction frameworks. Stimulated by the Flemish *Bouwmeester* and the Open Call procedure for government contracts, several important commissions were defined using the BKP terminology to address the urban challenges of small towns and villages. As young starting firm PLUSOFFICE won several of these commissions, for the village of Bonheiden (2005), 13 villages of Lommel (2008) and 13 villages of Landen (2010). Positioning themselves as a reflective practitioner, learning from these three major projects, PLUSOFFICE developed its own interpretation of the BKP instrument tailored to transforming villages, which continued to evolve in other projects such Eeklo (2015), Maaseik (2015) and Nijlen (2016). For the latter the municipality of Nijlen received the VRP Flanders Planning award in 2018 partly because for the innovative and integral approach spanning from participatory processes to vision and policy frameworks. In the village based BKP as practiced by PLUSOFFICE, two aspects of the imaginary can be detected. One relates to the qualities and the physical representation of existing village spaces through photographic analysis, cartographies, and historical sources. The second deploys the image as a tool to identify a potential future containing a common vision developed with – and sometimes by – inhabitants. Trying to avoid the limited understanding of the BKP as dealing merely with visual representation, a threefold definition surfaces[3]. IMAGE: a communal image that not only seeks visual improvement but supports a shared identity. QUALITY: the added value in multiple domains from win-win scenarios, where each intervention or project is a small step towards a larger vision, and a systemic approach towards more quality. PLAN: a heterarchical combination of multiple opportunities, outcomes, tools, and actions, that don't need to be realized as a complete set, but that become relevant by prioritizing and anchoring it within local policy and decision-making dynamics. With that definition a first attempt is made to describe an open system,

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3 This definition was produced by the PLUSOFFICE team and its partners during the translation of the BKP studies for the villages of Lommel and Landen, to a comprehensive message for the interaction with inhabitants and local politicians. It was first published in a book LANDenSTAD published by PLUSOFFICE in 2014 as part of the final documents of the Landen BKP.

that sets itself apart from the blueprint masterplan or closed regulatory framework of a zoning plan. It encompasses a certain relaxedness by focusing more on shared goals and aspirations than on concrete projects that may or may not be realized. Such an approach turns out to be a good fit for working in peri-urban villages which don't always have the means to follow through with significant investment in transformation projects but rely on responsive attitudes to what is ongoing. The BKP's produced in these cases all offer a framework to work in that is precise in the aspirations it holds, but open enough to respond to uncertain processes. Meanwhile it is important to recognize that the term BKP itself is up for debate as it became synonymous with a problematic reduction of architecture to the image it presents and not the qualities it contains[4]. To better understand the use of the visual tools in the creation of new village imaginaries, two major theoretical elements help to frame the PLUSOFFICE's approach and the debate around esthetics: the *image guide* (De Lauwe 1964) and the Imaginary Reconstitution of Society (IROS) (Levinas 2007).

[fig.5] Temporary intervention demonstrating the potential of a new passage from a backside parking lot to the church square of Nijlen, as part of the participation during the BKP process, designed by PLUSOFFICE. Source: Image by Author, 2017.

l'Image Guide [guiding image] is described by sociologist Chombard de Lauwe in a paper 'Aspirations, guiding images and social transformation'. He writes about societal aspirations that contain three interlinked elements: desires (a relation between the object and the self), hopes (directed towards a certain state and the values it holds) and expectation (which relates to potential realization and associated satisfaction that the results bring). Societal images can be seen as the overlap of several aspects: symbols and important perceived elements from the existing context, models suggested or imposed by society, and the intimate life of an individual. Important to note is that these images, even when assembled from open signifiers and blurred symbols, can exert attraction and when they do can be labeled as guiding images. "On the one hand, the representation is more rational, more logical, more elaborate, more conscious. The image on the contrary has a strong emotional coloring, it sometimes springs unexpectedly and can impose itself with force. Often, the unconscious plays an essential role there." (De Lauwe 1964) (translated by author).

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4 This critique surfaced on several occasions during the Kempenlab Dorpse Architectuur [Campine lab Village architecture] organized by Ar-Tur and KU Leuven. Most explicitly during the online symposium on 21 Jan. 2021 one part of the group chats drifted towards the particular concern that the term BKP is too much focused on the visual and esthetic, while this paper argues that this is too narrow a definition of the term 'image'. A follow up round table and email conversation with key actors such as the former *Vlaams Bouwmeester* Leo Van Broek were organized to define better the concerns, and clearly distinguish the challenges that relate to planning (Where shall we continue to build? What densification is suited for the villages?) and when does architecture quality comes in to play (How does this architecture respond to social dynamics? How do we relate to local building traditions? Which typologies emerge?).

According to De Lauwe, the guiding image is a mental representation of a particular place that shapes people's perception of that place and influences their behavior within it and the decisions on how to get there. The *Image Guide* operates as a double figure, rooting itself in the recognizable and rendering the possible attractive. For urban designers the guiding image and its influence on people's behavior can be used as a tool, in guiding the transformation of spaces with the aspiration to create more livable and sustainable communities that are responsive to the needs and desires of the local population. People's perceptions and expectations of the village as a place are shaped by cultural norms, social expectations, and historical traditions; and can have a significant impact on how they interact with the village space as built environment. Assuming these images align with the reality of these villages and stay away from the idealized image, because gap between the two could lead to disillusionment and a sense of dislocation.
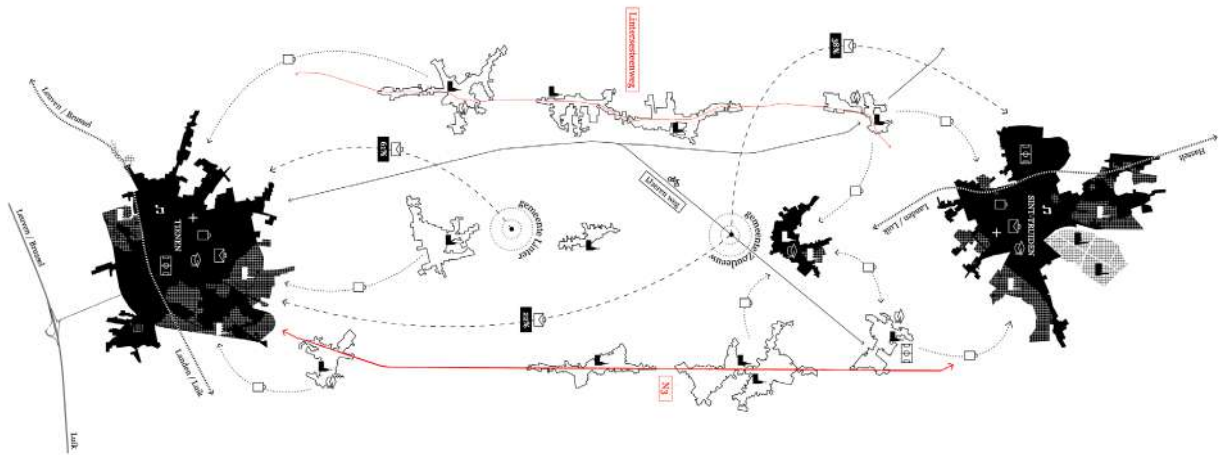
[fig.6] Cartography of the villages in the Gete River valley reimagining the relation of those villages to two major towns Tienen and Sint-Truiden, and the interconnecting infrastructures of main roads and bicycle highway. Source: Samuel Klein, Pluk Van Brempt. Promotor Ward Verbakel, Master thesis studio "Lelijk Dorp: Dorpslinter", 2020-2021.

A second theoretical element, related to the guiding image, is Ruth Levinas' IROS method when she describes the necessity of the utopian method in imagining potential societal models: "The advantage of utopian thinking is that it enables us to think about where we want to get to, and how to get there from here ..." (Levinas 2007). Clearly distinguishing the utopian method from the utopia as such, Levitas describes the components of this methodology. The first mode is archaeological, reconstructing from fragments the implicit qualities (physical, symbolic, political…) and thus facilitating a critical engagement and dialogue. The second mode is architectural, assembling alternative models that permit a holistic and long-term thinking. It is an invitation to combine the qualities of the existing in aesthetic terms with ambitious future potential and even the political. Both methods are closely related and conceptualize how by tapping into the cultural, physical and historical context of a place, the guiding image can create design ideas that resonate with the local community and reinforce a sense of direction and relation with place.

Imaginaries are powerful tools, that can be used in problematic ways. In an attempt to understand the mechanism needed to re-imagine the rural, not as an idyll but as a 'good place', Mark Schucksmith who specializes in rural studies and planning writes: "And here is a paradox: rural values are proclaimed as inclusive and neighbourly, and yet these can only be protected from corrosive urban values through being exclusive and drawing tight bounds." (Schucksmith 2018) While the moral dimension in the use of the term 'good place' is contingent on the community and is not the focus of this papers' reflection, Schucksmith does warn for an important pitfall when using the guiding image as a tool. Concerns that apply to transformation processes in general are methods of exclusion and the right to participate, which does not extend automatically to newcomers or minorities. Using only abstract, ethical, and pragmatic criteria to evaluate characteristics that make up the qualities of existing spaces or landscapes, and ignoring the social markers that make up these places, is a privilege belonging to a certain class. It highlights the importance to develop the village imaginary thoroughly and critically if they are to represent the aspirations of the village at large. The challenge in the redesign of the Bronplein, one of the follow-up projects of the Landen BKP, can be summarized as the collision between village imaginaries that

did not align. Rethinking the public domain for soft mobility and water retention versus the need for agricultural vehicles to pass and fill up with free spring water at the bottom of the square, led to a stammering design process; one that has taking up seven years so far with a third building permit in preparation for 2023. The importance of participatory processes given to most of PLUSOFFICE BKP projects, is a fundamental element of the guiding image method and even when done extensively is still no guarantee for success. Overall, the concept of the village imaginary is an important and contingent method for understanding how cultural constructs shape the perception of the built environment of villages, and how these perceptions can influence the behavior and transformation of space.

[fig.7] Selection of images illustrating the village imaginary discussions in the village of St-Lodewijk. A collage from the final dossier reimagining the church square, a participatory design and debate session with inhabitants; a drawing from a cocreation session with children from the primary school revealing the desire for open air swimming, play yards and lots of trees. Source: DNA van het Dorp Masterplan St-Lodewijk (PLUSOFFICE i.c.w. Omgeving, Voorland and Anyways) 2021.
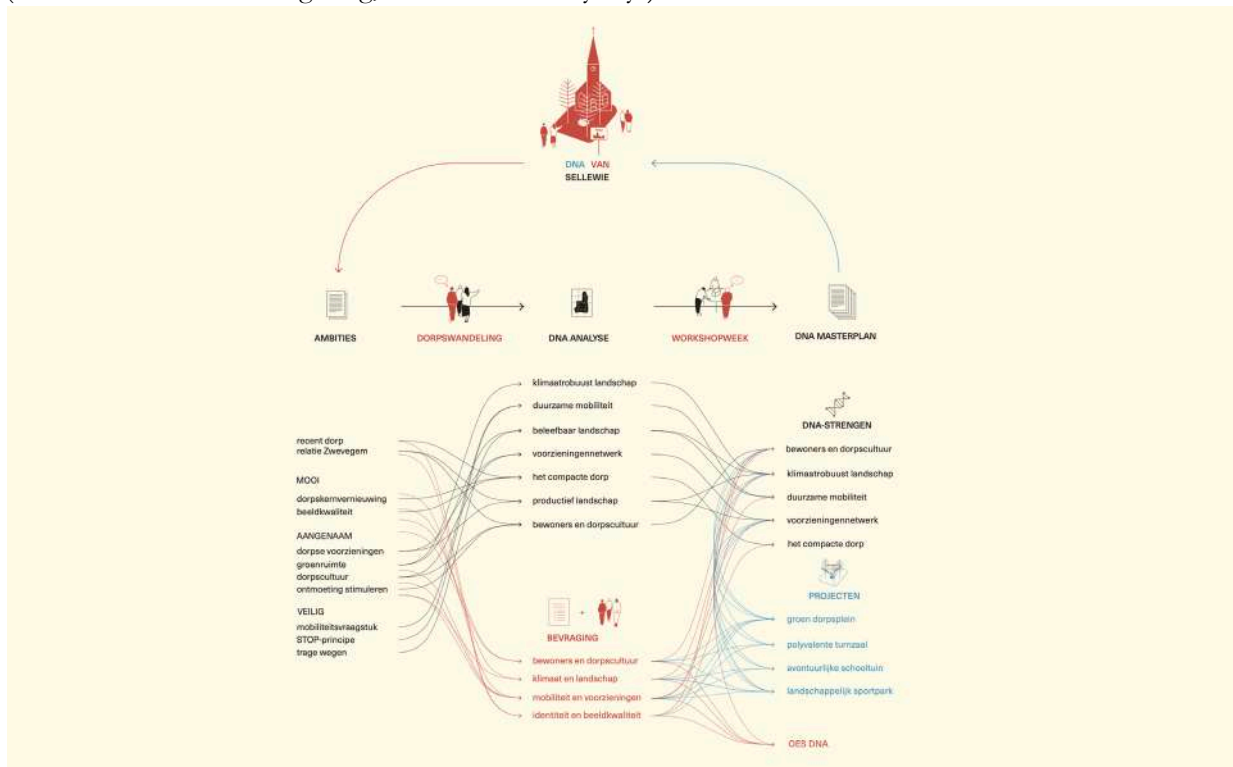
[fig.8] Diagram tracing back the evolution of thematic ambitions, intermediate discussion and the resulting 'DNA strains' throughout the masterplan creation process for St-Lodewijk, part of a series of village masterplanning trajectories commissioned by the Province of West-Flanders under the umbrella title *DNA van het dorp masterplan* [DNA of the village masterplan]. Source: DNA van het Dorp Masterplan St-Lodewijk (PLUSOFFICE i.c.w. Omgeving, Voorland and Anyways) 2021.

Framing the imaginary in the praxis and discourse of village urbanism

In contrast to the top-down, centrally planned approach often associated with urbanism, the emergent village urbanism from PLUSOFFICE context responsive practice is more bottom-up and community-driven. It relies on a collaborative process involving residents, planners, and architects to design and implement solutions that are tailored to the needs and desires of the village. Following the guiding image explored as a method above, two additional lines of thought were detected in the framework of the ongoing practice-based PhD, titled 'Constructing a practice on Village Urbanism in Flanders.' In the following paragraphs there is only room to briefly touch upon these concepts, enough to allow a reflection on how they relate to the village imaginary.

[fig.9] The garden pattern applied to the town of Spiere, integrating a redesigned church garden on the hill as the missing link of the Spiere River valley, which crosses the village underneath a main road and parking lot. Source: PLUSOFFICE architects, i.s.m. DELVA landscape architects, Spiere, Winvorm 2015.

The 'garden pattern' as a potential paradigm for peri-urban rhizomatic layout – in the tradition of a pattern language (Alexander 1977) – invites to reimagine the transformation processes in villages dealing with densification, public space redesign and new developments of housing projects and services. It conceptualizes an alternative structure of gardens, passages and other green spaces, that does not operate as an armature or relies only on intensity of use and clarity of form. The garden pattern - both as space and fabric - links social, ecological, spatial, and ideological layers, and can be rather potent in incorporating societal challenges around short chain food production, practices of commoning, increasing biodiversity or water retention, constructing shared identities, or strengthening informal relations. The patchwork of gardens, their interconnections and the related built programs operate as a guiding image, rethinking one layer of a potential village imaginary. One that does not erase the loose-knit characteristic of the village morphology and evolves in a rhizomatic manner throughout the fabric. The garden is a well-suited image to explain the three aspects of the guiding image mentioned before. It can serve as a 'symbol' of the individual land ownership, and a major structuring element of the urban fabric that is held together with side gardens, backyards, and front lawns. It represents several 'models' of society, from the suburban dream to the self-providence of home-agriculture, or the rewilding of manicured gardens. And it is one of the go-to elements for 'individual' expression (with gnomes, garden sheds, gravel paths,

lourdesgrotten[5]…). The gardens realm is the place for simple interactions between village inhabitants passing by pathways, entering through the back yard, chatting across hedges, and wandering through adjacent small woodlands. Hence the garden pattern is a potential village imaginary that can provide a future possibility for the village to re-imagine itself, one that can inspire design, new activities, common stewardship, and much needed solutions within the ecological agenda in dealing with climate adaptation, water retention or biodiversity crisis.

| Langgevelhoeve | Rijwoning | Fermette | Cataloguswoning | Jumbo-fermette | Toekomstbeeld |
| 17ᵉ E - 19ᵉ E | 1920-1970 | 1970-1985 | 1985-2000 | 2000-2020 | 2020-2035 |

[fig.10] Research models of the village architecture existing and imagined types developed in the thesis atelier which were organized as design research component of the Kempenlab Dorpsarchitectuur [Campine lab Village Architecture] set up by Ar-Tur vzw and KU Leuven. Source: Siemen Clerckx, Aurélie Van Calenbergh, Oskar Vanhulst, Promotor Ward Verbakel, Master thesis studio "Lelijk Dorp Rebooth", 2019-2020.

The other line of thought interprets the murmur of architectural interventions as being practiced in the villages, as a sort of proto language for village architecture. As indicated in the opening paragraph the density, typology and scale of built interventions is in evolution throughout the peri-urban Flemish village. The architectural challenge that comes with it, is to find a language that is true to the new dynamics on the one hand, but still produces meaningful relations with the architectural practice of the context. 'Village chatter' is the umbrella term introduced for a collective vocabulary, tested dialogue and shared value system that offers an alternative and hands-on way to discuss and guide the architectural quality of what the transformation of villages should look like at the architectural scale. Used as a toolbox with figures, tactics, dialogue rules, references, and distinct roles for different actors, it has been published, exhibited, and tested in several workshops with local stakeholders (Verbakel, Wouters 2021). Operating like a language system the village chatter is another village imaginary playing into the importance of the physical characteristics as major component of the guiding image, while accepting the nature of the apartment building and linking it to larger societal responsibilities. It is the aspiration of these multivocal and plural architectural gestures to produce a village chatter. Maybe a stereophony, in the words of Roland Barthes, who writes about the characteristics of Tangiers in 'The Pleasure of Text':

'One evening, half asleep on a banquette in a bar, just for fun I tried to enumerate all languages within earshot: music, conversations, sounds of chairs, glasses, a whole stereophony… through me passed words, tiny syntagms, bits of formulae, and no sentence formed, as though that were the law of such language. This speech, at once very cultural and very savage, was above all lexical, sporadic; it set up in me, through its apparent flow, a definitive discontinuity … outside the sentence.'
(Roland Barthes, 1975)

The articulation of two spatial conceptual strategies, the 'garden pattern', and the 'village chatter' are part of the proposed framework for village urbanism resulting from a practice-based PhD thesis in preparation. They can be understood as the results of a 'village imaginary' method. As an emergent framework to guide the aspirations and spatial transformation of peri-urban villages in Flanders, it might, perhaps, offer a praxis and discourse of what a village urbanism could entail.

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[5] Throughout private gardens of Flanders and the Netherlands numerous replicas have been built of the cave of Massabielle near Lourdes France. During the second half of the 20th century access to cheap cement technology has led to a proliferation of such cave facsimiles in various scales for individual Virgin Mary veneration. While rapidly disappearing, hundreds remain and for some or the focus of preservation and inventory initiatives. 'Gezocht: Lourdesgrotten groot en klein' DeStandaard 9/7/2009, consulted online on 02/03/2023

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Manufactured Altered Alps

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The ecological transition requires an unprecedented amount of raw materials, and new extraction perspectives in the Alps are underway to complete it. Since 2019, the Regione Piemonte has granted two Australian mining companies a licence to explore the presence of cobalt and associated minerals. It reverses the trend of relocating these activities in recent years and opens new debates around the territorial project.

The development of the Alps has been defined by exogenous phenomena that have changed physical, social and economic contexts. The city has imposed itself within the mountains, replacing the 'natural' and rural components to colonising them physically. Transit routes for international trade and the industrialisation of extractive processes favouring mining activities' intensification, and the exploitation of hydroelectric power radically altered the Alpine landscape – rural and with an economy based on self-sufficiency.

The paradoxes and contrasts of energy transition

In 2020, the European Union listed primary materials of 'strategic interest'. It changed its mining policy to extract raw materials from local resources, reversing the trend of recent decades in which extraction was relocated to other parts of the world (Arboleda 2020, Hutton 2019). These materials are crucial to achieving the European Green New Deal, and the geographical concentration of extraction and refining poses a potentially serious risk to future supply (van den Brink et al. 2020).

Cobalt is a critical material in many sectors and an essential component of lithium-ion batteries[1]. In the next five to ten years, the industry that manufactures these products is expected to grow as much as three times, and the supply chain must also expand at a similar rate (Sun et al. 2019). In 2018, about 65% of cobalt was mined in the Democratic Republic of Congo, specifically in the Katanga province in the south. Significant producers include New Caledonia, China, Canada, and Australia[2]. China dominates the global production of refined cobalt, which accounted for more than 60% of the world's total in 2018. Current cobalt extraction in Europe derives from three mines in Finland, while refinement activities occur in Finland, Belgium, and France. Recent studies (Horn et al. 2021) identified 509 cobalt-bearing deposits and occurrences in 25 European countries. In particular, the Alpine Orogenic Belt is an up-and-coming area for potential cobalt-related minerals mines. Exploiting this area would drastically alter the European role in cobalt extraction and Europe's position in the global supply market. The socio-ecological transition will require an unprecedented amount of raw resources.

Collateral landscape

The development of the Alps has been defined by exogenous phenomena that have changed these territories' physical, social and economic contexts (Bätzing 2015). The city has imposed itself within the mountains, overlapping or replacing the 'natural' and rural components to colonising them physically with new buildings, infrastructures and land uses, establishing a "territorial machine" (Cavalieri, Viganò 2019). To reconsider, in a non-conflictual way, the relationship between the city and the mountain, the first one must not be understood as a centralised form but as an additional integral element of this complex urban system (Diener et al. 2006).

In their physical entity, the Alps are a dynamic organism on which anthropic activities have been concentrated for a few centuries but produced radical transformations. This work focuses on how external activities – such as extractive ones – have replaced rural processes settled over the years in the Piemonte, highlighting contrasts and problems derived from these processes. The depopulation phenomenon occurs through the shift of the Alpine population toward the valley floor, where the settlement of large-scale industry (Modica 2022), thus reversing the relationship between low-lying and upstream municipalities. This is the main element in changing the complex economic and social

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[1] These types of batteries are used in many everyday devices, such as cell phones and laptops, but also medical equipment and electric cars and hybrids. Lithium-manganese cells are combined with lithium and nickel-manganese cobalt oxide (NMC) cells to extend their service life and specific energy.

[2] In this case, cobalt is produced chiefly as a by-product of nickel extraction.

balances of traditionally rural areas such as many portions of the Western Alps. In other parts of the mountain territory, the emergence of the electric industry represented a confirming factor for new balances that were being consolidated, with a gradual abandonment of an economy based on self-sufficiency.

Alpine mines, large infrastructural works and hydroelectric power exploitation
Mining influences the relationship between population, economy, environment and health, particularly concerning industrialisation and its consequences. Mining history is conventionally divided into two main phases: the "peasant miners" and the industrial phase. At the end of the 16th century, mining automation was early, developing more efficient techniques[3] favouring the intensification of silver and gold mining and a centralised and properly industrialised organisation. Thanks to these features, mining was essential in that phase of European economic history, leading to demographic, environmental and economic changes resulting from the industrialisation of mining. Although on a smaller scale, cases can already be found in the early modern age in Alpine regions where a mining industry fuelled by substantial immigration of labour was firmly established as early as the first half of the 17th century, in places such as Alagna Valsesia and Macugnaga – Monte Rosa – it experienced substantial expansion, especially during the 18th century (Zanini 2016).
The Simplon Tunnel is an essential[4] railway infrastructure in the Alps, connecting Switzerland with Italy. It was built to provide a direct rail link across the Alps, thus facilitating trade and passenger transport between the two countries. Construction of the tunnel began in 1898, and the work took about seven years and was completed in 1905 and officially opened in 1906. It immediately significantly impacted transport and trade, providing a faster and more reliable train route between Switzerland and Italy. It played a crucial role in facilitating the movement of goods and passengers and promoting tourism across the Alps. Temporary villages were built for the workers employed on the site and their families, who also came from central and southern Italy. Balmanolesca [fig.1] housed 8,000 inhabitants and provided services such as a school and a hospital. The village was destroyed by a flood in 1920.

[fig.1] Balmanolesca. Source: Associazione tutela del patrimonio storico della Val Divedro

The current vision defines a relationship between concentrated and extended urbanisation, including the operational landscapes of resource production and extraction (Brenner, Katsikis 2020). Turin's metropolitan mountain is a relational space where economic, social and cultural characteristics derive

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[3] New drilling, drainage and ventilation techniques have been developed.
[4] The Simplon Tunnel is about 19,8 km long. It passes under the Simplon Pass, a mountain pass of historical importance located at an altitude of 2,005 m.

mainly from interactions with the metropolitan area (Dematteis 2018). The first significant use of water resources in the western Alpine region resulted from the city of Turin's energy policy (Pavese 2007). An important demonstration of public lighting at a distance, conducted during the 1884 Industrial Exhibition, increased the market prospects. Lucien Gaulard won a special prize for the "best electrical transmission to Turin from the Alps" and attracted the attention of foreigners to the sub-alpine area (Calligaris 1993). At the end of the 19th century, the Ossola Valley entered a large electrical industry, accelerating the structural transformation process that had already begun with the extension of the mobility network [fig.2]. The importance and frequency of the large-scale works (Bolzoni 2006) wiped out the agro-pastoral economy and the mountain pasture system of the upper and lower valley, wiping out the income from forest land. The growth of the electrical industry profoundly altered the economic and social balances achieved for centuries in the Western Alpine arc (Calligaris 2004). Even today, the demographic crisis is concentrated in mountain areas. It leads to housing imbalances in the territory, with growth in the lower part due to the presence of active industries (Corrado, Sega 2019). Combined with connective difficulties, this leads to other phenomena of abandonment of portions of the territory.

Thinking of the Alpine environment as a common good can trigger a series of narratives and practices that reduce the right of local communities to exercise decision-making power over their territory (Debarbieux, Price 2012). The protests and associationism of the municipalities of Val Maira in the early 20th century demanded an energy policy capable of rebalancing the phenomenon of energy production for export, even in contrast to the economic interests of the companies involved. These practices concerned the energy infrastructure directly involved and the emergence of a collective consciousness that has influenced regional energy policies and landscape choices over the years.

[fig.2] Morasco dam construction process. Source: ENEL

Another modernity. Capitalism in the countryside and conservation processes of nature

The transformation of agrarian structures and social and economic changes can be attributed to the penetration of capitalist logic into rural areas. Emilio Sereni (1968) focused on the transition from feudalism to capitalism in the countryside and the processes and dynamics that led to this transformation. By emphasising profit and market-oriented production, he argues that capitalism profoundly affected rural societies with the rise of commercial agriculture and the commodification of land and labour. The emergence of agrarian capitalism has had social, economic and political consequences on various groups, including small farmers, agricultural workers and rural communities. Through this analysis, the tensions and contradictions inherent in the capitalist transformation of the countryside emerge. The state's role and policies – again exogenous processes – shaped the agrarian structure and how rural societies adapted to and resisted capitalist pressures.

Starting in the second half of the 19th century, in the face of the growing environmental impact of industrialisation processes and the tendency towards uncontrolled exploitation of resources, a greater interest in the rational use of natural resources and the protection of the environment began to develop (Armiero, Hall 2010). The early nature conservation movement was not an anti-modern

reaction to progress but substantially impacted traditional natural resource management methods[5]. Industrialisation created the conditions for unsustainable development, so the movement sought to preserve some 'natural' spaces and to initiate limited experiments in the rational exploitation of resources. However, it also often opposed the traditional models of resource use by local communities to replace them with new models deemed more scientific and rational in the name of landscape and environmental protection. From this perspective, nature conservation should be read as a question of balances of power and social conflicts over the management of resources (von Hardenberg 2011).

New cycles(?)
The population of the Alps increased by a growth rate significantly below the European average[6]. The proportion of the people living in the Alps in the seven Alpine countries of Europe fell from 7.4% (1870) to 5.8% (1990) of the total European population (Bätzing et al. 1996), 43% of all Alpine municipalities have experienced a substantial decline[7]. The drastic population collapse has been significant in the region of the southwestern Alps, south of the line connecting Annecy, Aosta and Lake Maggiore, and in the Cuneo area and the Ligurian Alps. The collapse in these areas was partly caused by the lack of subsidies (or inadequate subsidies) for mountain regions in France and Italy; it is also the result of a large-scale weakness in the economy and infrastructure.

In this framework of low socioeconomic dynamism, the opportunity to generate new economies from resource extraction is generally welcomed. However, different studies (Auty 1993) argued that no direct correlation exists between a nation's resource wealth and economic growth. In the western Alps, cobalt is reported in the Alpine region of Piemonte. Seven abandoned mines formerly worked magmatic deposits are in the Ivrea-Verbano zone[8], exposed during the Alpine orogeny. In 2019, a mining company was granted a license to explore cobalt, nickel, copper, silver and associated minerals at Punta Corna (2,960 m). The area is included in the territory of Usseglio and Balme, the two towns, characterised by severe depopulation, maintain an economy based on tourism, especially in summer, and agro-pastoral production. The mines have been exploited since 1753, and cobalt was used as a colour pigment. In the 1930s, when mining in the high mountains became too expensive, the site was closed.

Local authorities in Usseglio welcome the operation. In contrast, the municipality of Balme has approved an action against mineral exploration, seeking to preserve its territory. In December 2022, the license was renewed and extended to start a second exploration phase. In addition to this area, searches are conducted in Valsesia and towards Ossola Valley by another Australian company, but current resource estimates are yet to be available.

Thinking of an alternative, hybrid urban-rural scenario
Paradoxically, the European Union's Green New Deal includes policies and programs that involve the expansion of mining - of non-renewable resources - with consequences for climate, ecosystems and local communities. These actions should always face negotiation processes based on an estimation of benefits at the national and local levels informed by the interpretation of the territory that these processes are disposed to alter. Evaluating if the impact on ecosystems and local communities is a social cost we are ready to address and if value extraction is still viable in interacting with the landscape. In this case, significant investment is needed in the research and development of cobalt-free batteries and cobalt recycling [fig.3] to improve the value chain and avoid replicating old exploitation processes. Territory must be considered as the result of the stratification of these different processes (Corboz 1985), and scenarios (Viganò 2010) must be proposed to respond to the climate emergency without further damaging the ecosystem and local communities.

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[5] The exclusion of certain land areas from exploitation processes and the organisation of the environment according to modes of production is considered more scientific (von Hardenberg 2011).
[6] The population of the Alps increased by 57% between 1870 and 1990, from 7 to 11 million inhabitants (Bätzing et al. 1996).
[7] In particular, an average of 44%, reducing the population by almost half.
[8] Nickel, copper, and cobalt were produced from the late 19th century until the Second World War.
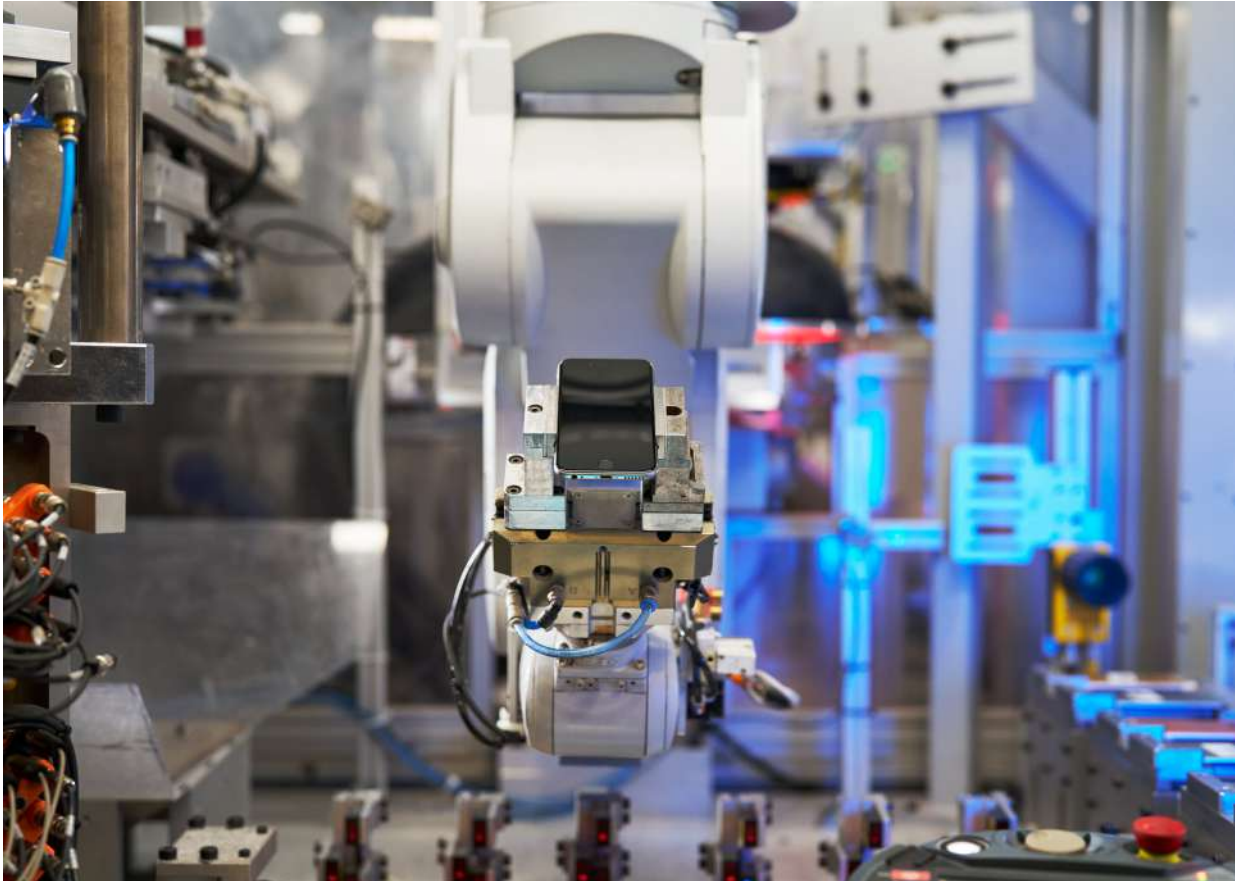
[fig.3] Apple recycled materials, disassembly robot. Source: Apple

However, paradoxes are triggered even in alternative scenarios based on renewable sources and self-consumption. In 2021, the Valle Maira and Valle Grana mountain associations set up Italy's first 'large-area energy community' – entirely public – to study and promote energy efficiency in the valleys, partly by reusing old, abandoned hydropower plants. Piemonte is considered one of Europe's driest areas[9], where the Po River flows more than 40% below historical averages[10]. In autumn-winter 2021, there were 110 consecutive days without rain or snow. In December of that year, rainfall was 65% lower than in the historical series[11]. In the same valleys in the Cuneo area, there is a 25% deficit in water supplies[12]. Agricultural activities have worsened for the past two years because of drought and competition with hydroelectric power plants. Mountain agriculture and animal farming products must be considered essential resources for sustainable development in the Alps (Debarbieux 2020, Pettenati 2020) through preserving and transmitting local knowledge and reproducing traditional cultural landscapes.

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[9] In July 2022, a state of emergency was declared due to water shortages in Piemonte, Friuli Venezia Giulia and Emilia Romagna. In December 2022, the expiring measure was confirmed for one year, and Liguria, Toscana, Umbria and Lazio were added to the list of regions in crisis.

[10] Measured by the World Meteorological Organisation, comparing rainfall data for 2022 with that of the last 30 years.

[11] It should be specified, however, that these regions have always been considered low in rainfall; as early as the 13th century, to make the best use of the water resource, the "ru", small canals fed by the streams at high altitude through a network of pipelines and storage tanks, were constructed.

[12] In other parts of the region, the situation is also critical. In Crodo, the locality known for its springs, industrial production draws on its resources, which is one of many evidences of this situation. Viù, in the Lanzo Valleys, has to deal with emergencies using recharge tanks.

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The monetisation of exchanges between city and countryside as an indicator of the urbanisation of Congolese territory. How is the urban phenomenon reflected in the case of Mbanza-Ngungu?

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This paper aims to understand the meaning of notion city in Sub-Saharan Africa through the case of a medium-sized agglomeration, Mbanza-Ngungu, located in the Kongo Central province, located on the route between Kinshasa (150 km), the capital of DR Congo, and Matadi (225 km), the access to the ocean for the whole country.

The medium sized African urban phenomenon is relatively lessdescribed, and its definition does require several shifts in focus. First, a historical shift. Mbanza Ngungu is historically a colonial settlement, which has therefore imported the name of the city into a territory that was previously structured differently. Over time, the African city has also experienced its own specific evolution, very different from other continents because occurring outside of the processes of industrialization and tertiarization. In this context, beyond basic services, the African urban economy is primarily linked to agricultural and charcoal productions for urbanized neighborhoods.

To address the concept of the city in this context, a second shift is necessary: looking to the phenomenon through the prism of urbanization. This perspective firstly allows to move from the morphological field to a more ontological approach, describing urbanization as a change in the state of the territory and practices, with the increasing monetarisation (Polanyi, 1944) and the emergence of mobility in daily life (Remy and Voyé, 1992), and then accepting urbanization as a generalized phenomenon (Brenner and Schmitz, 2014) that inseparably affects both urban or extra-customary world and rural or customary world.

The analysis will therefore focus on the characterization of the relationships and transactions between urban and rural lands to characterize the structure of the city of Mbanza-Ngungu based on an original cartography. This description will be made at several scales. First, it will trace the trajectories of the Mbanza-Ngungu inhabitants who go daily to operate the neighboring clan lands, either exercising their ancestral right of use as former members of the village, or monetizing this same right. The analysis will then focus on the localization, all around the city, of markets where the production is sold, leading to identifying the cores from which the urban extension is structured, pointing out both the agglomeration amplitude and that of its hinterland, indispensable to its economic functioning. Finally, direct exchanges with the capital, Kinshasa, will be described in order to insert the urban phenomenon of Mbanza-Ngungu into a metropolitan dynamic. This description will conclude on the need to approach the sub-Saharan urban phenomenon not as territorial entities distinct from a rural world, in its relationship to agriculture and silvicultural production on the one hand, and in a trans-scalar perspective, taking into account the relationship to large millionaire agglomerations on the other.

Introduction

The description of city/countryside exchanges through their monetisation reveals the evolution of the Congolese territory, which in the province of Central Kongo is reflected in progressive and generalised urbanisation. It also provides an insight into the unique dynamics of cities in sub-Saharan Africa - whose development is weakly linked to industrialisation and tertiarisation - by questioning what a medium-sized city can mean. In the medium-sized town case like Mbanza-Ngungu, the changing relationship between urban and rural areas is socially and spatially transforming village land. This paper shows that this transformation does not generate a hybrid territory, a sort of rural-looking territory where urban behaviour is adopted, but rather that the whole of the agricultural hinterland of Mbanza-Ngungu is part of a single urbanisation phenomenon that is still largely undocumented.

Like other Congolese cities, Mbanza-Ngungu is historically a colonial settlement that was structured differently. These cities, 'some of which were recently created'[1], represent land that was removed from the traditional yoke by the colonial system before being registered and governed by written law, the extra-customary centres. Customary land represents all the land that remained under the pre-colonial system, in other words, governed by customary law. In the Kongo social organisation, this land, which is still outside state control, refers to lands whose 'ownership is collective and acquired in accordance with custom'[2]. This collective ownership is defined by what Kamumfuekete in Lemaire and Genard (2017) describes as a traceability structure, bringing together all consanguines through their mothers, the clan. In customary land, unlike extra-customary land, some goods cannot be socially validated by the market.

Apart from the resulting distinction between those with rights - or consanguines - and allochtonous, referring to the extra-customary and the customary reflects forms of the relationship between society and space that make it irrelevant to differentiate between the formal and the informal. In addition, they allow urbanisation to be approached from an ontological standpoint, rather than from a morphological one. Urbanisation seen as a non-homogeneous global phenomenon (Brenner, Schmid 2014), societal (Remy, Voyé 1992) and increasing monetarisation (Polanyi 1944) illustrates, accompanies and stimulates, enshrining the city as a place of collective consumption (Harvey 1995, 2004) at different scales.

Based on a detailed description of exchanges by "tracking" (Leloutre, 2018), this paper reveals a new scale and a new structure for the growth of medium-sized cities, but also of the metropolis of Kinshasa, hitherto described through its peri-urban territories (Trefon 2004, Lelo Nzuzi, De Saint Moulin 2008, Lelo Nzuzi 2018). It looks successively at the urbanisation of the customary, the reverse commute and oriented markets.

h
1. The customary land urbanisationh

The urbanisation of customary land leads to socio-economic changes that reshape the relationships between social actors. This assertion is based on the observation that the intensity of monetarisation in customary societies is increasing in terms of market exchanges and the commercialisation of clan goods.

The urbanisation of customary society, in this sense, involves the rights holders in a process of acculturation, accompanied in some cases by a gradual abandonment of the traditional lifestyle. Increasingly, rights-holders themselves define certain norms of their existence in terms of customary law, with regard to values or practices that they consider outmoded. New activities are being created and certain pre-existing activities are adapting to the times. This situation, which can be likened to "modernisation" (Santos 1972), shows the way in which the elements of a spatial system remain unchanged or give way completely or partially to others. Modernisation highlights the mutations that can be referred to on a wider territorial scale - than that of the customary - which define its space on the basis of a set of temporally heterogeneous elements linked together. It is on this scale that the tension between normative and cultural internalization and critical distancing is defined, thus creating the personality and identity of rights holders. The entitled parties are constantly moving from what Jean Piaget (1964) describes as a state of lesser equilibrium to one of greater equilibrium. The incorporation of elements of external influences and the readjustment of action structures are the two major movements that are distinct, complementary and significant to the system of dispositions of an individual linked to a social trajectory.

It is in this context that the increase in the need to hold cash reduces the filters of accessibility to customary land. This is shown by the monetarisation of exchanges and the commodification of clan goods.

1.1. *Evolution of the monetisation of exchanges between the customary and urban worlds*

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[1] Décret n° 13/026 conférant le statut de ville et de commune à certaines agglomérations de la Province du Bas-Congo, col. 130, JO, juin 2013.

[2] See paragraph 1 of Article 34 of the Constitution Journal Officiel - Constitution de la République Démocratique du Congo Amended by Law no. 11/002 of 20 January 2011 revising certain articles of the Constitution of the Democratic Republic of Congo of 18 February 2006.

The 'monetisation'[3] of market exchanges is one of the levers for intensifying exchanges with superficial links. It reflects the influence of money on non-monetised market exchanges that have coexisted with monetised market exchanges in the customary world. In these non-monetised market exchanges, which have also contributed to the fight against food insecurity in towns, the absence of equivalence through money has not always been a source of disagreement between the parties to the exchange. The rare disagreements have resulted in the exchange between the parties not taking place. However, it should be emphasised that the agreement between the parties that determines the exchange has not always reflected the preference of the entitled parties. In some cases, the agreement is simply a constraint arising from the lack of alternatives. Two forms of non-monetary exchange that are currently monetised illustrate this point: barter[4] and sharecropping[5].

Barter consisted of an exchange of goods produced on customary land for certain manufactured goods available off customary land, including sugar, salt, coffee, soap, seeds and clothing. Bartering, which coexisted with monetised exchanges, established a relationship of trust between the inhabitants of the customary land and the intermediaries involved in the exchanges, who were socially close to the inhabitants of the town. This reduced search time and avoided the problem of double coincidence. The exchange intermediaries are traders involved in the distribution circuit of clan goods between the farmers and the final consumers. The replacement of barter by monetised exchanges has reduced the importance of the social proximity of the parties to the exchange. Socially distant exchange intermediaries can now trade directly with customary inhabitants.

Sharecropping was a temporary transfer of the right to use land from the beneficiary of a village in return for a share of the produce of the tenant farmer, who was a non-native, i.e. outside the village clan. The access of non-natives to customary land depended on their expression of 'temporal stability and inter-situational coherence' (Rolland 2019), because the social peace of customary land depended on it. With the monetisation of temporary use of customary land, the personality of the non-native is no longer a priority. Who are you" has been replaced by "how much do you have". This frees allochthones from their production debt to the rightful owner. It also opens up the exploitation of customary land to any non-indigenous person with financial power who wants to exploit it. Visits to customary chiefs in July 2022 revealed that the annual right to use a plot of agricultural land in the villages surrounding Mbanza-Ngungu varied between USD 30 and USD 70 per hectare per year.

1.2. *The commodification of clan goods*

The commodification of clan goods blurs the differences between rightful owners and allochtonous. Clan goods that was traditionally reserved for the non-market exploitation of right-holders alone can now be acquired by non-natives. For example, fruit trees are used to gather fruit and caterpillars. And land is the basis for agricultural crops and many other socio-economic activities. These goods, protected against any form of alienation by custom, help to maintain the trans-generational link that underpins the collective interest of those entitled to them by differentiating between merchandise and goods that cannot become merchandise. The trans-generational link implicitly evokes the societal responsibilities of the actions of certain members of the present generations on past, future and present generations. The societal responsibility of the present generations in the custom of the Kongo universe refers to taking into account the interests of the beneficiaries of different generations in activities involving goods protected by custom.

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[3] The debate is not part of a historical approach to highlight the evolution of forms of money over time and their coexistence in specific periods, as in Blanc (1994), Fantacci (2005) and Kuroda (2008). Nor in an anthropological approach to describe a primitive or modern society ((Polanyi, 1974) (Polanyi 1971) (Akin, Robbins 1999). Nor even to question Western societies using analytical grids that have been historically and anthropologically developed and validated in the light of Aglietta & Orléan (1998) and Théret (2007).

[4] Barter is mentioned without discussing 'the existence of traditional currencies' (Edoumba-Bokandzo, 2001), or asserting that barter was once a widespread phenomenon in customary law. Nor is it a question of contrasting barter with monetarised exchanges to describe the economies of primitive societies where barter disappeared with technical progress (Hildebrand, 1864; Amselle, 1966 and Jones, 1976).

[5] The aim here is not to discuss the various consequences of this, but to see how customary land is becoming increasingly accessible to non-natives wishing to exploit it.

This guarantees the beneficiaries of generations that are physically absent the same freedom of choice in terms of socio-economic organisation as the generations that are physically present.

The creation of markets for fruit trees and land is a form of alienation that breaks down the internal limitations of societies based on social, economic, anthropological and natural dimensions. By extension, it creates "all situations of dispossession of the individual in favour of external entities and loss of control over the aims of his activity. This ultimately deprives man - understood as the entitled person - of his very humanity, by assimilating him to an interchangeable cog deprived of control over himself" (Coulangeon 2020). In contrast to the monetarisation of market exchanges, the commodification of clan goods involves a reduction in the weight of customary roots, or even the gradual abandonment of customary values. The use of customary land is thus becoming accessible to any allochtonous who, depending on how the situation is interpreted, can make use of the clan goods reserved for with rights.

Beyond these analyses, one question remains. How has the need to hold money increased in customary societies?

2. The reverse shuttleh

The reverse shuttle refers to the movement of city dwellers to work on customary land. This situation defines the city as a place of residence and the various clan lands as a place of work. It highlights one of the types of employment that feeds and drives the urban economy, and hence the growth of the city, a phenomenon highlighted by the geographer Alain Dubresson (1999). Reverse commuting is not part of a logic of "labour market adjustment between territories" (Deschamps, Descours, Cohen-Solal, Jacquot 1991). It reveals the forms of city development. In some cases, integrating the reverse commute into the lives of urban dwellers is an alternative to the lack of job opportunities or filters in the city, and a choice in others. In other cases, it is a choice. 'Visits to traditional chiefs, commuters and city dwellers in between, as well as non-participant observations'[6], show that urban commuters still travel to their clan lands on foot. It concerns both men and women, the older of whom vary in age from 15 to 60 for those entitled to live in town, and from 19 to 55 for allochtonous.

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[6] Carried out in the field from June to August of 2019, 2020, 2021 and 2022
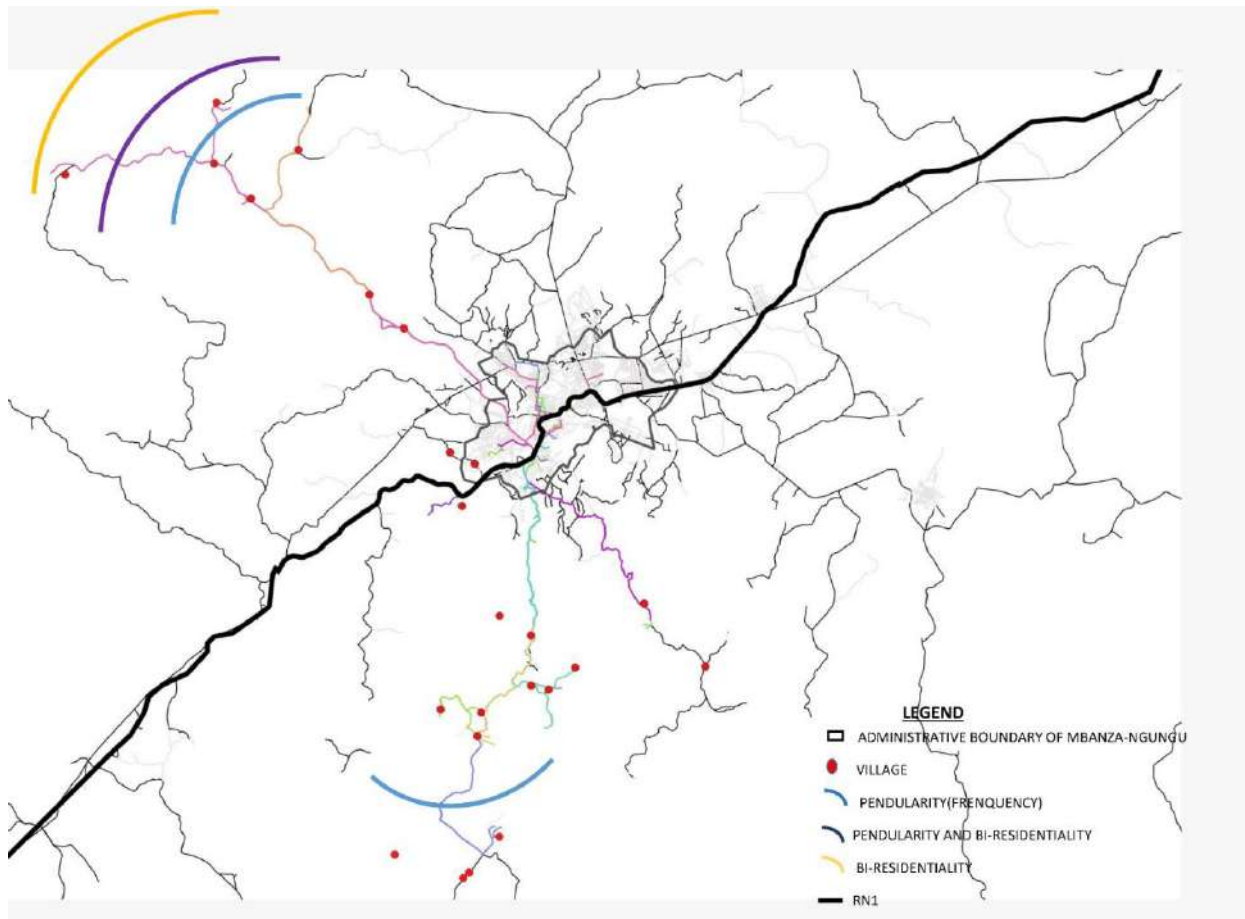
[Fig 1]: Trajectories of urban dwellers to rural areas by Joel KAPASI on the basis of field data.

By mapping the journeys of 37 commuters on four roads, we can distinguish between two categories: commuters and in-between city dwellers. Commuters are single-residence city dwellers. Their home-to-work commute is a daily round trip to villages within a radius of around twenty kilometres. In-between city dwellers are bi-residential commuters. The home-work commute is not a daily round trip. The clan land becomes a secondary residence without leading to residential migration from the town to the village in the long term. This secondary residence may change when the activity of the urban dweller moves from one village to another. So a commuter can become an in-between city dweller, and vice versa. In-between city dwellers live in villages located beyond an 18-kilometre radius of the city.

The reverse commute, understood as a journey between home and work, implicitly calls into question the work of urban dwellers, whose location - in customary terms - seems to play little part in the choice of where to live in the city. The idea is that the forms of work generated by urbanisation cannot be reduced to legal and statistical categorisations. Thus, a positive link can be established between ongoing urbanisation and work growth.

2.1.   Choice of residence in the town of Mbanza-Ngungu

The location of commuters' place of residence in the city is independent of the distance-related commuting time. It is linked to the specific socio-economic situation of each household. A profile of urban commuters who work on clan land shows that plot owners have less choice than tenants.

Homeowners live on their inherited or purchased plot. Choosing a residential location other than their property would be too expensive for the household.

For tenants, budget constraints, household composition and social ties are among the factors that determine their choice of residential location in the city.

The budget constraint refers to a trade-off between limited income from commuter activities and the acquisition of goods and services. Tenants prefer affordable housing. The semi-structured interviews conducted in June 2019 revealed that the cost of rent ranged from \$17 to \$62[7]. The cost of rent depends on the neighbourhood, the number of rooms in the dwelling and the possible social ties with the landlord.

Household composition refers in particular to the age structure of its members. According to our fieldwork, there are households with children under the age of 12 that take into account the proximity of their home to a primary school when deciding where to live. Proximity to the school means that children can travel to and from school under the supervision of a member of the household, requires less physical effort from parents and children, saves time and makes it easier to keep track of children. It is one of the guarantees of safety that is needed in the face of the various risks that can be caused by the circulation of motorised rolling stock or urban delinquency embodied by gangs made up of idle young people. Proximity creates a close relationship between the school and the parents, which means that children are obliged to follow their parents' instructions and work hard to avoid any bad reports being made to their parents about their behaviour.

In this case, social ties are self-organising, providing a form of local social protection that complements that organised by public institutions. Among other things, they determine attachment to specific residential locations in the city. Fieldwork reveals that attachment to a particular district (or avenue) of the city is a consequence of the residential fixity of households that can be counted on and for whom they are counted. As a result of geographical proximity (living in the same neighbourhood or avenue) and/or different interactions over a long period of time, the individual can mobilise them to deal with life's hazards and certain daily needs (needing salt, sugar, soap or food and services: running the laundry). The social ties between these households and the individual support the individual's specific emotional ties with his or her neighbourhood (or avenue). These households belong to different professional categories. If these households change location, the individual may choose to locate his or her home by looking for geographical proximity to one of these households. This observation was made among residents of the town who were born and grew up in Mbanza-Ngungu.

2.2.   *The daily activities of the city dwellers in customary land: their work*

The daily activities of customary urban dwellers help to transform the territory according to their interpretation of the situation in order to find the means to participate in social life and express their personality. Urban dwellers who work on customary land cultivate the land or produce charcoal between 7 a.m. and 5 p.m. or to mediate exchanges between 12 p.m. and 5 p.m.

Urban production on clan land is akin to outsourcing production from the city to clan land. Outsourcing urban production is a process that enables the city to build up its supply for local markets and other cities. It can be related to the surface area of arable land available in the customary system, to sociological links to clan lands and to economic relationships with urban space. Furthermore, the outsourcing of urban production is helping to reshape the peasantry and reduce urban violence. Like idle youths who are members of urban gangs, farmers are able to offer their labour to commuters' farms in return for payment. This reduces the time they have to work on their own account. For any given village, the distance travelled to produce is greater than the distance travelled to mediate trade. This is illustrated by the mapping of journeys by urban activity on clan land.

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[7] at the rate of 1965 Congolese francs to the US dollar

[Fig 2]: reverse shuttle mapping by activity by Joel KAPASI on the basis of field data.

Unlike production outsourcing, exchange intermediation takes place between production and final consumption. It consists of buying agricultural produce from farmers (peasants or urban dwellers) on the various agricultural feeder roads in order to resell it to other exchange intermediaries or households in town. Trade intermediaries include urban dwellers who identify themselves as "mamas manoeuvres" within the various associations. On the one hand, these associations are vectors of sociability which, to a large extent, lead to social transformations in which economic relations between actors are embedded. These associations, which take into account the social concerns of individuals, far from political projects, overcome the various social segregations based in particular on clan, religion and political affiliation. On the other hand, this is a type of urban work where men lag behind women.

3. Oriented marketsh

Oriented markets are markets that sprang up spontaneously around ten years ago at the edge of the conurbation, and which play a part in the urban economy at both local and metropolitan level. They are located at the end of a specific agricultural feeder road, hence their name, "oriented" towards a specific clan land. These territorial dynamics are also illustrated in the transport of clan goods, TBC for short, which cannot be reduced to a purely technical matter. The appropriation of public roads reflects a conception of how to make and live in the city that follows on from the ability of urban dwellers to work on their territory in redefining their environment according to their own interpretation of situations. It is in this context that spontaneous uses are superimposed - on the specific locations of public thoroughfares - on previously conceived uses in specific locations of thoroughfares.
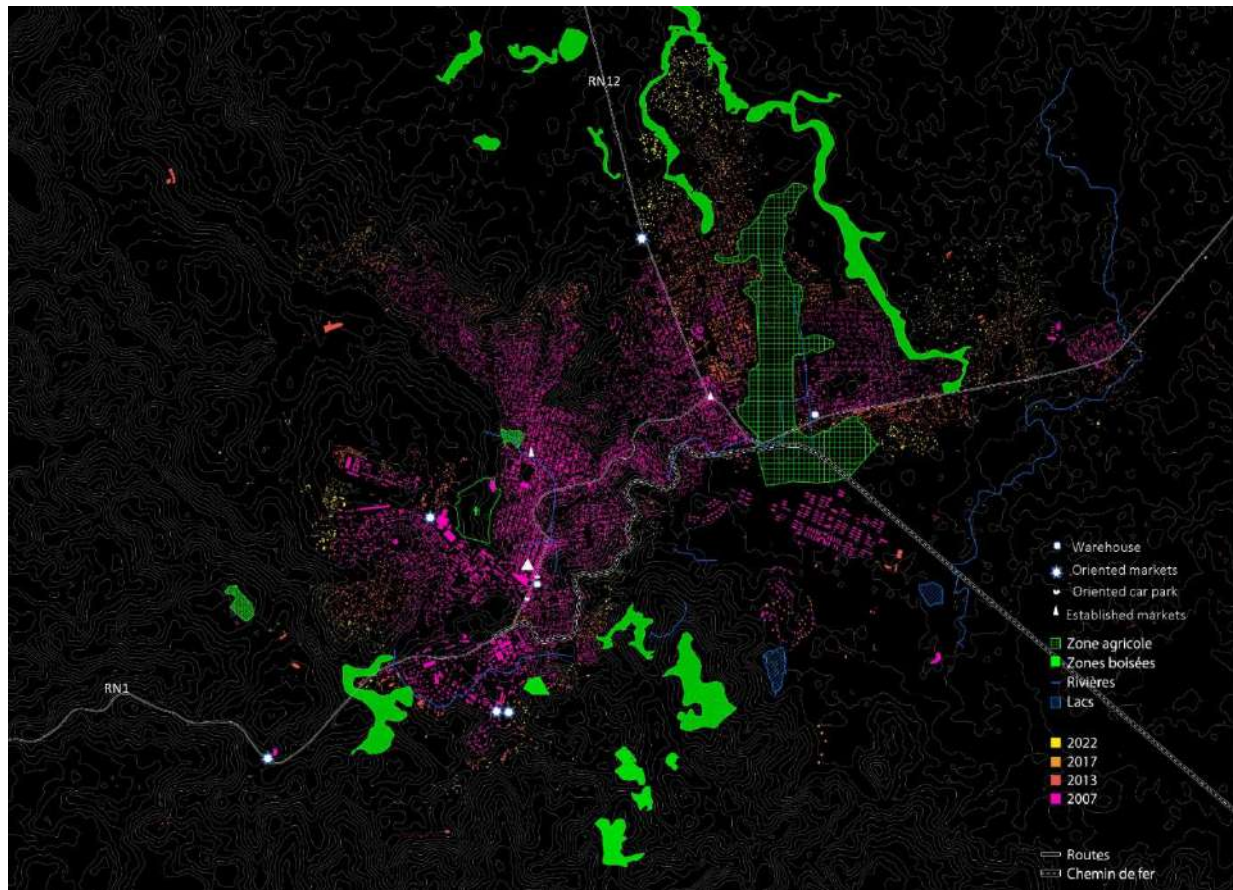
[Fig 3]: *Some of the places where spontaneous uses are superimposed on planned uses in the context of the urbanisation of Mbanza-Ngungu. Map base ADP-2022(ULB) modified by Joel KAPASI on the basis of field data.*

Oriented markets and warehouses are indicators of the comparative advantages that the city derives from trade, mainly with the metropolis of Kinshasa. The warehouses occupy a central geographical position in the town. Charcoal produced in the customary way is transhipped there, stored at a price, exchanged, and loaded exclusively for Kinshasa. Oriented markets are located off-centre in the city. They are crossroads between the main road or artery of the town and the agricultural feeder road, where a variety of clan goods are traded, mainly for local and Kinshasa demand. And secondarily to other cities. More specifically, with the construction of the outlying districts, certain oriented markets have undergone an evolution in the reconfiguration of centre-periphery relations, without changing the role of the established markets, in other words the older markets managed by a public authority. In addition to goods produced on clan land, manufactured goods are now traded on these markets. In addition, the mapping of specific markets shows that the choice of their location in the years of their appearance was determined, among other things, by the accessibility of the TBC. By bringing urbanised areas closer together, it contributes to the urban socio-economic dynamic by transforming the city's public spaces and influencing its urban structure.

3.1.   The transport of clan goods[8]

The transport of clan goods highlights the creation of multidimensional wealth by broadening the functions of public spaces. It is therefore an ideal framework in which to make a breakthrough in the concept of "terripreneurship" (Kapasi 2020)[9] as the foundation of the social and solidarity economy. The emergence of these TBCs has transformed the crossroads between the city's main artery and the N1 into a fixed parking

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[8] On-site investigations (J. Kapasi)

[9] Kapasi (2020) conceptualised terripreneurship as the grip of the territory on the creation, perception and incitement to exploit the business opportunity, on the setting of the price and on the location of the exchange on the public highway. In particular, price setting was a function of social link.

area, the oriented car park. This situation, which can be seen in the vicinity of the central market, is the work of the permanent TBCs. It is made up of second-hand cars and new motorbikes for the journey from the town to the customary place. And second-hand vans for the Mbanza-Ngungu Kinshasa route. Transport of clan goods from Mbanza-Ngungu to towns other than Kinshasa remains occasional and on request. It should be noted that the permanent use of motorbikes and cars for transporting clan goods in Mbanza-Ngungu dates back to 2012 and 2009 respectively. Motorbike transport is suited to the generally impassable agricultural feeder roads. The motorbike and the car have replaced non-motorised transport, which was the interface between the customary place and the town of Mbanza-Ngungu, but also between the oriented and instituted markets or the final consumers.

As the foundation of the social and solidarity economy, terripreneurship reveals dimensions that broaden the spectrum of territorial influence by combining market and non-market logics to create multidimensional wealth. This can be seen in the following ways :

- a pattern of action to create economic activity subsequent to hoarding, new money or lack of income. Terriprendre cannot be limited to economic and financial aspects. This overturns the perception of social classes by reducing the strength of hierarchy and competition. This situation contributes to the basis of a democratic society that gives every individual freedom of choice, regardless of their family background, life history or socio-professional situation.

- The anchoring and investment of gains in the economy of the city district as essentially entrepreneurial approaches in response to local problems in which the profit of terripreneurs results from the maximisation of social utility. Terriprendre is a way of committing oneself to a socially legitimate cause that contributes to the well-being of the population of urbanised areas by meeting their unmet or poorly met needs. One example of this is taking account of the living conditions of TBC applicants when setting transport fares. In this case, the terripreneur can be likened to Hassan Zoual's homo situs (2005).

- The perception of urban public space as a catalyst for the associative phenomenon reinforces the idea of a democratic society by helping to strengthen the ability of terripreneurs to respond to the complexity of their environment. A link can be established between public space and cohesion, despite the tendency of urbanisation to create an increasingly individualistic society.

3.2.   Mbanza-Ngungu space-time through the transport of clan goods

The Mbanza-Ngungu time-space illustrates the breakthrough of the terripreneurship concept by highlighting the shift in social control of the same space at two different times: Mbanza-Ngungu during the day and Mbanza-Ngungu at night. Unlike Mbanza-Ngungu by day, Mbanza-Ngungu by night is the time-space of a set of behaviours on the fringes of the regulations - on the road traffic of transporters - but which, considered collectively, benefit the societies of Mbanza-Ngungu as well as those of Kinshasa. Profiling these landowners shows that their rationality in transporting clan goods stems from the complex relationships they maintain with the Mbanza-Ngungu area.

In the city by day and by night, the terripreneurs are bosses or chauffeur-bosses. This distinction outlines the professional reconversion that results from terripreneurship and its links with the gendered division of labour in the social order.

The owner is the owner of rolling stock who hires a driver - and in some cases a conductor and/or a mechanic - to put it into service. This category, made up of both men and women, has been identified among politicians, pensioners, the self-employed in general, public service employees and companies.

The owner-driver is both the owner of the equipment and its driver. These men were self-employed, employed by an international organisation or had no income before acquiring the rolling stock. This is the

case for farmers, coal miners and mechanics, who acquire rolling stock with their own money or by accumulating hoarded money. Some give up their initial activities to devote themselves to transport. Others make a trade-off between their initial activities and working in transport. On the other hand, young people with no income, still living with their family, who, out of trust, acquire rolling stock from a trader under an unwritten contract. Under this contract, the young person with no income undertakes to pay the purchase price in instalments over a fixed period. Trust is therefore a guarantee of solvency that is independent of the life trajectory of the parties involved, enabling them to "do what they want to do". This type of contract, which lasts only six months, is still common practice for motorbikes, which are one of the components of the daytime city.

In the daytime town, the TBC operates between Mbanza-Ngungu and the surrounding customary lands. In addition, all the offices of the various public services are open 6/7 days. This form of transport, used by both rural and urban dwellers, is also characterised by compliance with the highway code and possession of the minimum documents required to operate. The rural residents live in le coutumier, while the urban residents live in Mbanza-Ngungu. The urban dwellers come from a variety of professional backgrounds, unlike the rural dwellers, who work solely on their land. These TBC players join forces to claim and legitimise the use of a purpose-built car park. It should be noted that the associative phenomenon, without distinction of space-time, makes it possible to standardize the practice of transport.

In the city by night, on the other hand, the TBC runs from Mbanza-Ngungu to Kinshasa. This transport, which takes place when all the public service offices are closed, does not respect the traffic lanes. Some use LED projectors as lighting systems. The drivers are urban dwellers and people from Kinshasa. Living in Mbanza-Ngungu, the urban dwellers come from different professional backgrounds. The people from Kinshasa, on the other hand, are business intermediaries or have been between Mbanza-Ngungu and Kinshasa. Also, some politicians who lived in Mbanza-Ngungu before their mandates. These transport operators join forces to claim exclusive use of a designated oriented car park.

Conclusion

The urbanisation of the town of Mbanza-ngungu is part of a complex dynamic that goes beyond the question of administrative boundaries at the sub-national level of the country. This calls for a shift from territorial policies to policies that can take on inter-territorial dimensions, principally, in our case, metropolitan dimensions.

The urban phenomenon of Mbanza Ngungu makes it possible to reformulate the terms of the definition of urbanisation in the Congolese or even sub-Saharan African context. Firstly, in its ontological dimension, showing that urbanisation goes well beyond the built-up area, but manifests itself through changes in social relations, with the emergence of mobility in everyday life and social diversity, as emphasised by Jean Rémy and Liliane Voyé, and the mobility of capital, with the monetarisation of exchanges, as defined by Polyani.

This plurality of forms also refers back to the notion of urbanisation as a global phenomenon, a concept dear to Brenner and Schmid, perfectly illustrated here by the strong relationship between the urbanised economy of Mbanza Ngungu and the metropolitan dynamic induced by Kinshasa. The location of oriented markets also demonstrates the specific role of the city - understood here as the built-up area - as a place of collective consumption, as emphasised by David Harvey. Finally, urbanisation is a place for the accumulation of capital (Sassen 2016), even if this capital circulates in a different here. And, in the light of Alain Dubresson (1999), agriculture is an integral part of the urban economy, with, as a corollary, the whole chain of related values and services.

Identifying these different dimensions enables us to begin to examine the issue of planning this urbanisation, or in other words, the challenge of internalising the externalities associated with urbanisation (Leloutre 2022), which requires an understanding of the scales and dynamics underlying the transformation of the territory. The medium-sized towns of Central Kongo absorb part of Kinshasa's demographic surplus while

helping to supply it. This is where the morphological dimension comes into play because it is their scale, in direct proximity to the vatas, that enables them to produce a surplus for the metropolis. On the other hand, it is this activity that gives structure to the developing neighbourhoods on the edge of the city, via the oriented markets that are gradually becoming retail markets. This justifies the city's seemingly chaotic structure.

Furthermore, distinguishing the territorial dynamics at work in the city invites us to examine the metropolis from the point of view of the city outside the metropolis. The question remains: how far can the metropolis be analysed through the lens of a medium-sized city?

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Ruralization in urbanization in the Peasant Territories of Southern Mali: everyday life in Ségoukoura, Ségou

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Inhabiting a territory in Southern Mali is a continuum of movement to the rhythm of the world's transformations. In Ségoukoura, in Ségou, Mali (West Africa), this gesture relates to processes of ruralization and urbanization. The peasant perspective allows a counter and decolonial orientation to grasp these specific modes of living. The space of the city is investigated from the practices of everyday life that manifest themselves in artifacts, symbols of a subsistence relationship to the land. The work of life reproduction adapts to the possibilities of the contemporary city by bringing together the perspectives of the rural and the urban and of the global and the local in an open-ended relationship. Ségoukoura thus becomes a tale to interpret the relationship to the world and its transformations through the gesture of living.

Peasant perspectives on inhabiting a territory: a counter/decolonial narrative

For over a century, the inevitable decline of the peasant world has been announced. Yet, beyond the fortress of the old continent, family farming remains the most widespread form of agriculture, producing 80% of the world's food (FAO 2014).

In Mali, West Africa, to speak of peasantry is to refer to culture. This culture defines a way of inhabiting the territory that eludes the laws of the neo-liberal market, especially in its relationship with the land. It is linked to a family economy of subsistence and community, open to commercial production, but whose essential purpose is the reproduction of life and dwelling. Reproduction is understood as the direct and fundamental satisfaction of human needs beyond the mere production of goods (Mies, Bennholdt-Thomsen 1999), based on peculiar interactions between capital, land, labour and knowledge (Van Der Ploeg 2018). Similar to the peasant economy model that the Russian agronomist Chayanof theorized in the 1930s (Chayanof 1966), in Mali, private and individual land ownership struggles to transcend the cities' zones of influence (Bertrand 2021) and the work of the land, which employs the majority of the population, is not waged[1].

The territories between the capital Bamako and the city of Ségou in southern Mali are historically, and still today, among the most densely populated in the region. Here, major transformation processes are underway: the population growth, the quickened development of Bamako, as well as the increase in motorization, match the widespread availability of mobile communication networks and solar energy. Despite these signs of apparent homologation, it is not possible to compare the emerging settlement forms with the 'megacities region under construction' that one can find in the nearby Gulf of Guinea (Choplin and Hertzog 2020). In the area between Bamako and Ségou, as well as in the rest of the Sahelian hinterland, the expansion of a few large cities inserts itself into a pattern of territorial settlements linked to the peasant villages that stud the flatlands [fig.1].

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[1] In 2017, 29.9% of the 'urban' working population were employed, compared to 5.1% of the 'rural' working population. In 2017, Mali had 18.786.996 inhabitants of which 74.8% are considered to belong to the rural *milieu* (INSTAT, 2017).
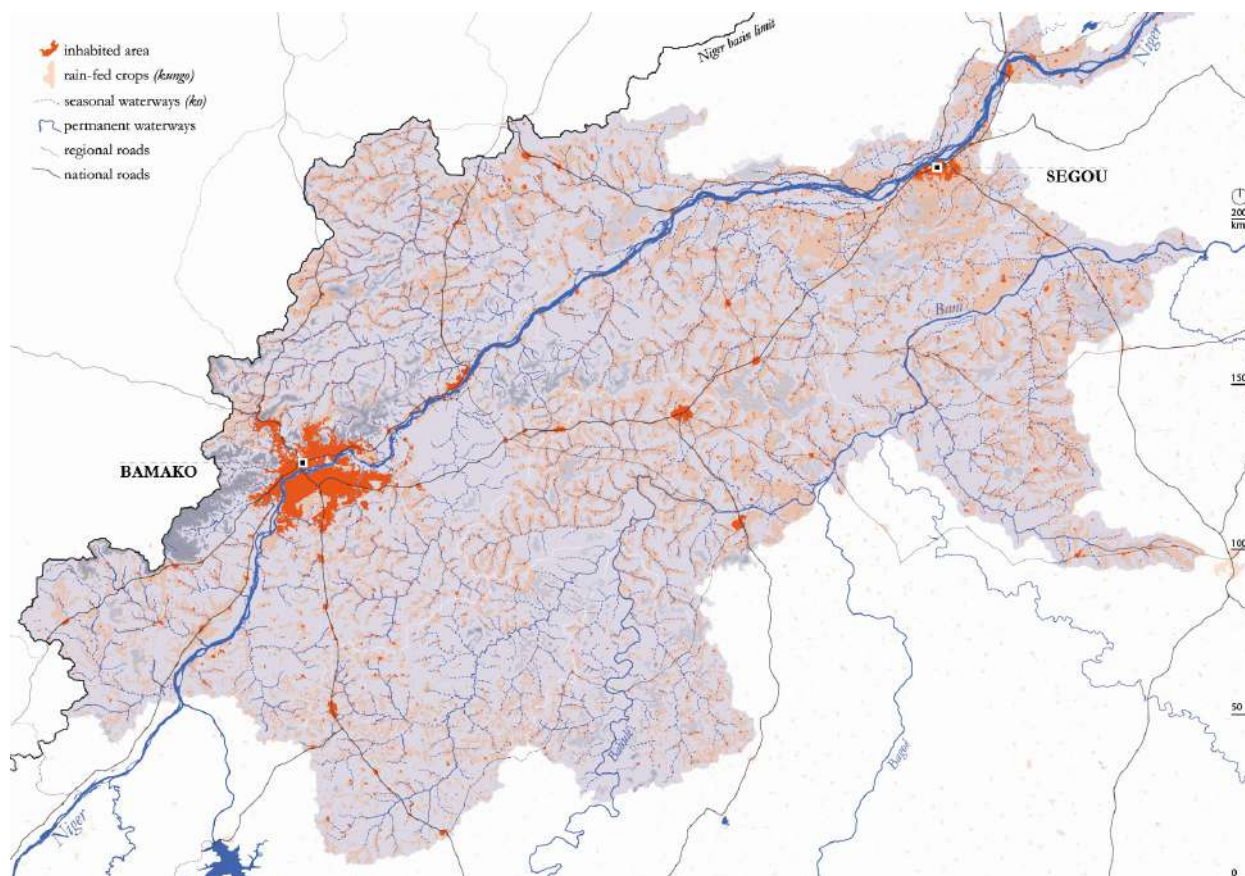
[fig.1] Map of agricultural land use, hydrography, roads and settlements in the main waterways' basins between Bamako and Ségou. Source: elaborated by the author.

Along the national road that links the cities of Bamako and Ségou, peasant villages (*dougou*) alternate with pluvial cultivations, grazing, hunting and harvesting areas (*kungo*) and slight depressions of the ground where rainwater is collected (*kɔ*). The village (*dougou*) keeps a certain level of autonomy, particularly in terms of food production, and it represents the economic and social unit that weaves the net of local geographies together along the paths of the seasonal impluvium waterways (*kɔ*). There, the water table is closer to ground level and the waterways' shores are suitable for cereal cultivation (Benjaminsen 2002).

In West Africa (as in other parts of the African continent), to name peasant culture means first of all to recognize its existence and the way it defines specific 'territorial figures'[2], images of the spatial-ecological frames in which living is immersed. On a more general level, taking a peasant perspective means looking at ongoing transformation processes holistically, without sectorising the different aspects of living. As Maria Mies explains, commenting on her work 'The Subsistence Perspective' (1999) from which this article is directly inspired: "We aren't speaking of a subsistence economy, but of a subsistence perspective. That is to say, it's not an economic model, but rather, a new orientation, a new way of looking at the economy. That means something entirely different. It doesn't just apply to the economy, but also to society, culture, history, and all other possible areas" (2005).

In the second two decades of the 21st century, assuming a peasant perspective means referring to social movements such as 'La Via Campesina' defined by some authors as 'new ontological politics', "la cui posta in gioco classica, quella relativa alla questione della produzione e della distribuzione della ricchezza sociale, si articola con la possibilità di produrre una differente natura storica" (Avallone, 2015, p.23). This also echoes 'critical agrarian studies' which are "simultaneously a tradition of research, thought and political action, an institutionalized academic field, and an informal network" (Edelman, Wolford, 2017, p.962). Like LVC (La Via Campesina), they position themselves as "politically engaged, pluralist and internationalist" (Borras, 2023, p.476).

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[2] By territorial figures we mean the conceptual representations that interpret the conditions of the existing in relation to the structuring elements of the territory with reference to Paola Viganò reflection on the tools of the project as a "forma specifica di interrogazione della realtà" (Viganò 2010).

If we look at inhabiting a territory in West Africa from a peasant perspective, we recognize a space made up of interweavings and knots of different nature in which the fundamental dualisms are articulated around "de ce qui est ouvert et de ce qui est fermé, de ce qui est visible et de ce qui est invisible, de la vulnérabilité et de la durabilité" (Mbembe, 2023, p.43)[3]. In this context, discussing rurality and urbanity acquires a relative value. In a pluralist perspective, or rather of pluriverse, "les cultures de notre époque vivent plusieurs temps different mais en subissant les mêmes transformations, les mêmes influences" (Glissant, 1990, p.83). This means questioning the assumption of overcoming the opposition between urban and rural "by the extension of urbanism to the entire territory" (Corboz, 1983, p.15) as a consequence of the disappearance of the peasantry as such (Corboz 1998) and the percolation of market laws into every aspect of life, of the *vivant*.

This article proposes a peasant perspective to reflect on settlement transformation processes in Southern Mali. The neighbourhood of Ségoukoura in the city of Ségou is considered a case study. The space of the city is investigated from the practices of everyday life because these represent the main terrain of social change (Federici 2018). The 'southern urban theory' has expressed on several occasions the need to examine the practices and imaginaries of the everyday with reference to the 'hyper generative dimension of daily life' (Pieterse 2009; Mbembe, Nuttall 2004; Simone 2004). "Daily life, like language, contains manifest forms and deep structures that are implicit in its operations, yet concealed in and through them" (Lefebvre, 2005, p.2). When considered from a peasant perspective, this language is, in the first place, an ecology, where ecology is understood as the place of coexistence made up of many opaque membranes that protect what's different and make relationships work (Glissant 1990). These relationships define "a space of flows, of flux, of translocation, with multiple nexuses of entry and exit points" (Mbembe, Nuttall, 2004, p.351). On the other hand, if we consider the territory as the horizon of reference (Corboz, 1983), these relationships appear as well anchored to the soil towards which they turn a fundamental form of dependency for the purpose of subsistence.

The artifacts of everyday life: symbols, spaces and land

Ségou is a city on the right bank of the Niger River about 200 km north of the capital Bamako. The city has seen its population grow exponentially over the past thirty years. The latest available official population figure is 135.000 (INSTAT, 2009), compared to 90.000 in the late 1980s (INSTAT, 1987).

Ségou is a historical city: it was the capital of the Bambara kingdom of Ségou until 1861, when El Hadji Oumar Tall[4] conquered it. At that time, Ségou was a 'multiple capital' (Sow 2021) made up of four villages, the four Ségou: Ségoukoro (*koro*, old), Ségoubougou (*bougou*, hamlet), Ségoukoura (*koura*, new) and Ségoushikoro (*shi koro*, the old shea tree). When French settlers arrived, a town centre was defined at the village of Ségoushikoro and the settlement lost its historical multipolar feature. Since that time, the city began to expand in a radial manner. Today, Old Ségoushikoro is the commercial centre of the city with its baked brick colonial buildings, the harbour and the light installations of the large weekly market (*sougouba).*

Ségoukoura contains three settlement fabrics. The oldest is the village of Ségoukoura, which dates back to around 1750. It has maintained its original morphology defined by a density of dwellings shaped by courtyard clusters with a variable, non-orthogonal geometry. In Sègoukoura, as in other city villages, people continue to build above the same wall layouts. Sometimes they use concrete blocks instead of traditional mud bricks, but they preserve the salient heritage features in terms of typology and morphology.

There is only one plot whose walls do not border the others. This is the Bouarè family's house. The Somono, the fishermen, live in the northern part, and the Bambara, originally farmers, in the southern part. There is no clear delimitation, but, even today, there are two *dougoutiki* (village chiefs), one on each side. The Bouaré family is one of the two families, together with the Coulibaly,

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[3] In 'La communauté terrestre' (2023) Achille Mbembe refers to the Bambara culture. The Bambara are peasants who speak the language of the same name and inhabit the study territories between Bamako and Ségou. Mbembe considers their culture as one of 'l'Afrique ancienne', forgetting, perhaps, that Bambara peasants still inhabit this world.

[4] El Hadji Oumar Tall from the Fouta Toro region in present-day Sénégal started a jihad towards the Mandinka and Bambara regions around 1850. He went as far as the conquest of the Islamic kingdom of Macina in today's Mopti region in Mali. The Toucouleur Empire he ruled resisted until the French occupation in 1893.

who has access to the social role of Bambara *dougoutiki*. Madou Bouaré from the large Bouaré family (*douba, dou*-family *ba*-big) kindly opened the doors of his home and guided us through the walls, symbols and objects of his daily life.

In the Bouaré courtyard, there are four *gwaw*, housing units consisting of bedrooms in which three of the Bouaré brothers live with their wives and children as well as a widowed sister. They are all built in *banco*, mud bricks, with cement plaster and a sheet metal roof; apart from Madou's house, which has mud plaster and a wooden structure roof covered with straw and earth. There is also an imposing concrete block building. However, the building is uninhabited and its construction is financed by a brother who lives in Bamako. There are also three sheds for a dozen sheep, a pigeon house, a ruined building inhabited by rabbits, and three outdoor toilets. To enter the courtyard, one must pass through a vestibule. Next to the rooms occupied by Madou together with his two wives and children, there is a large vestibule made of concrete blocks. This is the place where the village council meets to discuss issues affecting the community together with the *dougoutiki*. At the corner of the boundary wall stands another one, reserved for women on ceremonial days.

Bricks, wooden planks, scrap metal, and other useful materials are arranged in different corners of the courtyard. Roofless mud buildings are left to become piles of sand, while animals roam around. Everything is subject to possible change, apart from the two vestibules and the new building, a symbol of recent wealth [fig.2].

[fig.2] In the Bouré *douba* courtyard, Ségoukoura village, January 2022. Source: photo by the author.

In the centre of the courtyard is the well where all the *gwaw* (households) draw water. Three concrete bricks, or three laterite stones, symbolize the place where the fire is lit for cooking. Nearby is always a mortar and *calebasse* or recycled plastic bowls.

The house of the Guindo family, meanwhile, is part of the settlement fabric of Ségoukoura résidentiel. This area is called *billiontiki* (one who has billions) by locals because the plots are the most expensive in the city. They are designed according to a late 1970s plots plan that included 1200 m² plots, 12 m wide roads, and 2400 m² public spaces at a distance of 200 m. The plan provided for the cadastral subdivision of the land and connection to the water and electricity network. However, it did not include the installation of sewage infrastructure or paved roads.

Today, the majority of the population consists of families who live as caretakers in empty houses or on not yet built land. The owners hold the land titles for speculative purposes and, apart from the Europeans who left a few years ago, it remains difficult for locals to rent the available houses.

Chaka Guindo immigrated with his wife to Ségou from the *Pays Dogon* about ten years ago. After several moves, he ended up in Ségoukoura and now lives on one of these large plots of land. Together with his wife and three children, he occupies an enclosed space of 12 m² made of concrete blocks and a sheet metal roof. He built a terraced space at the front covered with *karatà*, the straw with long intertwined stems. Spinach, grapevines and a few flowers grow on the branches supporting the terrace roof. Next to it, an enclosure for sheep and rabbits, and around it a few fruit trees and aromatic plants. Under the *karatà* roof, there are wood stove, bowls, a mortar and water jerry cans filled from the well on the other side of the courtyard. In the corner, a television connected to a satellite dish and powered by solar energy.

Chaka learned to farm with his family in a Dogon village. He has a precise knowledge of reproduction and fertility methods. Unlike most Bambara gardeners in Ségou, he does not use any kind of pesticide and prefers his own seeds. Chaka spends most of his time working in the garden of his house. Since he received the money to buy two solar panels and a pump from his previous employer, at least 600 m² of the courtyard are cultivated all year round [fig.3]. The family is self-sufficient in food, except for cereals, such as rice and millet, which are bought with the sale of garden products and with the income from Chaka's occasional work.

[fig.3] In the Guindo family garden during the rainy season, Ségoukoura résidentiel, August 2022. Source: photo by the author.

In front of the front door stands a heap of dry leaves, branches and *gnama*, rubbish that Chaka waters down to make *nogo* (compost). Chaka also collects *nogo* in the public space next to his house. This is where the neighbours often deposit their rubbish and animals come to ruminate and defecate. Chaka prunes the trees in the public space before and after the rainy season and stores the wood for cooking. He uses the soil in the public space in front of his house to grow *shɔ* (beans) or *tiga* (peanuts) during the rainy season.

Sacks of onions grown all year round and potatoes, peanuts, maize and beans grown during the rainy season hang in the terrace. In October 2022, Chaka harvested 50 kg of beans of which he saved the seeds and sold the leaves as fodder, a meagre harvest of maize and potatoes, and 150 kg of peanuts of which he sold 50 kg and saved 20 kg as seed for the following season.

The Guindo family's garden changes throughout the year: plants grow and die, wood piled up dries, is burnt or becomes compost. New light constructions are set up and removed. The family home itself is in obligatory change: it may have to be left free from one day to the next if the owner asks for it. Every form of life in its various stages contributes to the reproduction of living without distinction between the decorative and the utilitarian: instruments of distant manufacture are juxtaposed with those of ancient model forms.

Ségoukoura is crossed by a paved road. South of the road, on the opposite side of the river, Bagadadji was built in the early 1970s. The name is derived from Bagdad. Like the neighbourhoods of Medine, Missira, Hamdallaye, and Dar Salam, it alludes to Arab-Muslim culture. The Bagadadji plotting was planned to relocate the inhabitants of the village of Ségoukoura, whose houses had suffered severe damage following an extraordinary flood that has remained in the collective memory without a precise date. Lots of 625 m² surrounded by 12 m wide orthogonal roads and public spaces of 3.600 m² were allocated to families. However, the large families (*douba*) remained in the old village: only a few family units (*gwa*) moved and some land was sold. A few years later, part of the plots were assigned to military officers.

Near the public space, where the daily market attended by the whole of Ségoukoura is located, sits the home of the Djire family. The Djire family living there consists of five *gwaw*, all members of the same Somono family from the village of Ségoukoura. In the village by the river, there is still the court of the *douba*, where Bagadadji's Djires go for celebrations or other purposes. Vieux Djire today works as a tailor and his workshop is located in one of the buildings in the plot. Together with his younger brother, he runs the business with seven electric sewing machines. In front of the entrance, there is a covered and enclosed terrace where customers wait their turn. Near the door, a jar is filled with water for passers-by.

Between 2019 and 2022, the years in which the surveys were conducted, the courtyard changed considerably. New lemon and guava trees were planted and the old papaya tree was replaced by new ones. The wood stacked in a corner was used to build a roof with *karatà*. Where there used to be a sheepfold, a concrete block warehouse has been built. The sheep are still there and when they are not left to graze in the street, they rest in front of the pigeon house [fig.4]. The five *gwaw* use a common outdoor toilet. A well is located in front of the shared kitchen-storeroom, where other building materials, including many mud bricks, are gathered. The fodder for the sheep is stored on top of the warehouse roofs. The Djires retrieve it from relatives in the old village, who are still fishermen and use pirogues to cross the river and collect straw on the opposite bank.

[fig.4] In the Djire family courtyard, Bagadadji, December 2021. Source: photo by the author.

In Bagadadji's house, there are no *daba*, the tools for hoeing, nor stocks of beans or peanuts. One does not cook with wood as the Bourés and Guindos do but with coal bought in the neighbourhood. There are no vestibules. Access to the courtyard is between mud-brick rooms with cement plaster and a sheet metal roof. The gestures of drinking and fetching water from the well, eating from a shared plate while sitting on a low stand, cooking with the back bent over a *daga* (pot) at the fire of a low cooker, filling the plastic teapot to go to the outdoor toilet: all this is linked to a way of living defined by movements shaped under new influences, yet reliant on an ecology defined by the balances between the land, the source of all that is living, space, where "le vivent se compose sur la base d'un potentiel de variabilité, d'élasticité et de plasticité chaque fois changeant" (Mbembe, 2023, p.42), and artifacts which, like symbols, are "ustensiles de la vie..leur role [est] d'aider les humain à établir un pont entre leur propre 'réfection' et la réfection du monde" (Mbembe, 2023, p.23), in other words, to inhabit.

Peasants without barns or a city of women
Along the road that separates Bagadadji from the village of Ségoukoura and Ségoukoura Residentiel, a wide range of activities take place. In the transect corresponding to the residential area, the road has an average width of 35 m. The two paved traffic lanes are approximately 6 m wide, bordered in several places by slight depressions in the ground where rainwater collects. Household waste (organic waste mixed with plastic bags) is deposited here, animals graze the grasses and shrubs that grow, and what remains is collected as brushwood to light the cooking fire.
Along the road, a large public space of about 30.000 m² separates the residential area and the village. This space is occupied by a *grabal*, a livestock market where wood, coal and fodder are also sold, and a station for *katakatani*, two-wheeled public transport vehicles with trailers. The population density in the village is higher than in the residential area. The width of the road reduces to about 20 m and the numerous activities leave no space for buffer zones.
Craft and commercial activities are the same, but their frequency is different. There are activities carried out in segments of courtyard dwellings with extensions on the street by means of sheet metal or *karatà* shelters. These include handicraft activities such as welders, mechanics, carpenters, tailors, cobblers and barbers; commercial activities such as hardware shops, stationers, electronics

shops, second-hand clothes shops, plastic tool shops and grocery shops with basic consumer goods. There are also two bakeries and a pharmacy.

The remaining activities are carried out on public ground using sheet metal kiosks, *karatà* or sheet metal canopies, or a simple stall. These activities follow a variable timetable to meet neighbourhood needs. They mostly sell fresh vegetables that come from the gardens along the Niger River cultivated by village families. At break times, these are supplemented with products bought at the market, products that may come from the villages surrounding Ségou or from Europe. This is the case with onions and potatoes, which for a considerable part of the year are imported from Holland by multinational companies like Dacomex. The other stalls sell daily rations of basic necessities such as powdered milk, sugar, loose cigarettes, bags of Lipton or Chinese green tea, single-dose packets of Nestlé Nescafé, Maggi cubes, single-dose bags of soap powder, soap bars or loose nappies. Along the way, bulk gasoline is sold in recycled glass bottles [fig.5].

[fig.5] Flows and living around the *goudron* in Ségoukoura Source: elaborated by the author.

The *goudron*, the street of Ségoukoura, appears as the variegated and fluid space of what Abdoumaliq Simone calls 'popular economies' (2019). "'Popular economies' refers to the variegated, promiscuous forms of organising the production of things, their repair, distribution, use, as well as the provision of social reproduction services that simultaneous fall inside and outside the ambit of formal capitalist production" (Simone, 2009, p.618). The logics and the time that define them are baroque, mottled (Gago 2018), and in their action ground "the 'neoliberal reason' (a supposed norm of pure mercantile calculus) is appropriated, ruined, transformed and relaunched by those who are supposed to be only its victims" (Gago, 2018, p.31).

Plastic packaging waste at the roadside emphasizes "the integration of households into new networks of capitalist production" (Coquery-Vidrovitch, 1991, p.73). Everyday approaches to global market rules reveal how trade and craft are defined by the sharing of needs on a neighbourhood scale, the needs of oneself and one's *sighignogow* (neighbours, literally those who sit together). Where the sharing of practices and spaces is no longer possible as extensively as in spread-out villages, interactions accelerate and the dimension of the everyday acquires a reference value.

The satisfaction of the neighbourhood's needs interacts with the flows of the street. This intersection displays "the ability of residents to engage complex combinations of objects, spaces,

persons, and practices" and how "these conjunctions become an infrastructure - a platform providing for and reproducing life in the city" (Simone, 2004, pp.407-408). At Ségoukoura, it is not only these conjunctions that are involved in the process of reproduction, the foundation of daily life. This process comprehends the set of activities that reproduce life and the ability to work day after day. For the most part, it is performed by women (Federici 2018). "Le femministe hanno dimostrato che la vita quotidiana non è un complesso generico di eventi, atteggiamenti ed esperienze in cerca di un ordine. È una realtà strutturata, organizzata attorno a un processo specifico di produzione, la produzione di essere umani, e il suo epicentro il lavoro domestico e i rapporti di genere" (Federici, 2018, p.159).

The rhythms and necessity of the reproduction of everyday life shape the space and time of the city. Beyond the flexibility and unpredictability of exchange opportunities, women's work anchors the city to the soil, the movements of the sun, and the flow of the seasons. It is guided by a peasant language. The act of eating, for example, is not fixed by conventional timetables, but rather by the cooking rhythms of unprocessed and unpackaged ingredients available in open-air shops at certain times of the day. In Ségou, a town of more than 150.000 inhabitants, there are no supermarkets: shared temporal and spatial references guarantee the sustenance of the *gwaw* (households) with the least possible energy expenditure.

Women in Ségoukoura cook in the *daga*, the recycled aluminium pots with convex bottom, as their sisters do in the villages. They lower their backs in the same way so as not to burn their eyes with the smoke from the fire. They shake the *calebasse* with firm movements to leap out rice or bean peels. They spin a small *calebasse* inside a larger one to wash the rice. As Achille Mbembe notes, writing about traditional Bambara culture, "savoir-faire et objets étaient considérés comme des gages de vie", within the manner of "faire monde en se mouvant et en résonance avec les forces du vivant" (Mbembe, 2023, p.45). In the concreteness of these gestures, which are by no means trivial, present and daily needs intersect with a peasant temporality traceable in the signs of its territorial spatiality.

Reliance on everyday life implies a necessary relationship between the space of reproductive work and sociality. The domestic space where women cook for several hours is separated from the street, but not isolated from hearing and sight. To buy fresh or dried ingredients, each morning the women of Ségoukoura go to the market in Bagadadji and spend their *prix de condiments* there. In the morning they wash their clothes at the river or with tap water and often leave them to dry on the ground: the midday sun will soon dry them [fig.6]. They go to the neighbourhood mill to grind millet or maize and can look for some products in the grocery shop no more than 100 m away; or, they can buy from the street vendors who stop in their yard. They often engage in punctual trading activities, such as selling food at certain times of the day prepared in roadside stalls near their homes.

[fig.6] Morning laundry and gardens along the Niger in Sébougou, Ségou, December 2021. Source: photo by the author.

In general, space is divided into degrees of openness towards the outside or protection towards the inside. From the bedroom, an intimate and inaccessible space, one quickly advances to the living room or terrace, the courtyard, the street in front of the house, and the paved road. Women move between these spaces punctually and conscientiously according to a map of the resources they have access to through pre-established relationships. One example is women's accessibility to medicinal plants, regardless of whether they are planted along the road or in a courtyard. Domestic space does not define a separation since, according to the peasant perspective, every activity intended for reproduction is work: through work, I inhabit the territory and relate to what is life.

Public space, that is, everything that is not part of the domestic space, is called *foroba*. *Foro* is the cultivated field, *ba* means big. In the peasant territories of southern Mali, *foroba* are the fields of extensive rain-fed cereal cultivation. The *foroba* are collective family fields managed according to the social customs of the village. They are not enclosed: the *douba* families have the right to cultivate in certain areas, but the fields are accessible to different actors depending on the season. The land traditionally belongs to the spirits of the subsoil and not to those who step on it.

Ségoukoura *foroba* is, beyond the goudron line, a permeable soil. There are paved zones, but bare soil is continuity. Most grey water is drained from outside toilets into open ditches on the street. During the rainy season, the passage of vehicles digs up areas where water stagnates, creating traffic problems and the multiplication of mosquitoes. As everywhere in the city, the 12 m wide unpaved roads that cross Ségoukoura do not respond to urban decorum. This is reserved only for a few paved roads. Rather, the dirt streets reveal the intimacy of domestic and neighbourhood reproductive cycles[fig.7]. The city's *foroba* changes over time: in addition to the different activities that punctually occupy it, the transit flow changes course after each rainy season. In less densely populated areas such as Ségoukoura Residentiel, flocks graze and, during the rainy season, *tiga* (peanuts), *shɔ* (beans), *gombo* (okra) or *da* (hibiscus) are cultivated. Preference is given to low plants over cereals grown in village *foroba* because, as Madou Coulibaly explains, in the city it is not recommended: someone could hide among the stems.

[fig.7] Three sisters on the roads of Bagadadji, January 2020. Source: photo by the author.

Ruralization in urbanization in Southern Mali: spaces of possibility

Abdoumaliq Simone devoted much of his thinking to placing African cities in the world. "The 'worlding' is more than simply a state of being 'cast out' into the world as the 'homeless' or the marginal. Granted, there is little autonomy African societies can currently exercise in terms of ensuring a sufficiency of resources and participation in international economic transactions. Yet, African cities continue to be places of experimentation for engagement, the terms of which are not exclusively fixed or determined in advance" (Simone, 2001, p.22). People's effort would be to create a plurality of alliances and opportunities to relate the everyday, local dimension with an 'elsewhere' that retains a sense of 'open-endedness' (Simone 2001). In this gesture, the inside, as opposed to the outside, acquires, according to Simone, a symbolic and spiritual dimension and configures "geographies that are off the 'map'" (2001, p.25), as described by Filip De Boeck in his tales of Kinshasa (2014).

For Achille Mbembe, the encounter between local and global assumes, in turn, the figure of the interweaving: "la conscience de cette imbrication de l'ici et de l'ailleurs, la présence de l'ailleurs dans l'ici et vice versa, cette relativisation des racines et des appartenances primaires et cette manière d'embrasser, en toute connaissance de cause, l'étrange, l'étranger et le lointain.. de domestiquer l'in-familier, de travailler avec ce qui a tout l'air des contraires - c'est cette sensibilité culturelle, historique et esthétique qu'indique bien le terme 'afropolitanisme'" (2010, pp.180-181). For the philosopher, Johannesburg is the most manifest laboratory of *la façon d'être monde* of African cities (2010), and 'afropolitanism' a poetics of the world forged at "l'interface de l'autochtonie et du cosmopolitisme" (2000, p.16). Mbembe is bringing his broader reflection 'À propos des écritures africaines de soi' (2000) into the city's spaces. A tradition of reflection on 'identity' in its double political and cultural dimension that finds its roots in the brutal encounter of slavery and colonialism. 'Identity' is here critically confronted with the idea of 'universal' and then of humanity. Ségoukoura is a very different place from the inner-city Johannesburg portrayed by Simone (2004) or the cosmopolitan capital Mbembe refers to (2010). Ségoukoura in Ségou, on the banks of the Niger River, is the place where "les représentations africaines de soi" (Mbembe, 2000, p.16) are

forged at the interface between the forest lushness on one side and the desert sands on the other. It faces the river that unites and flows to the distant Atlantic Ocean shores. It is a land of the Sahel, in other words, a place where the "pensée de l'enchevêtrement et de la concatenation" (Mbembe, 2010, p.66) is above all an aspiration of the peasant populations that inhabit it. Aware, like any other, that "n'existe pas d'alternative à la modernité", their "travail pour l'universel" (Mbembe, 2010, p.28) consists in materially creating spaces where processes of ruralization meet those of urbanisation. Ruralization can be understood as "the processual, more-than-residual, and geographically-variegated socio-spatial dynamics of contemporary human engagements with rural land, livelihoods, and lifestyles" (Gillen, Bunnell, Rigg, 2022, p.3). This intersects with the construction of the *dugouba* (city, literally large village), "a complex, multifaceted and sometimes contradictory process" (Murray, Meyers, 2006, p.3) in which the diversification of labour and the extension of housing density lead to intensive exchange relationships, as in the paved road of Ségoukoura.

Yet it does not happen as 'hybridization'. Glissant himself distinguished 'hybridization', the calculated outcome of a process, from the 'creole' encounter whose results are always different and unexpected (1990). It does happen in a way that leaves a constant possibility of encounter.

Terry McGee's seminal work in Southeast Asia highlighted how settlement transformation processes in the 'Third World' could follow a different itinerary to the Western model (1971). At the time when the city-territory debate was consolidating in Europe and North America as an actual extension of the urban, McGee framed the term *desakota* (*desa*-village, *kota*-city) to describe the spatial and morphological intertwining of urban and rural in the city development regions of South East Asia (1991). However, McGee's most significant contribution may have been to recognize ruralization as a process and its role in the transformations of living. In his early studies on rural-urban migration, McGee investigates social processes, rather than spatial and morphological patterns, and asks the question "how can this factor of 'ruralization' of the cities be incorporated into the typology of urban model?", since "when a city...has a high number of features which are characteristically rural...this does not mean that the features of an urban style are affected, but it does mean that any static model of urbanism must be changed" (1971, pp.55-56). Fifty years later, while the 'extended metropolis' of Southeast Asia is still being investigated, debate continues on new analytical frameworks to bridge the gap between urban and rural studies (Ghosh 2017; Gururani 2020; Roy 2016).

In the African context, the city-territory debate has contributed to the definition of a new scale of study (Dorier-Apprill, Domingo, 2004). This has been particularly focused on the peri-urban, where the dilution and spread of settlements lead to a blurred distinction between urban and rural in terms of space occupation and land management (Buire 2014; Jaglin, Didier, Dubresson 2018; Sawyer 2014). In particular, the multipolar character of urban expansion has emerged in different parts of the continent (Denis 2015) challenging a simple core-periphery binary (Pieterse 2019). However, a question still remains between the images of an 'Africa's urban revolution' (Pieterse, Parnell 2014) and the problematic nature of translating locally an urban-centred thought on the city.

In 'The Ruralization of the World', Krause proposes an alternative to the "intellectual imperialism of the urban" (2013, p.234). According to Krause, "only when we ruralize the way we think, can we fully disaggregate the different distinctions that have been subsumed under the categories of urban and rural, and think about the different ways they can be put together in forms of social settlement. Only from this perspective can we examine the different ways they are put together again as part of contemporary socio-spatial transformations" (2013, p.234). Studies such as those by Gillen, Bunnell and Rigg echo this position (2022). Inspired by McGee, their work on/from the Global South seeks to form "new dialogues and ways of thinking in human geography" (2022, p.14). They argue that from this placement "ruralization takes the rural-urban binary not as a set of oppositional categories but a relationality" (2022, p.13).

Ségoukoura in Ségou contributes to the discussion by emphasizing that the subsistence of reproductive labour linked to peasant practices is a necessary condition for this relationship, this potentially unfinished encounter, to be possible. These relate to the urban and the rural, as they relate to the local and the global, to what is open and what is closed, to what is visible and what is invisible; as they relate to an idea of identity and humanity: they take different forms shaped by the possibilities of the contemporary world. The four perspectives of the urban and the rural, the global

and the local meet here in a radical and original way, disrupting the analogies between globalisation, depeasantization and capitalism.

Present-day peasant practices hold a clearly structuring role at the scale of southern Malian territories (Pietrobon 2021). Ségoukoura in Ségou suggests that they could fulfil this role at the scale of the city too. The peasant perspective allows us to consider these spaces of possibility and encounter as tools for the construction of a prosperous and decolonial future.

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Critically Mapping the Micropolitics of Varying Notions to Land in Alshigelab (Janoob Al Hizam)

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Where the urban and rural meet in settlements such as Alshigeilab, arise varying notions of land and ways to govern it. A once agropastoral village situated on the riverbank of the White Nile south of Khartoum, Alshigelab had been subjected to the Village planning and Incorporation schemes administered by the Sudanese Land Department in the late 1980s. Although the department's objective of "bringing the village into the urban" could be seen in widened roads and formalized tenureship documents for some, what has risen in the aftermath of these schemes is a more complex hybrid of dynamics that speak to the relations fostered between inhabitants and the lands they inhabit. Through a series of mapping workshops conducted with local organizations and community members, the paper aims to investigate how overlapping claims have transformed customarily owned agricultural land along the riverbanks into densely populated settlements and the spatially manifested social contestations that have risen because of it. By doing so, the paper offers a critique to these schemes four decades later, foregrounding not only the contestations, but the networks of solidarity that have been shaped in the interstices of state-led positions. As such, it contests the dominant view of the peri-urban landscape as a site "awaiting to become urban", but as a territory where resistance and solidarity are re-shaping what constitutes the urban.

On Land

Oftentimes, discourse around land in urban areas is associated with municipal legal frameworks of tenureship that at a minimum constitute who owns it, plot sizes and regulations on how buildings are to be constructed on it. However, these universalized standards (which surely differ from one urban area to another) leave little room to understand and take into consideration the multiplicity of meanings attributed to land by its various inhabitants. This discrepancy comes into particular attention where the urban and rural meet, a dichotomous relation that many urban and geography scholars have strived to un-dichotomize. In the context of Khartoum, the capital of Sudan, this relationship between the urban and rural may be read through the lens of land and the various notions attributed to it by the populations inhabiting the region south of Khartoum. As shown in the quote above, to many, the notion of *ard* goes beyond legal frameworks. It brings to the surface attributes of generational history, legacies, culture, and belonging, transcending the ownership of a single plot, to the stewardship of what lies beyond it. However, these varying attributes do not exist independent of one another, but rather they overlap to create complex inhabited landscapes that are in constant tension, giving rise to different ways in which the *ard* is inhabited, taken care of, and governed. They exist in a state of in-betweenness, as framed by Franck et al. (2021), whereby, in a context of rapid urbanisation such as Khartoum, "the question of belonging and otherness" emerges from "the issue of access to land".

Through a series of fieldwork visits to Alshigelab in the summer of 2021 and a critical mapping workshop held with the youth of the settlement conducted in January to March of 2023, the idea of land and how it is governed appeared to be central to the settlement's varying community formations and disputes. In this paper, three of these notions will be highlighted, situating them within a broader network of actors and overlapping ideas of land and governance that surfaced.

Collective Critical Mapping as a Methodology

Between January and March 2023, the Mapping to Action Training Workshop [1] was organized, primarily focusing on capacity building and community empowerment in Alshigelab. It was initiated as a response to the momentum of its youth-led neighborhood resistance committees (NRC) who

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[1] Find out more on the Mapping to Action training programme on the project website here - http://mappingtoaction.com/

have proactively engaged with local and international organizations to facilitate a variety of projects for their neighborhood over the last 3 years. These focused on medical training, better NRC organization and securing aid for families impacted by the unprecedented floods of 2020, filling in the void left by the government for immediate action. This particular call evoked the need to better understand the complexities of overlapping land uses that are central to Alshigelab's internal disputes and communal formations. It is for this reason that the program offered an introduction to critical mapping through a series of lectures and action-based fieldwork. The research draws from Iconoclassistas' (est. 2006) practice of critical mapping as a collective methodology that seeks to critically draw out networks of influence on space relationally.

Through the program, we worked *with* community members to draw out past and present lived experiences, policies, landscape, and spatial logics, layering them to better understand their influences on one another. The collective consisted of a team of organizers, trainers, researchers, and community facilitators, working with 45 participants (28 young active inhabitants of Alshigelab and 17 young researchers and local organization members from the broader Khartoum region). Participants worked in guided groups of four under the collectively deduced themes of (a) Coexisting with floods in Alshigelab, (b) Natural resources of Alshigelab between the past and present, (c) Health reality in Alshigelab, and (d) Multiplicity of public spaces in Alshigelab, offering a series of co-constructed maps that foregrounded multiple layers shaping the settlement. This training in critical mapping required a continuous process of deconstructing the idea of the map; what it looks like, who can make it, and what information it has the potential to hold. Its role continuously shifted between a tool for dialogue and a medium of representation. Although it was made clear to us early on that asking about land ownership was off limits, a complex topic too sensitive to be explicitly addressed, it implicitly surfaced amidst discussions in all four themes, entangled with layers of healthcare, public use, and climate-driven ecological transformations.

Overlapping notions of land & emerging networks of solidarity

Source: author as interpreted from fieldwork in Alshigelab in July-August 2021

Alshigelab

Alshigelab, a settlement that exists on the eastern riverbank of the White Nile south of Khartoum, is an example of where overlapping notions of land have come into fruition since the introduction of the "Village Incorporation and Planning Schemes" introduced by the Ministry of Planning in the early 1990s. Where the settlement now exists as a collection of seven neighborhoods, sat three agropastoral villages, spread across the landscape, and inhabited by descendants of the Hassaniya family and ethnic group. The three villages became the cores from which the newly formed neighborhoods grew, expanding eastwards towards *Shari' Al Jabal* (Al Jabal Road), that connects

northwards to Khartoum's city center, and southwards to the Gezira state. The paper uses the following three narratives to understand the micro-politics of land in this settlement through the varying forms of relations old and new inhabitants, as well as civil servant workers from the land department, have attributed to it.

From stewardship to ownership in an urbanizing context

The Village Incorporation & Planning scheme implemented in Alshigelab in the early 1970s had two main objectives as indicated by the Ministry of Planning; to 'bring the village into the urban' by introducing electricity and water lines into the village which entailed a tradeoff reducing the size of inhabited areas to widen roads and assigning title deeds (shahadat bahth) to these inhabited areas, documenting their size and demarcating them into plots; to replan the spaces between villages which were in the past customarily owned grazing lands for cattle. As the influx of people rose into Khartoum due to political unrest in other parts of the country in the 1970s, 80s and early 2000s, these spaces were sold by the Hassaniya through *hiyaza,* a tenureship form which constituted a personal exchange between old inhabitants and newcomers, on the way towards receiving full legal tenureship. An interview with a resident of the Al Khor neighborhood in 2021, one of the village cores that was expanded, highlighted that although he had bought his plot in the early 1990s through hiyaza, he is still struggling to attain full ownership of the plot to this day. The process of "formalizing" land ownership through state-led understandings of land in a context where land had been customarily owned for a century before, lay the groundwork for a complex morphological transformation of the urban/rural in this area, creating social tensions between those considered asyad al ard (stewards of the land) and ghuraba (foreigners). For some, the ownership of this land is a legacy, for others, a way to legitimize their presence in Khartoum, and for both, a sense of security against forceful evictions in the face of a city that continues to expand.

"We told them [the locality government] that they couldn't build a taras here, but they did anyway, and now the water is trapped"

Local knowledge & land beyond the inhabited

Set atop this complex socio-spatial backdrop, the unprecedented floods that impacted Alshigelab and other settlements along both the White and Blue Niles in August 2021, brought into light the underlying tensions created at the intersection of land, water, and ownership. Tensions rose, not only between the Hassaniya and the new landowners who were sold lands in precarious areas close to the Nile's edge, but also between them and the local municipality. The coexistence of the Hassaniya group with water for the past century has given them a knowledge of the landscape they inhabit. Mobilizing collectively on an annual basis, inhabitants protected their settlements, cattle, and agriculture through the construction of the taras (sand barricades), which were carefully curated each year in response to the seasonally rising water levels. The rapid increase of these levels in

August 2021 and years thereafter, required emergency response, however, as tractors filled with sand sent from the local municipality made their way to the riverbanks of the Nile, local knowledge of the territory were dismissed, and sand barricades over two meters high, were constructed at manfas al Nile (a naturally formed wide canal which is where the Nile would normally expand into). The implications of this dismissed local knowledge of the territory is still seen today, where the sand barricade has not completely broken down, and water has been trapped. This has impacted the livelihoods of farmers who typically farm in this landscape during dry season, as well as the use of the space for social activities as it once was. Here we see how land, even in the uninhabited, and its varying degrees of wetness is a source of tension between those who hold knowledge of this relationship, and bureaucratic structures that disregard them.
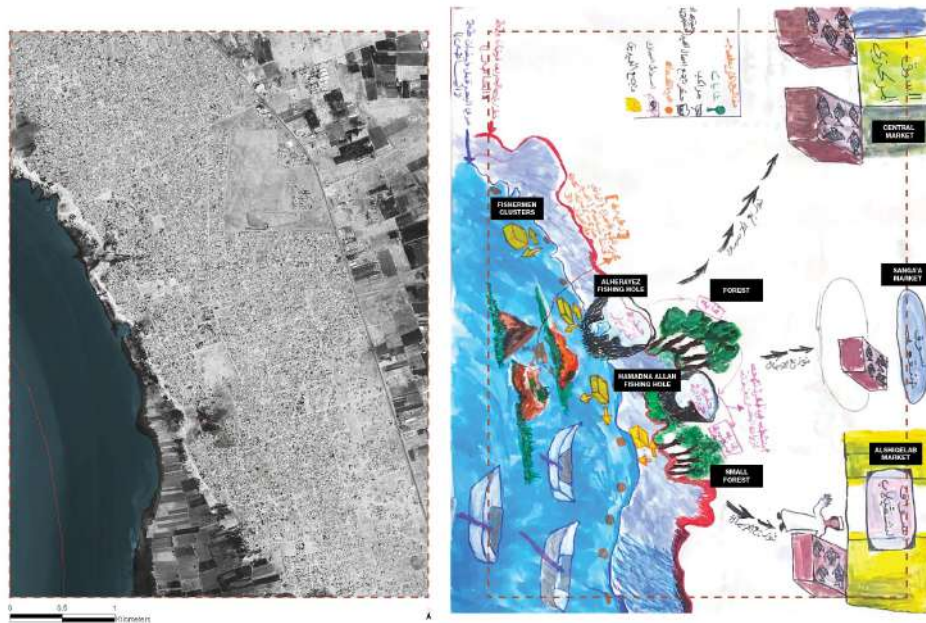
Source: (above) google earth edited by author (January, 2023), (below) Amani Seedbabe, Mohammed, Fadlalmola, Mohamed Mahmoud Agak Abra Abdalrahmen Al Nour, Yasra Albendi Mohamed, Ezzedine, Amin Ahmed, Esra Rahma Abdalla, Adam Yousef Idress, Magam Mohamed Kasar, Mutaz ahmed Saad Ahmed (February, 2023)

Legitimization through social contracts
Through the critical mapping workshop conducted, it became evident that the legitimization of one's stewardship over land does not only exist within the formalized frameworks of varying tenureship statuses documented on paper, but also exist through verbal social contracts that are both fluid and transient. The riverbanks of the White Nile along Alshigelab are occupied by customarily owned agricultural lands passed on from generation to generation within the Hassaniya family, public spaces known as the bahar dotted with tea ladies serving tea and shisha, and clusters of fishermen who appear and disappear every six months from the landscape. Unlike the farmers who also permanently reside in the village, many these fisherman groups are from elsewhere, traveling north to Alshigelab seasonally living and working on the edges of the Nile. Their days are driven by the fishing schedule, oftentimes setting out in boats during the night, and sleeping or heading to the market by day. As an extension of this social contract, before the fish is taken to the market to sell to the wider Khartoum population, those in Alshigelab, particularly those living close by, arrive at the riverbank with their baskets between 8h to 9h to select from the fresh catch of the day for free. For both fishermen and farming communities alike, cultivating the land and river is driven by an intricate knowledge of seasonal cycles and networks that extend beyond the settlement, it impacts how they settle and follow an alternative annual cycle to others who inhabit the urban.

Janoob Al Hizam – From the situated to the territorial
The land dynamics that overlap in Alshigelab do not exist in isolation, however, its location in Janoob Al Hizam gives room to contextualize it within a broader peri-urban territory which has undergone rapid transformation since the early 1970s. *Janoob Al Hizam (south of the belt)* gets its popular name from *Al Hizam Al Akhdar* (the green belt), a forest in the flat landscape that

demarcated a southern edge to Khartoum's colonial city, atop which now sits a military complex, sewage treatment plant, industrial area and residential neighborhoods. The Hizam has, and continues to, play a significant role in the urbanization of the Sudanese capital. Tucked between the Blue and White Niles, the territory which exists south of it where once existed a landscape of grazing lands, agropastoral villages and agricultural lands, now is home to a complex peri-urban landscape that is home to a myriad of expanding agropastoral villages, privatized agricultural lands, residential neighborhoods, squatter settlements and the remnants of internal displacement camps. For some, the choice (or lack thereof) to live far from their workplace in Khartoum's city center – 45 minutes to 2-hour drives away - is due to the rapid commodification of land and real estate around them, making it accessible to a select number of the city's inhabitants.

Over the last four decades, similar patterns of growth to Alshigelab have been experienced in over 15 villages (Ministry of Planning 2014) across the Janoob Al Hizam territory. The implementation of village incorporation and planning schemes have given rise to contestations over land, its distribution, and its governance, transforming them from spaces of collective customary ownership to individual plots. Studies in nearby villages (Elamin 2013, Casciarri 2021, Assal 2015) mostly located along the riverbanks of the Blue and White Niles, have showcased how the conflicts around land that have risen at the scale of a settlement, are embedded within larger "conflicts over resources nationwide, population growth, land-grabbing" (Assal 2015), all of which have given rise to emerging forms of urban governance that can no longer be subverted by a universal understanding and governing of land in this urban context.

Khartoum's Continuously Shifting Present – An opening

It is difficult to reflect on Alshigelab and Janoob Al Hizam without discussing the ongoing armed conflict which has ravaged through the country, particularly Khartoum, since April 15, 2023. Where once lay the center of Sudan's administrative capital and home to over 7 million people, now lies the remnants of destructed public service buildings, homes, public spaces, and streets. This is not to say that it is over, rather far from it. Each day that passes, news is shared from the ground, primarily through Twitter posts and WhatsApp communication, of heavy artillery but also platforms for mass mobilization by civilians caught in the crossfire. The conflict, headed by the country's two armed forces, the Sudanese Armed Forces and the Rapid Support forces, has led to the displacement of over 1,000,000 of Khartoum's inhabitants, as reported by the IOM (May 2023). For those who have been able, financially, safety has been searched for in states around the country, or across national borders, into Egypt, South Sudan, Chad, and Ethiopia. Private homes forcefully abandoned by their owners are now being looted, inhabited, and used as sniper positions or makeshift prisons for those abducted by the armed groups.

In addition to the various destinations listed above, many have also found safety in the many settlements of Janoob Al Hizam. Reuniting with family members or living with strangers on their way to states south of the capital, the notions of land in this territory once again continue to shift and change, now introducing the precariousness of inhabitation in a time of war. In the case of Alshigelab, various members from the RSF have rented, forcefully occupied, and bought land over the last 40 days, embedding themselves within the settlement. As national archives and land records in government buildings are being looted and burnt to the ground, and as the urban is a constant state of movement, it leaves us to question what will happen in the aftermath of the war with regards to the legitimacy of claims to land in the various settlements of Janoob Al Hizam and Alshigelab? What will be of the various relationships constructed by inhabitants to the ard over the decades? Will there be room to reimagine state-led understandings of land that stem from the multiplicity created by those inhabiting it?

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I.b

Cross-borders territories : mobility, migrations

The Borderlands in the test of representation : life paths of Roms families in Lille's metropolisation.

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The evolution of our contemporary borders is leading to tangible changes in our societies, both in terms of their increasingly diffuse characteristics and their differentiated impact on individuals. Current migration phenomena and the challenges posed by borders are constantly calling into question our relationship with the world. As we follow the journey of a Roma family in the Lille metropolitan area, a number of clues come to light. Borders manifest themselves in the form of a social filter that generates distinct 'border trials'. The places occupied by these migrants from Eastern Europe appear to be a consequence of borders in socio-spatial practices. Defining and naming these places means not only giving them an existence, but also becoming aware of the multiscalar and diffuse aspects of the territory of exile.

Out of respect for the families and to protect their privacy, the names of the people mentioned in the article have been changed.

Introduction

A personal journey

Origin of the research and definit ions of terms
The origin of this reflection can be traced back to a number of journeys during which I travelled along various borders. The border of the Kaliningrad enclave, the border of Transnistria, the border between Serbia and Croatia, the border between France and Belgium - whether on foot, by bike or in a kayak, I've been fascinated by these landscapes, these encounters with the border people, with whom I've learnt so much [fig.1]. These places with their distinctive contours produce landscapes in their own right, and the stories and memories of the people who live there all seem to be part of a single territory, that of the border. So, it's no coincidence that we talk about "border dwellers", people who live in the "in-between", in a world governed by its own rules, a world between worlds.
It was this attraction to these very particular social and spatial landscapes that inspired my desire to enrich my perception and understanding of these places. How can these places be represented? How do you reveal their dynamics, their thickness, their contours or their multi-scalar aspect? How do you give them a presence in the world that can at least partly convey the reality of the lives and journeys that mark out these places?
The aim of this research is not to define what a 'border' is, either as an administrative line or as a political object. Georg Simmel describes the border not as "a spatial fact with sociological consequences, but as a sociological fact that takes on a spatial form" (Simmel, 1958-1918). Thus, the border is a sociological fact that influences and produces spatial forms, while having significant effects on society. The focus of our research is therefore more on the consequences of these administrative lines on people's experiences, life stories and spatial forms. These consequences take diffuse and multiscale forms, and require reflection on the means of revealing and representing them, particularly through media such as cartography and film.

[fig.1] Border lines, geographical borders, human borders. From left to right and top to bottom: border of the Kaliningrad enclave seen from Lithuanian territory ; former Russian prisoners on the run in Transnistrian territory ; view of the Franco-Belgian border with a solid area formed by the piping of the Espierre river, which was used to mark the original border ; border between Croatia and Serbia under constant negotiation due to the fluctuating Danube, which determines the course of the border. Source: elaborated by the author

A change of perspective

In 2021, my thinking took a turn when I read an article in *Le Monde* entitled "Between France and Belgium, the Roma trapped in Absurdistan".[1] This article exposes a reality that is little known to the general public: people of "Roma culture" living in France regularly cross the Belgian border to renew their right to remain on French soil. In particular, the article denounces the abusive practice of OQTF "*Obligation de Quitter le Territoire Français*" issued by the PAF "*Police Aux Frontières*" and their impact on national migration statistics. This phenomenon highlights the continuing influence of our European borders, particularly on a marginalised population.

The article reveals that, according to data published by the French Minister of the Interior in January 2021, fourteen deportations were carried out in 2020 on the orders of the Prefect of the North, targeting 127 Roma living in the Lille metropolitan area. For the vast majority of these families, these deportations are a real nightmare, as leaving France means leaving everything behind: their home and their job for the period set out in the OQTF. The reason given is that "their precarious situation is a factor in disturbing public order".

In addition, the prefecture continues to issue OQTF, despite the fact that for more than a decade, the strategy of travelling to Belgium to renew their access to French territory has been widely practised by the families concerned. Thus calling into question the effectiveness sought by the introduction of this measure.

In 2009, according to the French Immigration Ministry, the average cost of an expulsion was €20,970 per person. Thus, the economic argument of a population that is "less expensive" to expel (intra-European expulsion), or the simple desire to influence migration statistics could explain the reasons for an administrative practice whose effectiveness remains to be proven.

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[1] MONIEZ, Laurie, Entre la France et la Belgique, les Roms piégés en Absurdistan, Janvier 2021, Le Monde

Meeting with the Radu family

In 2021, I visited one of Lille's four shantytowns located next to the "*Sauvegarde du Nor* reception area on *avenue Léon Jouhaux*. This shanty town was built around a basketball court and a football pitch on a plot of land belonging to Lille City Council. This public space provided an interstice that I was able to use to establish relationships with the residents.

Two or three times a week, I visited the shanty town, sometimes on my own or with friends, to do activities with the children: painting workshops, puppet shows, football, basketball, etc. [fig.2]. It was through their contact that I became close to several families, in particular the Radu family.

Constantin Radu told me all about his life. He quickly caught my attention. Constantin is 30 years old and lives in a small shack with his wife Olga and three children, Carol, Ionut and Sarah. He is part of a larger family group whose neighbouring shacks form a small street in the shanty town. This household is made up mainly of his parents, his brothers and sisters and their children, around twenty people in all.

For twelve years now, the family has been living in no-man's-land, in camps on the outskirts of towns, constantly moving back and forth, in constant instability and uncertainty. Shanty towns, squats, social housing, administrative detention centres, on the fringes of cities, along ring roads, straddling the border between France and Romania or imprisoned on the borders of the State, each place and each situation reveals hopes and shortcomings. At the same time, these places with their different characteristics are all part of one and the same place, the place of exile. The idea of making a film with Constantin emerged, I spoke to him about it and he agreed [fig.3].

[fig.2] Activity with children in the shanty town. Source: elaborated by the author

Borders and migration

Borders and migration

Since 1991, more than 30,000 kilometres of new international and land borders have been created (Foucher, 2015). The creation of sea and air borders since the 1980s has continued this trend.

As a result, the entire world is divided and criss-crossed by markings and delimitations. However, as the geographer Anne-Laure Amilhat Szary points out, we are witnessing the end of a political model that we thought was immutable, that of the nation state, and therefore a paradigm shift in the way we interpret borders (Amilhat Szary, 2015).

Indeed, the 21st century, with its changes linked to globalisation and free trade, marks a profound change in the status of our state borders. In an economic rationale, free movement projects are accompanied by

exclusion strategies to deal with a dynamic geography linked to migratory pressures. States are faced with a contradiction between the increase in mobility and the need to protect their borders from this mobility. Borders now have to perform a dual function of filtering "legitimate traffic" from "undesirables" (Amilhat Szary, 2015). The analysis depicts a complex reality linked to the economic emergence of a globalised world, and a tendency for borders to multiply.

Moreover, the increase in international migrants over the last fifty years is undeniable. In 2020, an estimated 281 million people were living in a country other than their country of birth (around 3.6% of the world's population), 128 million more than in 1990 and more than three times as many as in 1970.[2]

Of these 281 million international migrants, 87 million arrived in Europe, representing 30% of the world's total migrant population. Between 2000 and 2020, there will be an increase of 30 million international migrants in Europe.[3] Whether motivated by economic, geographical or demographic factors, the migratory phenomenon follows distinct trajectories, forming migration "corridors" that are difficult to define given the diversity of the reasons for moving.

The individualisation of bodies in the face of borders

The end of the "nation-state" paradigm, i.e. one based on "the territorially linear translation of the balance of power between states", has led to an individualisation of relations with borders according to the conditions of citizenship: "each individual is in a position to experience border(s) differently" (Amilhat Szary, 2015).

For example, citizens of rich countries cross more easily than those to whom they try to restrict access to their territory. This "individualisation" of the relationship with the border therefore takes the form of a social filter giving different access to the world: "Depending on the type of passport you hold, you may have access to between 28 and 173 countries, giving you a world of highly variable geometry" (Ibid).

Chris Perkins and Chris Rumford therefore propose to develop a 'vernacular' analysis of borders (Perkins, Rumford, 2013). The analysis of border systems, often dominated by 'macro' logics, struggles to capture the subjectivity of a world of variable geometry. Yet the day-to-day activities of ordinary people contribute to the process of constructing borders. The meaning of borders differs according to the logic of temporality and according to the individuals who confront them. Thinking of borders in terms of the individual would therefore be a better way of identifying them in their entirety. The individual, through his or her trajectories, is confronted with different border situations.

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[2] All the data mentioned can be found on the website of the International Organization for Migration (IOM), 2021. Migration and migrants in the world. In: State of World Migration 2022 (M. McAuliffe and A. Triandafyllidou, eds.). IOM, Geneva.
[3] Ibid

[fig.3] Shooting with the radu family. Source: elaborated by the author

Mobile borders, Borderlands and territories of exile

A "vernacular" analysis of borders

The logic of "borders-individuals" is therefore based on a dual system of relationships. In the first, changes in our contemporary borders would influence individuals by confronting them with 'various border tests' according to a decisive social filter. In the second, the individual, through his or her social-spatial behaviour, also produces the border.

While migratory flows are generally considered on a 'macro' scale, with the predominant question being to reveal the main 'international migratory corridors', the issue here is quite different. By following the journey of a Roma family in the Lille metropolitan area, we will seek to understand and represent all the places impacted by these 'border logics', as well as what this means for the Radu family in terms of the way they live and the time they spend there.

We will therefore attempt to describe and name these places, and understand how they are part of a wider dynamic. The challenge is therefore to answer the following question: In what way does the life of a Roma family reveal the consequences of our contemporary borders, while at the same time giving shape to specific spaces?

This quest for definition leads to a twofold methodological reflection. The first, based on the work of two authors, will examine the ways in which the changing status of our state borders has a social and spatial impact on our territories. The second, based on a field approach, will seek to define the places that govern the Radu family's journey into exile and examine the dynamics that link them together.

From the "line" to the "point cloud"

Anne-Laure Amilhat Szary, born in 1970, is a French geographer specialising in political geography and borders. She is best known for popularising the concept of the "mobile border". In her view, borders must now have a dual function of filtering "legitimate traffic" from "undesirables" (Amilhat Szary, 2011). In this way, the functions assigned to state borders are losing their linear aspect by adopting a more

mobile nature. Robert Audebert has been describing the phenomenon of "outsourcing" since the early 1990s. The control of flows is taking on increasingly diverse forms and is being exercised well beyond the boundaries of the districts where it was traditionally active (Parizot, 2013).

Anne-Laure Amilhat Szary considers that "the border has evolved towards other models, comparable to a cloud of points forming a network". The relationship with borders is becoming more individualised and more like a social filter. But what most disturbs this state of affairs today is that "the border is no longer located solely at the border" (Amilhat Szary, 2011). Transport facilities such as stations and airports also contribute to these differentiated controls. This is also the case when the PAF (Border Police) intervenes in the various shantytowns of the MEL (Lille European Metropolis) to issue OQTFs to the people concerned. Thus, the most striking process in the recent evolution of our borders results from the deployment of the functions traditionally attributed to them: these are now exercised both far upstream and far downstream of the border itself.

Based on these analyses, Anne-Laure Amilhat-Szary and Frédéric Giraut define the notion of the "mobile border" as follows: "Border functions tend to go beyond the established limits of areas of national sovereignty, to be pushed back, projected, multiplied or diffused in space" (Amilhat Szary, Giraut, 2011).

In fact, while the border may originally have been perceived as a front line evolving in step with military conquests, today it is more akin to an object whose qualities, attributes and consequences for life courses are diffused in space and time. As movement is permanent, the notion of a state border seems less obvious. These "two-edged limits" that are borders are cracking and diluting in space (Retaillé, 2012).

This diffusion of border functions, means that we need to rethink our approach, both in terms of analysis and in the representation of these polymorphous lines. Thus, if we consider that borders have lost all stability, it is now the lability of their arrangements that we need to analyse in order to better understand and represent them (Amilhat Szary, 2011). In fact, if we are talking about the diffusion of the border as 'a cloud of points', then how can we name and represent the places directly or indirectly affected by this geographical concept? What systems of influence and relationships do they have with each other, and how should they be represented?

From the "point cloud" to the "borderlands

A dual form of spatial marginalisation
The functions assigned to border areas tend to spread across the territory well beyond our administrative boundaries. The work of anthropologist Michel Agier reveals how "the difficulties associated with crossing borders have an effect that spreads beyond the border line itself". In this way, the concept of the border as a "cloud of points" resides in a dual system of relations, both through the border itself and through the individual, which also produces diffusion effects.

In his article "*Parcours dans un paysage flottant des frontières*" (Journey through a floating landscape of borders), he refers to difficulties as "border situations" and describes them as tests of more or less materialised boundaries. These trials reveal the thickness and spatial and temporal fragmentation of the borderline itself. They are characterised by a 'putting outside', the experience of a double exclusion from locality.

Firstly, in a "distant outside", i.e. outside the administrative borders of their state of origin, lost through displacement. In the case of the Radu family, despite European citizenship that is supposed to guarantee freedom of movement within the EU, this "far outside" constitutes a "border test". The "*Obligation de Quitter le Territoire Français*" is indicative of their status as second-class citizens. The idea of a population trapped in the "labyrinth of the foreigner" (Schütz, 2010) is particularly apparent when the individual settles in a border situation. They come up against language barriers and cultural differences and try to integrate while at the same time dealing with their "new and marginal sociality" (Agier, 2014).

Secondly, these same individuals face a 'near outside', i.e. outside the urban order. Most migrants find refuge on the outskirts of our cities, in shanty towns. This spatial marginality is reflected in problems of mobility and access to healthcare, education, water and electricity. Caught between urban boundaries and administrative borders, migrants face a double phenomenon of spatial marginalisation.

From the "point cloud" to the "borderlands
Our guiding principle will be to identify all the places affected by these borderland situations (shanty towns, squats, linked to the outside of the urban order and the distant outside). According to Michel Agier, this approach is well summed up by the term "borderland" (Agier, 2014). So, the trials of borders are said to produce particular landscapes. If we take the case of shantytowns, these places appear as

accidents in the context provided by urban planning. They act as a boundary between an interior that does not belong to the city and an exterior "the city" that keeps them at a distance:

"The border situation gradually becomes a landscape that settles into the city over time and space, at its very edge, at the cost of an unstable compromise between people on the move on the one hand, and the urban society and urban power that these people encounter on the move on the other. This political instability encourages 'floating' and uncertainty about the limits and future of these places of the limit" (Agier, 2014).

Shanty towns are part of this Borderland, that is to say, they are places that form part of this image of borders as "cloud of points". What's more, they have the distinctive feature of confronting two forms of margin, state and urban, giving these places an extraterritorial character.

Refuge, asylum, prison

The Borderlands take different forms, particularly in the migratory process. In his book "*Du refuge naît le ghetto*" (2013), Michel Agier identifies three key places: refuge, asylum and prison. These are places of relegation that punctuate the migratory journey, places that he describes as heterotopic according to the concept devised by Michel Foucault. Three heterotopic figures whose common features are extraterritoriality, exceptionality and exclusion. They share a separation from the common world and represent spaces of distance and limit. The relationship between exception and exclusion varies according to the context.

"Refuge" is "the shelter we create for ourselves in the absence of hospitality". These are "places out of all places" that are created in a hostile outside world, on the edge of the order of things. These are camps for foreigners, squats, shanty towns and urban ghettos. These demarcated "pieces of space" are the consequence of a marked desire to set people apart and separate them: "The state of abandonment of these spaces confirms and redoubles the absence of territorial citizenship of those who occupy them; neither the State of which they are nationals nor the State of their exile guarantees them the localised exercise of citizenship in the borderline places where they find themselves" (Agier, 2013).

"Asylum" is a place of transition and in-between, halfway between hospitality and seclusion, the right to life and banishment, humanitarianism and security. It brings together different types of structures such as CADAs (reception centres for asylum seekers), integration villages, reception areas, accommodation centres, etc. This system is designed to respond to the problem of refuge by offering a place to live, to receive and to provide access to the common world. However, it remains at the frontier of the social and national order. For Michel Agier, this is also reflected in: "the implementation of an extraterritorial fiction - a fiction consisting of recreating an out-of-place within the common world, within cities themselves" (Agier, 2013). These places find themselves in two topographies in conflict: that of the foreigner as undesirable and that of hospitality: "in their internal life, the material and social forms falling under this ambivalent principle of asylum are places of tension, conflict or unease, because the actors (housed/closed and interveners) are maintained, in a suspended temporality, in the uncertainty of the common rules of their existence" (Agier, 2013).

"Prison" means exclusion from the social structure, banishment or punishment. It is where the "undesirables" are locked up. It includes detention centres, administrative holding centres, prison holding facilities and waiting areas for people awaiting trial (ZAPs). It corresponds to one of the first-order heterotopias described by Foucault, i.e. the place where the social order is set aside.

The distinctive feature of these three heterotopic figures is their complementarity. All three mark a separation from the world. What's more, they are linked by an ambivalence: imprisonment is found in the asylum, and the asylum offers part of the refuge.

Multilocality and the place of exile

According to Marc Augé, population movements create 'places', with which trajectories, paths and routes form subsidiary relationships (Augé, 1992). These movements from one place to another affirm complementary links in a reticular manner, or even splinter. Moreover, according to Michel Agier, the succession of these places forms a single place, the place of exile.

This whole takes on a personal dimension in the narrative, hence the importance of accounting for this succession of places. When we are constantly moving from one place to another, our history is defined by the sum of these places, which gives rise to the condition of exile [fig.4]. The journey becomes the place, and memory becomes a multilocality that constitutes the subject's narrative (Agier, 2013).

In this way, the 'point cloud' effect of borders seems to be part of a dual system of relations, with border functions on the one hand and the individual facing borders on the other. Both are producers of places: the Borderlands. All these places form a single place for migrants, the "place of exile". From a 'vernacular' approach, we need to see whether all these concepts can describe the realities experienced by the Radu family in the Lille metropolis.

[fig.4] The ten sites of the Radu family's wanderings. Source: elaborated by the author from google maps

Living in exile: between occupation and movement

Filming and travelling through the territory of exile

The following observations were made as part of a two-year field study from May 2021 to May 2023. Our research approach through film led us to revisit each of the places where the family stayed. Since 2011, these places, which include five shanty towns, a squat, an integration village and an administrative detention centre, seem to fit perfectly into the three heterotopic figures described by Michel Agier.

Of these places, only three could be analysed as occupied: two shanty towns and one integration village. The first shanty town was located on avenue Léon Jouaux in Lille. We were able to observe it from May 2021 until January 2023, when the prefecture began eviction proceedings, bringing the observation period to an end.

Following the eviction, the Radu family was dispersed. On the same day, the Prefecture proposed alternative accommodation. Part of the Radu family was sent to an integration village in Loos, another to Hellemes, while the third did not receive any offers of rehousing and finds itself without accommodation. This last group, made up of Constantin's brother Sorin, his wife and their children, led to the departure of the first group to Romania. Out of solidarity, the first group could not leave the other without a solution. So, they decided to return to Romania before moving back to a new shanty town a few weeks later. So, since January 2023, the observations have been taking place in two different locations: a shanty town in Lomme where most of the family members live, and an integration village in Hellemes where Constantin, Olga and their children live.

These successive changes enabled us to observe various key stages in the occupation of the shelters. Here, we seek to reveal the underlying processes. Finally, we'll see whether other places can be found in the family's wandering path, beyond the three figures mentioned by Michel Agier.

Processual logic of the place of refuge

Shelters are all of varying quality and are destined to disappear according to the following logic: establishment, occupation, disruptive element (accident, eviction), departure and neutralisation [fig.6].

The first stage consists of establishing oneself in a place, which is a moment of great vulnerability. It can take weeks or even months to set up shacks illegally, connect them to the electricity grid, get access to water, or familiarise oneself with the surrounding environment in order to find food or care. This is followed by a period of occupation during which the families manage to stay put, consolidating their social and territorial roots in an unfavourable context (Mercier, Olivera, 2016). In the vast majority of cases, the next disruptive event occurs days or years after the establishment. It may be linked to an accident (fire, violence between occupants, flooding) that requires institutional intervention, or it may be caused by a simple prefectoral eviction order. Evictions from living quarters are usually accompanied by the neutralisation of the areas where people have settled: wooded areas or vacant lots are razed to the ground and immediately fenced off to prevent any new settlements; shacks are bulldozed, and so on. In this way, our cities bear the scars of these shanty towns, these areas deemed undesirable. By neutralising them, the public authorities are trying to erase all trace of them, making it very difficult to reconstruct a memory of these "places of refuge".

In this way, we are faced with a relationship of opposition between an order and those who face up to that order. The refuge is therefore both a space of resistance and a place of survival and daily life.

Michel Serres, in The Five Senses, defines shanty towns as "mixed places", i.e. spaces where wanderings materialise and movements are focused (Serres, 1985). Through this form of occupation and this way of living, he sees a landscape singularity.

By taking a tactile approach to the territory, we can observe the gestures and occupations of each person: the ritual moments when the migrants sing religious songs, or the moments of joy around an improvised football match. These experiences of place produce bonds and contribute to the idea that a community of people is reconstituted in a world governed by its own rules, an in-between, a world between worlds.

[fig.5] The four heterotopic figures. From top to bottom: the refuge (here the Avenue Léon Jouhaux shanty town), the asylum (the Hellemes integration village), the prison (the Calais administrative detention centre), the place of

[fig.6] Processual logic of the refuge. Column from left to right: establishment, occupation, disruption, destruction. Source: elaborated by the author

[fig.7] The processual logic of the «in-between». Source: elaborated by the author

These "mixed places", this transit territory urgently occupied by migrants, are therefore a landscape where hopes and shortcomings are balanced. They are characterised by a processual logic that is perpetually "made" and "unmade", where the temporary seems permanent.

The place of origin, a fourth heterotopic figure

In following the Radu family's itinerary, various places were filmed and observed. Among them, the village of Tinca seems to be an important point in the exile journey of these migrants from Eastern Europe. The transnational household comes from this small Romanian village between the towns of Oradea and Arad. After three weeks spent observing these places and living in Constantin's house, the idea of the existence of a fourth heterotopic figure emerged [fig.5].
The 'place of origin' is the place to which Roma families return regularly, even after they have left it. Often it is a family home belonging to one or more members of the family. It may be the place where they grew up, or a place that they later moved into to make it a "home away from home". It is also the place that precedes exile, the house or village of origin from which the transnational household originates (Benarrosh-Orsoni, 2019).
Although it is not found in the three pillars of extraterritoriality, exception and exclusion (see the three figures introduced by Michel Agier), this figure can also be considered heterotopic according to these criteria: an anthropological place of reference, a place of refuge for relocated memory, a place of both anchoring and uprooting.
In the anthropological sense, the place of origin thus meets three common criteria: identity, relationships and history (Augé 1992)[4]. It is a place of identity.

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[4] Roma mobility" is generally perceived as inseparable from a "diasporic culture". However, many families show a very strong attachment to their country of origin and to the village or neighbourhood where they were born. Many of them invest a large proportion of their income in renovating or building their homes (Benarrosh-Orsoni 2015).

The place of origin is a place to which families go occasionally or regularly. They go there to start renovation projects, for summer holidays, celebrations or family events. These "return trips" are closely conditioned by the families' personal resources. The most precarious often reduce these trips to the bare minimum. Sometimes they stay for a few days or a few months. Moreover, this practice is discreet in the eyes of the institutions. The fact that 'migrant Roma' maintain ties with their country of origin can be perceived as a lack of 'willingness to integrate' (Mercier, Olivera, 2016). Thus, in the case of an asylum situation, returning to Romania, even for a very short time, runs the risk of losing one's 'hosted' status.

Whether in the case of refuge, asylum, prison or place of origin, and despite different processual logics, the element common to all these points is therefore found in the quality of temporary occupation of the place. The territory of exile is therefore a place where the temporary appears to be permanent.

[fig.8] Source: elaborated by the author

Conclusion

The evolution of our contemporary borders involves a multiplicity of spatially and temporally dispersed places. Although they differ in function, form and boundary, many of them remain interconnected.

Asylum, refuge, prison and place of origin make up the Borderlands of the Radu family's journey [fig.7]. Borderlands in which the relationship with time is the common denominator. Asylum defines a temporality of occupation of the place with a view to future "integration", prison defines the duration of a sentence, while refuge is experienced in a processual logic that is "made" and "unmade". The place of origin, on the other hand, is occupied for a limited time: "you go there to leave again". So the territory of exile seems to be characterised by a particular relationship with time, a succession of places where the temporary is permanent.

This tendency is also reflected in the logic of displacement. Leaving an occupied place leads to movement towards new places. A wandering space-time in which people find themselves without anchorage.

The "in-between place" refers to the movement of an individual or group from one Borderland to another. In a way, it refers to a rite of passage that corresponds to the different stages that an individual or group goes through when changing status [fig.8]. It reflects a number of issues relating to changes in the status of boundaries, whether at an administrative or social level, or in terms of spatial relegation. By virtue of its eminently structuring aspect in the condition of the exile, the route also becomes a place in its own right.

However, this approach raises a number of points that need to be clarified. The pitfall would be to perceive Roma families as indissociable from a centuries-old 'diasporic culture' by promulgating a stereotypical identity image of the 'Roma': nomadism, material insecurity and community organisation. These stereotypes can be found in many 'public integration projects' that mention 'aid for sedentarisation', even though many of the 'beneficiaries' have never lived in anything other than a house (Mercier, Olivera 2016). If there is such a thing as exile, it exists because of the constraints associated with economic migration. When families come to France, they settle in the hope of a better life, and the shantytown is seen as a first step, a "pioneering" stage before being able to integrate the "social order". The shantytowns are places of waiting where, for many of them, the desire to find work, decent housing and a future for their children is intertwined.

However, if the territory of exile in which these families find themselves is not a constituent part of their identity, it would be equally misleading to denigrate all the effects that this exile has on their lives. So we need to think about ways of expressing ourselves that can convey a tangible, human reality. Whether in terms of relocated material and immaterial memory, or the feeling of double absence (Abdelmalek Sayad 2004), an entire system of social organisation is articulated by this geographical fragmentation. Memory is built around an absence, the absence of a land, this land from which I am absent (Agier 2011). Similarly, the notion of 'home' is turned upside down. Levinas writes: "Home is neither nature nor root, but a response to a wandering that it stops". "Is 'inhabiting the world' just being present in the place where you are? Does the temporary make it possible to be exactly in the world?

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TOD against the context in cross-border metropolis? Visions and paradoxes in the case of the Great Geneva Agglomeration.
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Urbanization and heavy transport infrastructure coordination has become one of the leading principles of sustainable urban growth and mobility transition. This paper proposes a critical reflection on the implementation of the Transit-Oriented Development model in asymmetrical and interdepend cross-border metropolitan regions. Using the Great Geneva as the main research case, this contribution highlights the ecological but also social risks which this intrinsically selective and hierarchic model bears. By looking at the evolution of panning vision as well as policies and mechanisms that shaped the urban structure of the metropolis, this analysis showcases the need to take a step back to understand the current territorial paradoxes systemically and to search for hybrid strategies through a more contextual socio-spatial reading.

Introduction
The articulation between urban patterns and sustainable travel behaviors within metropolitan territories, characterized by ever-increasing land consumption and mobility flows (Offner 2018), is one of the major challenges of the contemporary territorial project. The coordination of heavy public transport systems and urban development on nodes, also called Transit-Oriented Development (TOD), is the dominant model in practice and theory. It is internationally recognized to support sustainable metropolitan development (Newman, Kenworthy 2015). The question of the transferability of such a model in different contexts has been a major theme in academic research (Thomas et al. 2018; Thomas, Bertolini 2017; Tan et al. 2014). This body of research has produced knowledge on successful TOD policy implementation and how to overcome barriers in different contexts. However, when looking at the implementation of the model through a transport planning lens, results tend to be slightly tautological marked by a strongly normative and progressist ideology (Qviström 2015; Papa, Bertolini 2015).
In the Swiss context, changes in governance and practices of coordination of transport and urbanization have been the subject of much interest in the academic sphere (Kaufmann, Sager 2016; Walter, Roy-Baillargeon 2015; Gallez et al. 2013). This research mainly used historic and comparative approaches between Swiss or international agglomeration cases to assess cooperation and coordination mechanism. However, the spatial condition in which this coordination takes place and the impact of such a hegemonic model in specific contexts is still little documented. And this, even though some scholars have called upon the necessity of a critical gaze on the current Transit-Oriented Development and its role in metropolization processes (Qvinstrom et al. 2019; Vigano et al. 2017). The case of the Great Geneva is used as an "extreme case" (Flyvberg 2006) to reflect on the implementation of the largely Swiss-driven model in the cross-border territory. This contribution aims to identify the impact of the turn to Transit-Oriented Development model in cross-border metropolises, focusing on the socio-spatial condition in which the model is being developed.
This research intends to address the tension between current metropolitan TOD-supported growth ambition and the specificities of cross-border territory. By doing so, it intends to go beyond normative assumptions and fill the spatial and disciplinary gaps between the TOD model, based on transport planning, and the empirical observation of territorial development.
Firstly, it traces the emergence of the Swiss type of TOD, as the main growth model for metropolitan spaces, under national support. Secondly, it draws on planning history to understand the different visions that lead the cross-border metropolis development mirroring it with the actual evolution of urbanization. And finally, at present, this contribution highlights the paradoxes which emerge from the application of the model in the Great Geneva, identifying social and ecological risks associated with the model and the counter vision that could support future hybridization for the metropolis.

From city-territory to Transit-Oriented agglomeration development
A national turn toward the metropolis.

At the end of the 20th century, major works and studies identified the delayed but drastic change of scales of the urban phenomenon in Switzerland under the impetus of economic development, in the strongly attractive but also constrained Swiss territory (Bassand 2004; 1995). Despite the persistence of ruralist ideology (Walter 1994), the Swiss metropolization process was well underway, defining new spatial, social, cultural, and political relations, and needs (Leresche, Bassand 1991). Hyper concentration, conurbation, the massification of flows, and increasing social exclusion and inequalities, going far beyond the traditional municipal scale of action, became a major political and planning concern (Hildebrand 2006). While in parallel, the protection of rural, natural, and more widely, of the environment which had gained strength in the second part of the century, became operationalized with for example the first *plan sectoriel des surfaces d'assolement* (geographic census of cultivable land and amount to be protected). Hence, in planning logics, an opposition between the built and the natural and rural environments started to arise. Therefore, metropolization process and preservation process were increasingly understood as two separate problems, each advocating for specific and sectorial solutions.

Under the pressure of the Swiss cities union, the revision of the constitution in 1999 and the following report on Confederation agglomerations policies, despite advocating not to be a re-orientation of territorial priorities, clearly conceptualize the dominant new role that cities and their agglomeration were taking in the Swiss territory both spatially, financially, and politically (Rapport du Conseil Fédéral 2001). The myth of communal autonomy fades away and enacts a regionalist approach to Swiss planning (Joye, Leresche 1993; Walter, Roy-Baillargeon 2015). Rather than a "city coextensive of the territory" (Corboz 1999) on a national scale, the "rational occupation" (Constitution fédérale de la Confédération suisse 1999) of the territory is now associated with the vision of a "polycentric network of urban system" (Hildebrand, 2006) superimposed on 'natural' and 'rural' territories. This vision cuts drastically with the previous spatial and political stand for *Concentration Décentralisée* at the national scale. It takes a radical turn to support and emphasize a selective and hierarchical development processes structured upon metropolitan regions development (Viganò et al. 2017). Hence, since the beginning of the 20th century, rather than a means to "ensure the harmonious development of the entire country" (Loi fédérale sur l'aménagement du territoire 1979) the ability to accommodate growth while preserving natural landscapes became a metropolitan matter.

Toward a TOD model at the Agglomeration scale against sprawl and for sustainable development.

This polarization of political and planning concerns went along with a new operational tool: *les projets d'agglomération*. This tool inaugurates a new kind of metropolitan governance aimed at developing a "vertical, horizontal and multisectoral" (Union des villes Suisse 2016) cooperation between the different territorial scales both nationally and internationally. Showcasing that the main issue is now that of the sustainable accommodation of urban growth in the agglomeration perimeter[1], this cooperation tool is directly aimed at the "efficient coordination of transport and urbanization" (Union des villes Suisse 2016) to promote territorial coherence.

To support the agglomeration project, the creation in 2006 of the *programme en faveur du trafic d'agglomération* (program in favor of agglomeration traffic) supported by federal funds, marks a turning point for Swiss metropolitan development (Walter, Roy-Baillargeon 2015). This fund enacts the specific support and intervention of the federal government in metropolitan development processes. This fund, based on oil taxes revenues, enables the confederation to co-finance agglomeration measures, up to 45%, if, and only if, they are associated with mobility infrastructures, within the framework of agglomeration plans. In addition, the allocation of this fund is subject to the organization of urban development around public transport infrastructure following the objectives set by the *Loi fédérale pour l'Aménagement du Territoire* (LAT). The revision of this law in 2014, directly aims at stemming sprawl, requiring the coordinating of urbanization and transport with the explicit ambition to develop "compact built environments" while developing "the city on the city". To support these aims, the LAT also introduced the distinction between '*zone-à-bâtir*' (buildable areas) and '*hors zone-à-bâtir*' (out-of-buildable area), increasingly pushing for the reduction of urban

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[1] VACo Perimeter defined by the ARE (*Office fédéral du développement territorial)* on a statistical basis (Population, number of commuter workers, etc.).

perimeters. Therefore, today, following the idea that "mass-transit needs mass" (Suzuki et al, 2013), development is to be set in the remaining empty spaces of these urban perimeters to justify infrastructural investments, strongly cutting with the fine grain and highly subsidized multimodal transport system which characterizes the Swiss context. Hence, altogether, the Swiss federal support for Agglomeration development strongly sets incentive and normative measures to promote a Transit-Oriented Development model for Swiss metropolises.

Finally, the allocation of federal funding for agglomeration projects follows a specific process. The fund is parted between agglomerations according to a federal rating assessing the compliance of the general agglomeration project with federal policies. More specifically, the different measures proposed within the agglomeration plan are rated according to 'efficiency' criteria defining the 'cost-utility' ratio of the measure, assessing its relevance and maturity based on transport efficiency, densification, security, and environmental impact sub-criterias (ARE 2023). Thereby, this process puts in competition the different agglomerations with each other but also the different measures within the agglomeration according to a specific growth-supporting lens. We can also note that the very rapid pace of the process, 4 years between generations, strongly pushes toward a specific type of rapid mass new development. Thus, the agglomeration plans and their financial incentives account for a more and more clean-cut reading of the metropolitan space, between development corridors and the rest of the agglomeration space. This top-down planning logic supports hegemonic development strategies, regardless of the context. More 'mature' and easily compactable urban fabrics well-served by public transport are seen as sustainable places to accommodate growth in opposition to the rest of the urban fabric. Therefore, despite having participated in the reduction of the pace of land consumption, this cartesian and binary reading based on public transport infrastructure as the main driver of urban growth supports a selective and self-enforcing polarization mechanism on corridors, promoting spatial hierarchization at the agglomeration scale.

The Great Geneva, a case of trans-border TOD in an interdepend and asymmetric territory

The financial and planning process described earlier has the particularity, to be applied in the same manner in both Swiss and cross-border metropolises. It allowed the co-financing of transport development across but also outside national borders. Even more so, the cross-border agglomerations of Basel and Geneva are even considered to be the best-rated in the last evaluation process[2]. However, mobility and urbanization coordination takes on a particular dimension in cross-border territories. Firstly, as many scholars have pointed out, cross-border metropolises are specific cases where differences in remuneration, taxation, land and living cost, or access to services have a direct impact on mobilities across the border, creating an interplay between unbalanced socio-economic conditions and spatial interdependency, beyond the traditional center-periphery relation (Sohn 2014; Decoville et al. 2013; Gallez et al. 2013). Secondly, because of the difference in terms of embodied built and infrastructural capital on each side of the border. And thirdly, in terms of power relations in the planning process depending on both financial, but also human, social, and institutional capital available on each side of the border (Bertrand et al., 2015). The 'Swiss style' model of Transit-Oriented Development hence takes a specific dimension in cross-border agglomerations. Because of the country's geographical, economic, and instructional position in the European territory, as well as its decentralized political system, the Swiss cities have a strong vertical power relation with their cross-border edge regions. In addition, the specific decentralized democratic Swiss system strongly tempers the top-down application of the model. Indeed, no planning tools can strictly tight together infrastructural implementation and urban development, unlike the '*contrat d'axe*' for example in France, since citizens, through referendums have the ability at the municipal level to challenge any development project, which has no equivalent in more politically centralized systems.

The Greater Geneva agglomeration is a large and constrained territory in the watershed of the Rhone River caught between Leman Lake shores, the Arve Valley, and the Jura and pre-Alpine mountains. The cross-border agglomeration joins together the Geneva Canton with part of the Vaud Canton, Haute-Savoie and Ain French regions. Since 2007, following the new orientation of Swiss planning, the cross-border coordination of Greater Geneva has been federated around a radio-centric Transit-Oriented Development model, aiming to support the vision of a "green, multipolar, compact, and

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[2] Rapport d'examen des projets d'agglomération de 4e génération, 2023, ARE.

proximity-based, cross-border metropolis" (PA4, 2021, 24) with new public transport axes as its backbone. Here the TOD model is set as a means to bring coherence to the cross-border agglomeration as one entity. This development model is also at the heart of the agglomeration's recent commitment toward the socio-ecological transition which includes carbon neutrality and zero net artificialization by 2050 (Charte Grand Genève en transition, 2022).

As the recent change of name of the agglomeration asserts, the canton de Geneve has the leading role in the Grand Geneve Agglomeration development project. Power relations in the coordination project are strongly vertical with instructional, political, and financial means strongly polarized in the Canton in comparison to small parts of edge regions in the French hyper-centralized system. The Great Geneva is usually qualified as a cross-border metropolis with a strong 'functional integration' (Sohn 2014). This functional integration relates mainly to the labor flows, with nearly 70%[3] of the total amount of jobs in the agglomeration located in the Geneva canton. This form of asymmetry also goes with a high level of interdependence, with nearly half of Geneva's workforce living on the other side of the border [fig.1]. This interdependency was made even clearer during the Covid crisis with the inability to close the national border without paralyzing Geneva. However, the integration in terms of non-work-related activities is way milder and socially conditioned (Gumy 2022).

The differential in life costs between France and Switzerland creates a clear demarcation at the border. While, beyond the border, the French part of the agglomeration has the particularity of being at the same time a very wealthy region by French standards, due to cross-border workers' income, and one of the most socially unequal territories of the country since French base salaries are disconnected from the ever-increasing housing and live cost in the bordering space [fig.2]. Hence, despite the political engagement to "re-balance" the territory to ensure "solidarity, cohesion, and social equity" since the first *Charte d'Aménagement Franco-Valdo-Genevoise* in 1997, the Great Geneva remains a strongly interdependent and asymmetrical territory. Little to no financial, land policies, or fiscal levers have been implemented since then to remedy the situation despite planning cooperation through the agglomeration plan.
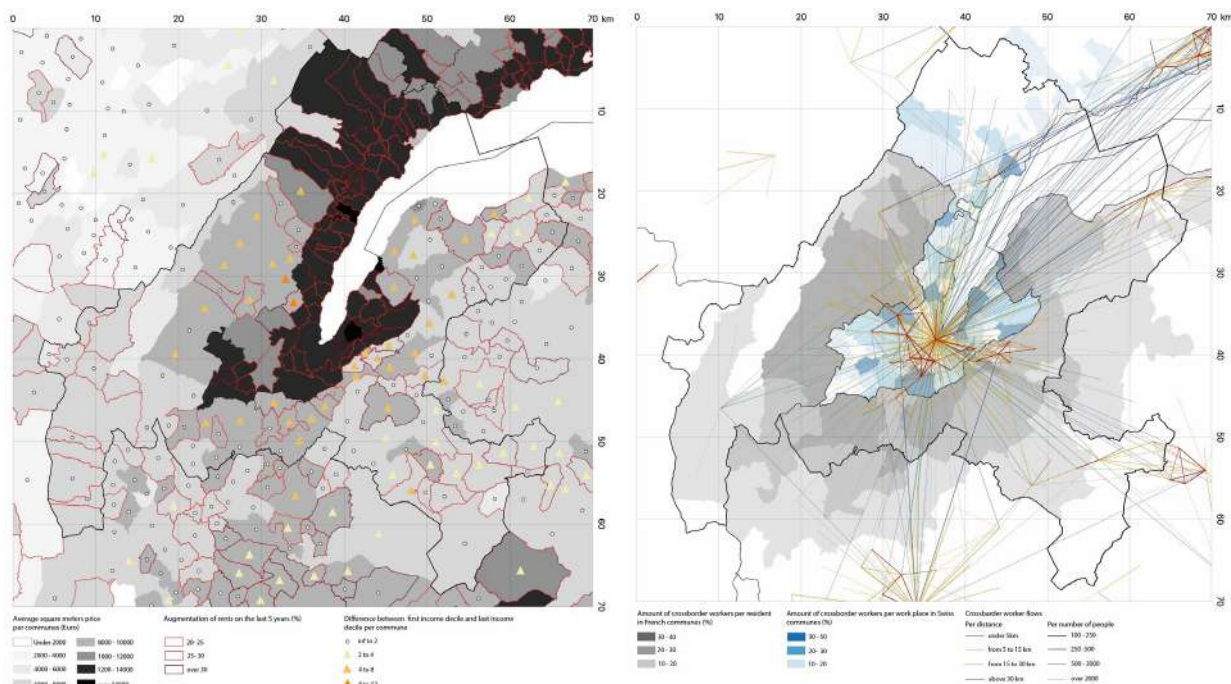
[fig.1] Left: Incomes and inequalities. Source: elaborated by the author, data from INSEE and OFS. [fig.2] Right: Metropolitan integration. Source: elaborated by the author, from INSEE and OFS data.

Erasing, Remanence, and Inertia – Planning and the territory
*Erasing of the transport network and rurbanization process*

The urban development of the canton de Geneve is the story of a city-canton cut from both its national and morphological territory through historical interplays (Barbier, Schwarz 2016). Because

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[3] In 2022 according to the Office cantonal de la statistique (Ocstat).

of this particularity, and its peculiar geographical position of being a dead-end city, main transport corridor development had avoided the city. To remedy this enclaved positioning, and connect the city to its natural territory, by the 1920's the city of Geneva had developed one of the densest tramway systems in Europe going in rays across the national border (Barbier, Schwarz 2019). However, this structure was nearly completely erased and replaced by a more efficient bus system when the first drastic demographic growth in the region erupted, enacting the era of the "all-car-oriented-development" dominating Geneva's planning (Gallez et al. 2008). At the same time, from the beginning of the 1950s, Geneva, aware of the restricted nature of its territory, sets in motion mechanisms to protect its agricultural and natural capital. This rapid awareness triggered a relatively early spillover mechanism of the urban growth towards neighboring French territories where the price of land was lower and the availability of land greater (Hussy 2019).
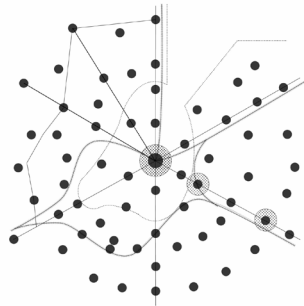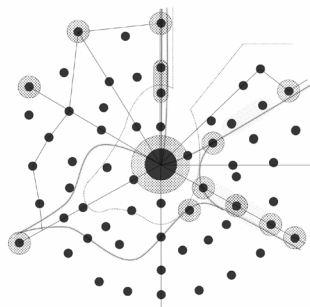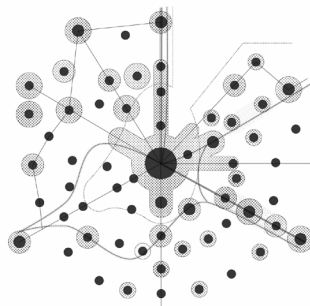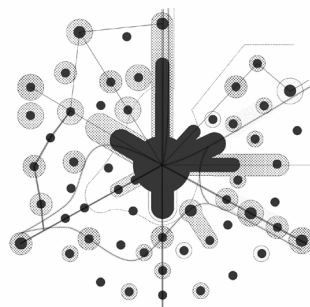
The development of the agglomeration followed a traditional "rurbanization" process (Bauer, Roux 1976) with the combination of continuous development of the core city and aggregation around pre-existing village nodes [fig.3]. However, the early preservation of Geneva's rural periphery to the north of the Canton, marks a clear-cut differentiation of the development across the frontier and a more important and faster transformation on the French side of what has for a long time been called the 'other Geneva' beyond the preserved green belt (Diener et al. 2005). In the first phase, until the end of the 40's, there is clear development based on the rail infrastructure and a smaller one related to the tramways. By the 1960's we see an important development of Geneva, both transversally and on the lake shore, and the development of polarities on the main road system. However, between the 60's and the 80's a much less hierarchical urbanization started to take shape supported by the strong car-oriented infrastructural development. This development on the French side is achieved by aggregation around the pre-existing village structure on first but also secondary roads and according to the topo-morphological logics, while the radial continuous urbanization of Geneva came to join the borders of the canton [fig.4]. Thereby, between the 1960's and today, 60% of population growth has been accommodated on the French side, mainly around village areas and small local centers [tab.1] defining a spread but concentrated development based on village structure in the main plain, developing a multipolar urban structure with little hierarchization.

[fig.3] Great Geneva development scheme. Source: elaborated by the author from Roux and Brauer's diagram

	Part of growth absorbed:		
	On the french side of the Agglomeration	In French Village, local and peripheral communes	In Great Geneva Village, local and peripheral communes
Growth 2018-1968	61	63,7	62,3
Growth 2018-1982	43,9	68,9	45,1
Growth 2018-1999	59,7	66,7	42,6
Growth 1999-1982	62,9	72,8	79,1
Growth 1982-1975	62,6	71,2	77,2
Growth 1975-1968	61	44	50,4
Growth 1968-1954	43,4	33,8	15,6

Table 1: Population growth from 1954 until today in the Great Geneva region, according to commune types. Source: elaborated by the author, from INSEE, OFS and structure urbaine per commune SITG.
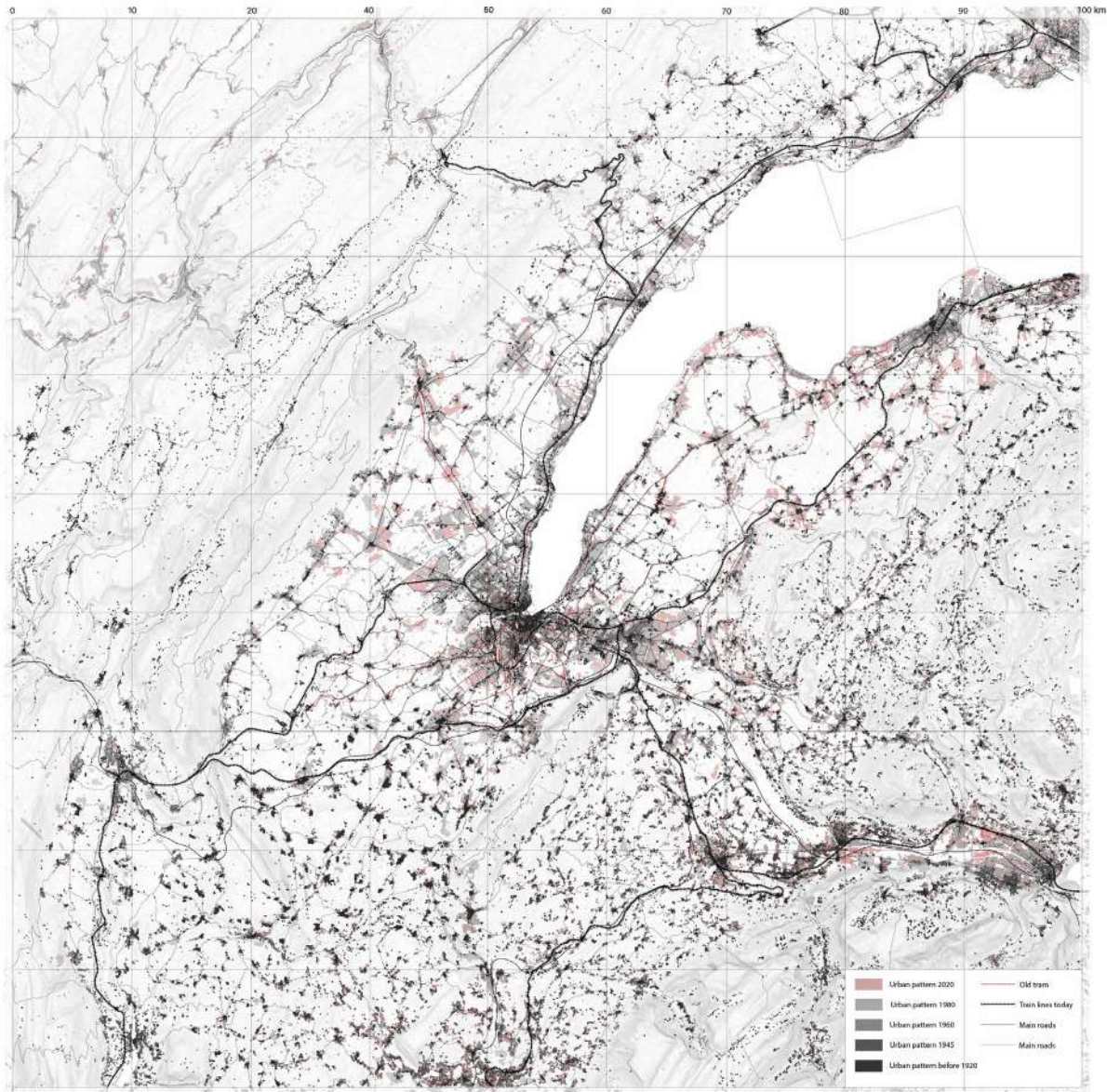
[fig.4] Up: Great Geneva development. Source: elaborated by the author from carte de l'état major, carte Siegfried, built fabric from data.gouv, SITG. [fig.5] Down: 'good' and 'bad' development Scheme. Source: A.Bodemer, *Livre d'or du bimilinaire,* 1942.
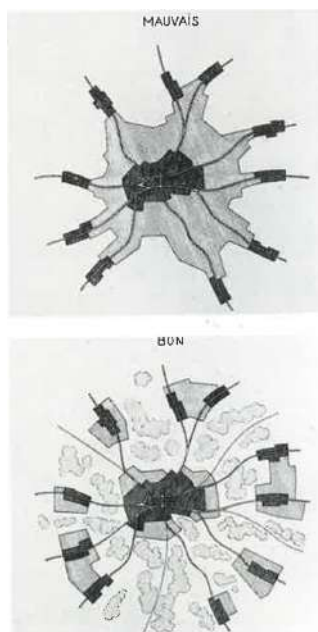
Visions et planning

The canton of Geneva supported a particular model of a "compact city on automobile networks" (Gallez et al. 2013), of which the *Plan Directeur* of 1966 is the apogee. This period advocates for a concentrated but discontinuous development of the city still focusing on the idea that a 'good' urban development should maintain natural connections in-between urban poles rather than enforcing axial development [fig.5]. The so-called '*Plan Alvéolaire*' of 1966 draws a hyper-compact Geneva structured on motorway belts. This vision considered too radical will be rejected by the population through a referendum (Joye, Kaufman,1998). However, the edition of this plan corresponds to the French law for land orientation and with it, the implementation of the first *Schéma Directeur d'Aménagement Urbain* (SDAU). Thus, the first master plan of the French Genevois, and the first representation of a planning vision at the metropolitan scale, is structured around the vision of an alveolar agglomeration [fig.6]. This plan shows the significant multipolarity already taking shape in connections. However, in the 1980s Geneva

took a drastic turn towards public transport and the question of how-to management labor induced cross-border flows, growing in intensity, became a priority. The *Plan Directeur de Geneve* of 1989 still clearly expresses the will to stem the oil-stain development of Geneva towards its cantonal borders while developing a transport system beyond its borders. Hence, the first *Plan Directeur Transfrontalier* in 1996, carried out on the scale of the agglomeration in 1996, largely relies on this alveolar and multipolar vision while shifting from car-oriented development to transport-oriented development [fig.7]. Thus, by the end of the 20th century, we can still read a continuity between automobile planning and transport planning with a very articulated vision of what the public transport network should be at the agglomeration scale. Nevertheless, with public transport planning, we can already see a much more hierarchical reading of the urban structure.
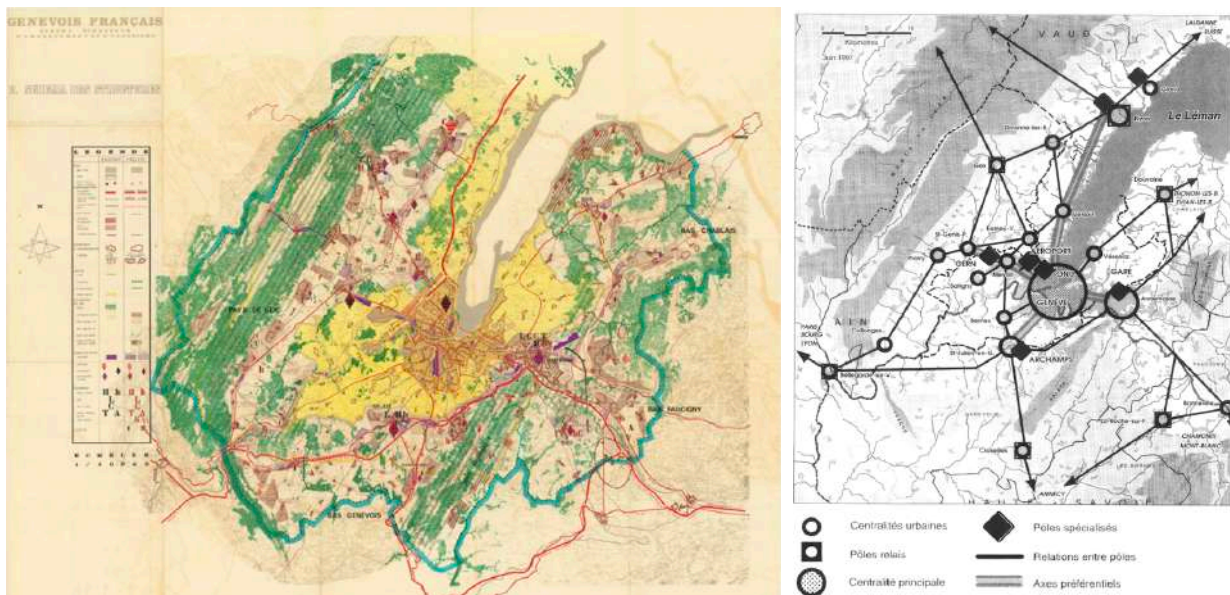
[fig.6] Left: Schméma Directeur d'Aménagement et d'Urbanisame du Genevois francais, 1967. Source: Archive fond CRR. [fig.7] Right: Plan Directeur Transfronlalier, 1996. Source: Chartre d'Aménagement Franco-Valdo-Genevois, 1997.

The first Franco-Valdo-Genevois' agglomeration plan, fitting the transborder coordination into the tool provided by Swiss planning, bears witness to an important shift of vision for the Great Geneva agglomeration. The main vision becomes that of radiocentric corridors around Geneva reaching out to the French side of the agglomeration to accommodate 'sustainable development'. This vision is confirmed by the definition of radiocentric study areas for the second-generation plan, also called PACA (*Permiètre d'Aménagement Coordonné d'Agglomeration).* The ambition of this reading is to get out of the typical center-periphery and French-Swiss divide (Quincerot 2009). Nevertheless, this vision establishes another form of duality where the spaces "outside the networks" are gradually being disregarded. Nearly all the urban structures outside the radio centric model are defined as 'villages' in the first agglomeration, whether qualifying actual Swiss villages or secondary or small French centers [fig.8]. Finally, in the fourth agglomeration plan, taking a strong stand to adapt to the necessity of the socio-ecological transition, they are completely erased in both the transport plans and the overall vision of Greater Geneva 2040 [fig.9]. Thus, the TOD vision proposed by the agglomeration plans increasingly tends to ignore the question of spaces 'in-between' (Sieverts 2004) the main axes and poles, going against the alveolar vision of the territory. Embodying the strongly selective and normative bias of the TOD logic, it puts in opposition good compact urban form well-served by public transport and bad urbanization condemned to car-dependent or relegated to aesthetic and ruralist values. Therefore, by giving priority to the search for radical solutions in the face of environmental challenges, the dominant vision for the Great Geneva neglects the pre-existing tissue in favor of a hyper-selectivity and vertical growth-oriented model putting in opposition the more endogenous urban development and the planning vision.
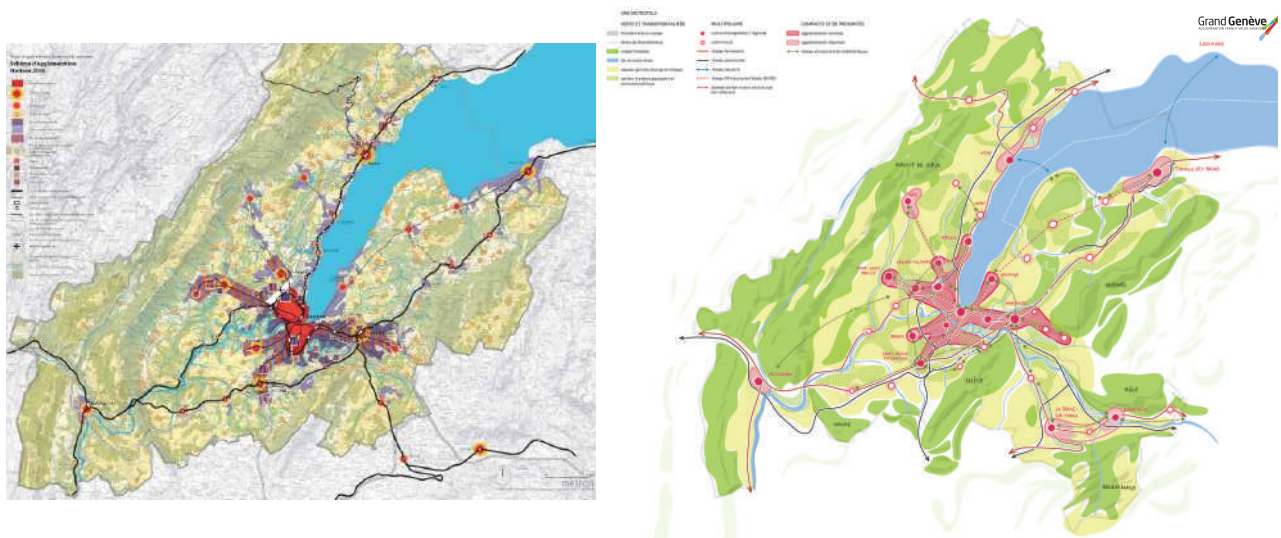
[fig.8] Left: Schéma d'Agglomération. Horizon 2030. Source: Agglomération Franco-Valdo-Genevoise, Projet d'Agglomeration de 1er Génération, 2007. [fig.9] Right: Vision d'ensemble Grand Genève 2040. Source: Grand Genève - Agglomération Franco-Valdo-Genevoise, Projet d'Agglomeration de 4er Génération, 2021.

The contemporary paradoxes of the TOD, risks, and counter-visions.
Geneva a *specific case of Swiss style Trans-Boarder TOD*

From this increasingly selective and hierarchical planning vision, tending to neglect the urbanization of the last half century, emerges the spatial paradox that the metropolis is facing today. The TOD bases project, intended to tackle the transition of the Agglomeration toward carbon neutrality, supports at great expense and with great difficulty, the establishment of a radio-centric system which only served 50% of the metropolitan urban fabric[4]. Therefore, around forty percent of the current population of Greater Geneva lives "outside" of the main public transport infrastructure's reach[5]. Meanwhile, according to scenarios developed by the Great Geneva still, only 52,6 % of the population should have access to a very good or good public transport service by 2040[6], meaning that massive investment in transport will only allow to buffer radio-centric growth effect rather than support a modal transition for people living in the metropolis today.

The proportion of people with poor to no public transport access is very high in the Great Geneva (39,1%) if we compare it to Zurich (23,3%), Berne (25%), or Basel (32,8 %) Agglomerations [Tab.2]. This result is even more striking if we consider that the Great Geneva has a densely populated central core compared to other Swiss agglomerations. Quite obviously, Zurich's densely meshed metropolitan transport system is much more successful in responding to its dispersed urban structure with 76,7% of its population beneficiating from a very good to average public transport service. Nevertheless, both Bern and Basel metropolitan areas have a radio-centric transport structure. In the case of Berne, the rather concentrated urban structure of the metropolitan space can partly explain its high service quality. Basel agglomeration showcases that the transborder nature of agglomerations strongly impacted the relationship between transport and urbanization. However, the Basel communal-based planning did not have early protective mechanisms, enforcing spillover mechanism across the border, and represents a more traditional case of metropolitan corridor development on its persistent transport system [fig.10]. This comparison highlights that the current state of the Great Geneva Agglomeration is due to a multiplicity of factors from its topo-morphological and institutional conditions to historical political and planning decisions, which created a strong path dependency. The Great Geneva is therefore a specific situation, which is not only one of "delay", as it is usually asserted, but one of another form of urban structure based in its particular conditions of development. These are particularly ill-suited to the TOD model in which strong infrastructure reticular re-development is utterly disconnected from the current context.

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[4] GIS calculation made on the base of public transport services in 2020 (ARE) and the urban fabric 2019 (SITG).

[5] GIS calculation made on the base of public transport services in 2020 (ARE) and georeferenced population density pers 100m2 in 2020 (OFS).

[6] Scenario MOCA developed for the Plan d'Agglomération de 4eme generation. PA4, June 2021.
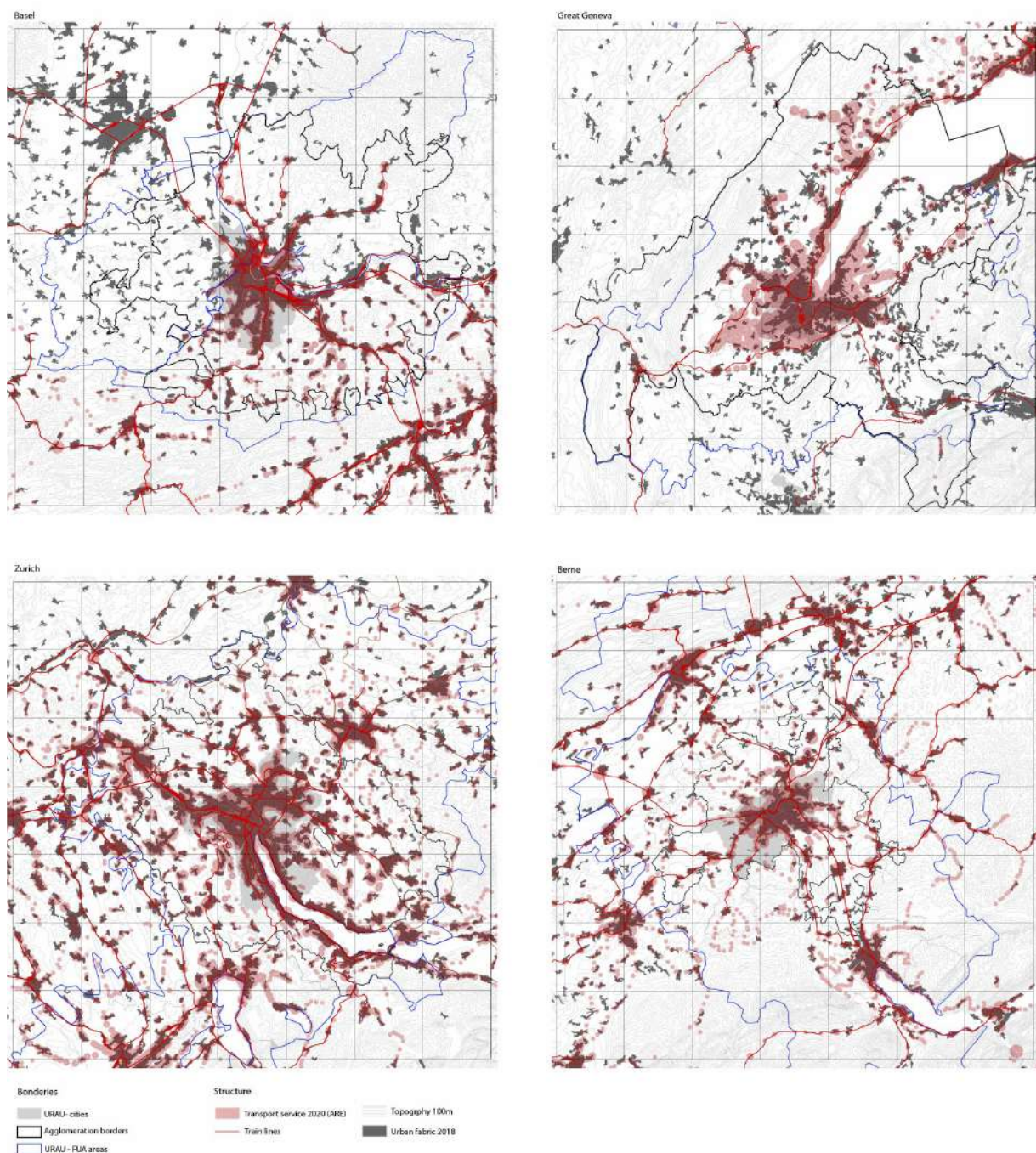
[fig.10] Comparison map of urban and transport structure between four Swiss metropolises in 2020: Basel, Zurich, Great Geneva and Berne. Source: elaborated by the author from Copernicus, ARE 2020, Opentreetmap, OFS and Europa.Eu data.

	Zurich	Basel	Berne	Geneva
Urban strucutre	Stongly dispered	Radial and dispered	Concentraded	Radial and dispered
Transport system structure	Network	Radiocentic	Radiocentic	Radiocentic
Topographic constrain	Low	Low	High	High
Continuity of the public transport system	Yes	Yes	No	No
Surface Bati pas desseri par le TP	12	9,5	6	49
Transborder	No	Yes	No	Yes

Protection of open space before federal policy	No	No	No	No
Part of the population in central agglomeration	45	36	22	44
Part of the population in periphery	55	64	78	56
Early car restriction policy	Yes	Yes	Yes	No
Population of the Agglomeration with very good to medium public transport service	76,7	67,2	75	60,9
Population of the Agglomeration with bad to no public transport service	23,3	32,8	25	39,1

Table 2: Comparison table of urban and transport structure between four Swiss metropolises in 2020: Basel, Zurich, Great Geneva and Berne. Source: elaborated by the author based in GIS analysis from Copernicus, ARE 2020, OFS and Europa.Eu data.

Ecological risks and socio-spatial marginalization

The miss match between the planning model and the current urban structure of the agglomeration also generates another spatial paradox at the scale of the agglomeration between the different objectives of ecological transition. On the one hand, 52%[7] of the future developments are located outside the transport axes in areas with little or no transport service, which showcases the inertia of the cross-border structure and the complexity of its reorientation. However, most of them are redevelopment or projects on already artificialized land. On the other hand, while the Greater Geneva is committing to soil preservation in order to achieve net zero-artificialization by 2050, 47% of future development is planned on agricultural land among which 65% is on the French territory. The vast majority of these are located on future public transport infrastructures [fig.11]. Thus, the proposed model creates an internal contradiction between modal shift and land protection. Hence, despite the questionability of the ability to truly re-oriented growth the current model clearly puts in opposition new development and the adaptation of existing urban structure. Therefore, current planning takes the risk to support a head-along metropolization process in which new flows induced by mono-functional mass development on arable land are barely supported by new infrastructure rather than sustaining ecological transition processes. Specialized development of which the latest ZAC project in Ferney-Voltaire is a striking example, highlighted by *Terre de Luttes* as one of the most ecologically detrimental projects on the French territory[8].

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[7] GIS calculation based on public transport services in 2020 (ARE) and spatialized future development project (SITG)

[8] Rapport projet local, impact global. (in)compatibilité entre les objectifs de transition écologique et la réalité de terrain?, Terre de lutte, Mai 2022.
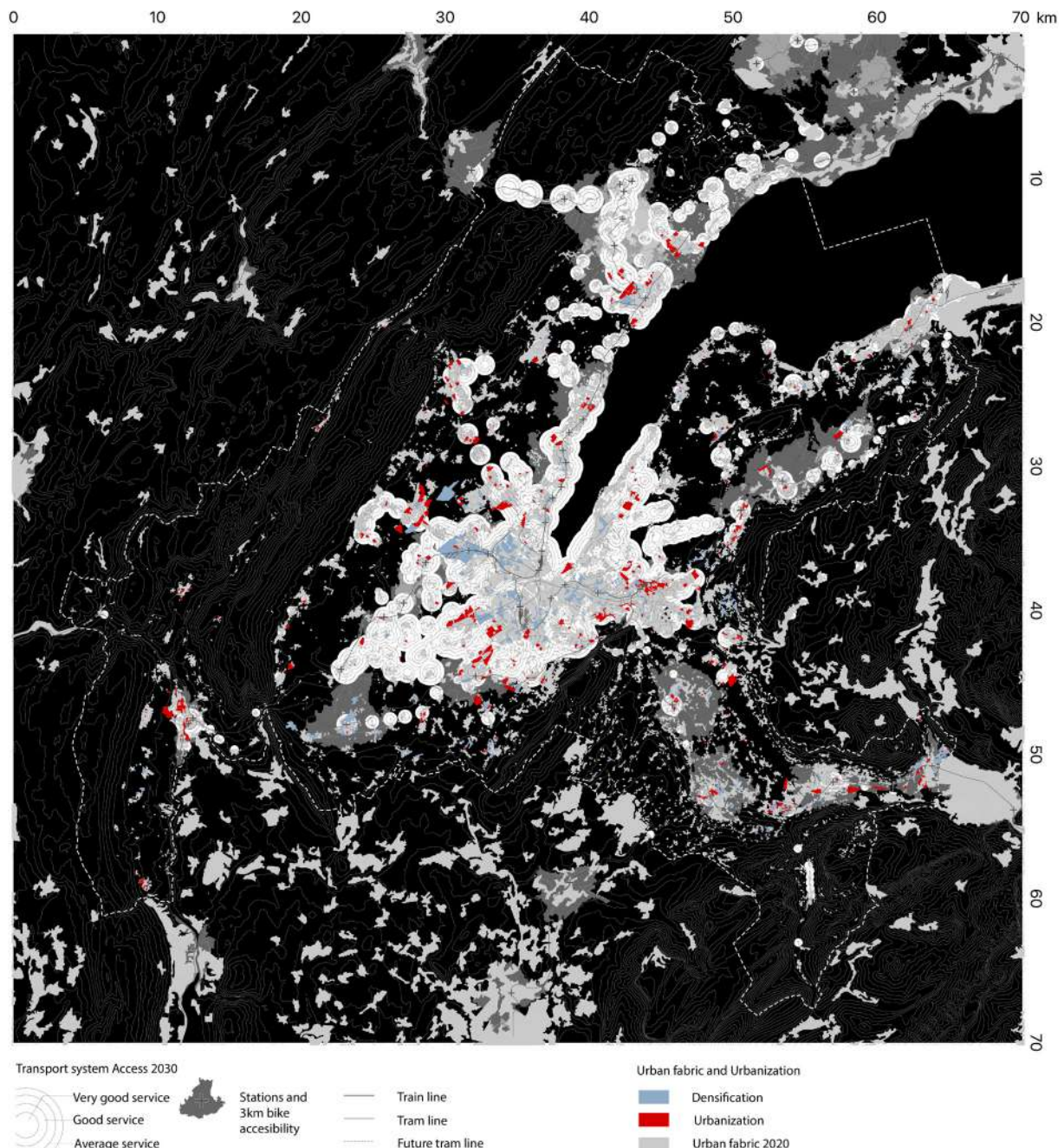
[fig.11] Great Geneva development and public transport access in 2030. Source: elaborated by the author from SITG and ARE data.

In addition to ecological risk, in the cross-border asymmetrical context of the Great Geneva, this selectivity of the strong transport and urbanization mechanism needs to be understood not only in the typical duality between transition objectives and economically driven metropolization, but also as an actor socio-spatial dynamic. As described earlier, the Greater Geneva is a socially unbalanced metropolis. As we can see, the social schism in the agglomeration is not only materialized across the border but also organized around main transport corridors leading to Geneva. While the median income strictly marks the borders, in terms of living standards the wealthiest populations on the French side are located not only in the bordering spaces but mainly in the denser well-served by public transport areas. This phenomenon is of course directly related to the very important and ever-growing number of transborder workers in the well-connected French communes. However, in parallel, we also witness that the major poverty rate augmentation in the last ten years has taken place in-between the network's axes, further marking the gap [fig.12]. This can partly be explained by the conjunction of housing and living prices, French-based salaries, and the fact that small French communes do not have the obligation to provide social housing. Nevertheless, precarity is mostly

located at the margin of the model in highly car-dependent areas. In this context the hyper-polarized and selective development model, located in communes where housing prices are high and strongly increasing [fig.2], can only enforce the socio-spatial marginalization process especially when public transport pricing is based on Swiss standards while the Canton de Geneve is slowly restricting car permeability through its frontier and enforcing prerogatives to access social housing[9].
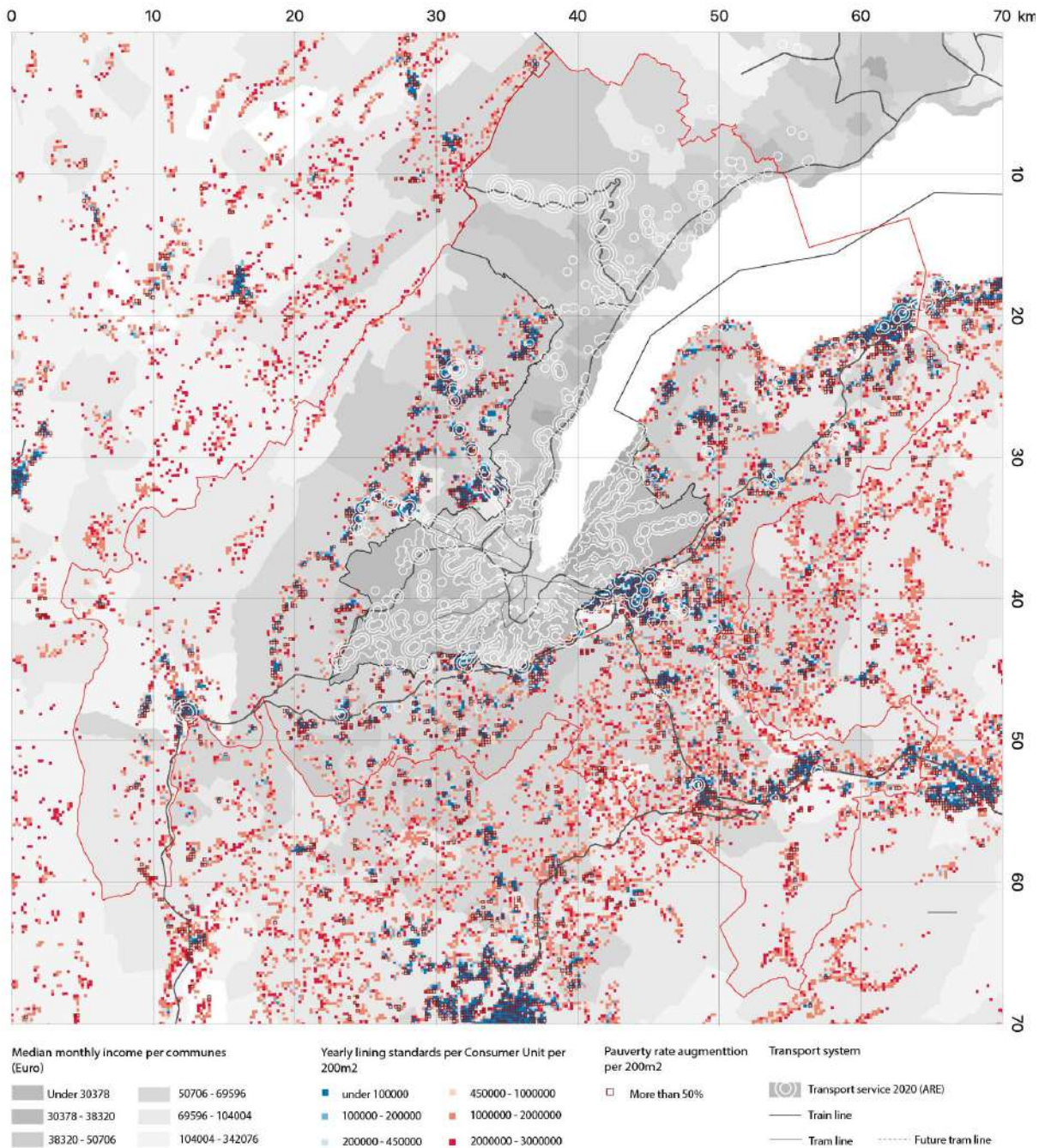
[fig.12] Left: Great Geneva development. Source: elaborated by the author from carte de l'état major, carte Siegfried, built fabric from data.gouv, SITG

Hence, this very vertical transport-based planning of growth tends to transfer metropolitan externalities to the French side of the agglomeration, with increasingly detrimental ecological impact, but also, reinforces the spatial dominance of the reticular agglomeration model directed toward Geneva, and by doing so participates to the socio-spatial marginalization of the metropolitan population 'outside of the networks'. In this sense, the current radiocentic TOD development in the transborder context of the Great Geneva metropolis is risking supporting a socially selective re-

[9] In February 2022 a referendum accepted by the population demands four years of residency in the canton (instead of two) to be able to applie social housing.

bordering (Herzog, Sohn 2014) while chasing « transition » objectives which would have an important socio-ecological impact. The conflicting Geneva bypass highway project, seen as an emancipatory tool for the French Chablais communes while having a major negative environmental impact is one of the representations of such risks.

(re)Emergence and possible counter visions
In 2020, the Foundation Braillard organized an international competition intended to propose scenarios supporting the ecological transition of the agglomeration. The visions that emerge from this consultation are drastically shifting from the image prefigured by the agglomeration plan. In the seven contributions, the radiocentric image around the central city disappears and the focus is no longer on the ability to accommodate dense growth on public transport but the ability to take advantage of the embodied built and unbuilt capital through mobility networks [fig.12]. This contribution strongly supports the analysis made earlier and tries to find more hydride urban models neither alveolar nor reticular in the usual sense. They offer an image based on the diversity of ways of inhabiting the territory and the plurality of networks. In-between spaces, whether rural, rural-urban, or peri-urban are identified as more flexible spaces which represent opportunities for the socio-ecological transition.
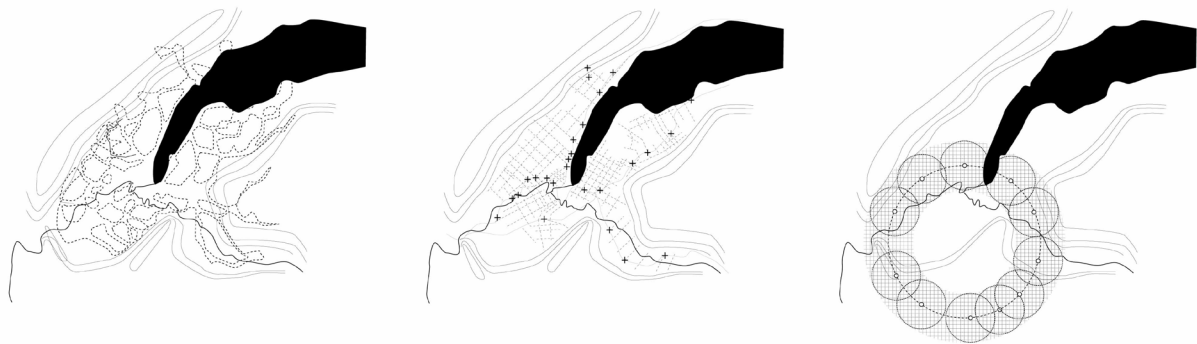
[fig.12] Left: Great Geneva development. Source: elaborated by the author from carte de l'état major, carte Siegfried, built fabric from data.gouv, SITG

Aware of the limit of the current agglomeration model in terms of transition and to the little response that the last agglomeration plans call for "proximity-living" brings to the metropolitan space "outside of the networks", the Great Geneva is currently engaged in a new form of research-by-design through the latest and ongoing PACA process. This consultation based on the work of design teams and participative ateliers, intends to draw possible transition strategies from the edge of the metropolis toward Geneva rather than the other way around. The fine grain territorial and policy analysis provided by the teams strongly enforced the idea of a transition from the ground up based on the existing territorial context. How this contribution will tackle mobility urbanization relation, and further on, how they will be translated in the 5th agglomeration plan remains to be seen.

Conclusion
The Great Geneva is today at a crossroads in its planning process, which justifies the importance of better understanding its evolution, both in terms of planning and political visions and morphological evolution, to support future development scenarios able to sustain the drastic shift that the socio-ecological transition requires. The national Swiss planning's turn against 'sprawl' lead to a growing selectivity and hierarchization of the urban fabric defining a 'one-size fits all' Transit-Oriented Development strategy for metropolitan growth, supported by financial and institutional logics. In the case of the Great Geneva, the agglomeration plan marks a drastic shift in territorial vision. The alveolar reading fades to give way to a radio-centric reticular reading echoing pre-car structures. Historical, morphological, and political reading allowed us to take a wider gaze upon the current paradoxes that are arising in the metropolis. Highlighting a situation that is not only one of "delayed" infrastructural development but of misfitted strategies with regard to the stratified cross-border context.

But despite the lack of transferability of the vertical and top-down model, the complex socio-spatial cross-border metropolis showcases the idea that the generic application of the model poses socio-ecological risks. First of all, vertical power relations tend to push metropolitan externalities beyond the border, rather than support coherent transition strategies. Second of all, the opposition between well-served compact new urban nodes and the urban fabric "outside of the networks", defined an exclusive and 'urbano-centered' transition process. Regardless of how ones gazes upon periurban and rural-urban space, they still constitute a un negligible part of the urban fabric which needs means to adapt to current ecological objectives. The model's lack of attention to in-between space does not just ignore the peripheries but takes the risk to sustain and ever to relatively increase its car dependency. Finally, in strongly asymmetric and interdependent contexts such as cross-border contexts, the TOD model risks to supports a form of selective re-bordering through transport and urbanization development, enforcing socio-spatial marginalization of the already most vulnerable parts of the metropolitan population.

At a time when the ecological transition is the main challenge of metropolises, this contribution highlights the need to take a step back from generic selective and hierarchical models of development to understand the conditions and the context in which they are implemented. It points out the necessity of a more contextual reading beyond generic growth-supported metropolization processes, to the risk of sustaining, specifically in asymmetrical and unbalanced territorial context, socio-spatial marginalization, and ecological risks. Therefore, the need for hybridization of the TOD model towards a less top-down and more articulated relation between the urban fabric, both new and pre-existing, and transport networks. More so, these hybrid strategies need to be in line with the existing path-dependent spatial logics, adapted to the specificity of places as well as plural and horizontal territorial relationships.

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From lines and nodes to edges and dialogues in the dispersed territory. The case of former railway line 87 in the Eurometropolis Lille-Kortrijk-Tournai

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Dispersed territories are facing complex collective challenges and urban questions that require large-scale transformation. This paper builds further on the conceptualisation of infrastructures as drivers of the urban condition in these territories, therefore defined as lifelines. This research-by-design departs from the idea that interventions in these lifelines eventually lead to a new form of the territory. More specifically it focuses on the case of former railway line 87 in the Eurometropolis Lille-Kortrijk-Tournai. Section-plan analysis of this partially abandoned, partially retrofitted linear element demonstrates that this initially standardised engineered transportation line that only interacted with its surroundings around its stations or nodes, has evolved into a lifeline that dialogues with the landscape and local conditions through edges. This paper therefore challenges the traditional monofunctional infrastructure design approach and tendency to retrofit former railway infrastructure for solely recreational purposes. Alternatively, railway line 87 could take up a catalyst role as prototype of a multi-layered lifeline.

Introduction

Urban-rural hybrid territories are increasingly under pressure to provide answers to collective challenges such as flooding, drought, social inequalities, energy transitions and so on. Therefore, research and design into how to rethink these territories is highly needed. In Europe, several of these hybrid territories have been coined since the 1990s, indicating the need for alternative frameworks e.g., *città diffusa* for the Venice region (Indovina, Matassoni and Savino, 1990), *ville-territoire* for the territory between Geneva and St. Gallen (Corboz, 1990), *Zwischenstadt* for the Frankfurt Rhine-Main metropolitan area (Sieverts, 1999), and *la banlieue radieuse* for Flanders (Smets, 1986). Notwithstanding their local specificities, many of these territories point to "a kind of hybrid megalopolitan spatial organisation characterised by the presence of certain urban characteristics in the absence of others" (Viganò, 2012, p. 664), forming an alternative to the urban-rural dichotomy. More recently, a separate strand of research is studying these hybrid territories both in their historical evolution and as a future project, identifying as "in-between territories" (Wandl, 2020), "Horizontal Metropolis" (Cavalieri and Viganò, 2019; Corte and Viganò, 2022), and "All City/All Land" (Gheysen, Scheerlinck and Van Daele, 2017; Gheysen, 2020). To avoid confusion, in this paper these European urban-rural hybrids will further be addressed as dispersed territories, referring among other things, to their scattered spatial configuration.

Despite the awareness of the large-scale challenges that dispersed territories are facing (European Environment Agency, 2006, 2016), answers often remain limited to copy-pasting solutions from compact cities, resulting in "dyslexia" and "agraphia" in urban design (Gheysen, 2020, pp. 103–134). This paper approaches dispersed territories from their infrastructure networks for analysis and as a starting point for design. In this research, infrastructure is understood as all physical networks that are needed to support an urban condition in a dispersed territory, therefore further defined as "lifelines" (Leemans, Van Daele and Gheysen, 2023). This paper presents the case of a former railway line in the Eurometropolis Lille-Kortrijk-Tournai, a French-Belgian cross-border territory. Through analysis of its morphological evolution and research-by-design about retrofitting, this paper aims to demonstrate the potential exemplary role of this former railway line as a prototype for a new infrastructure transition in the dispersed territory. This paper therefore tries to provide an answer to urban questions in dispersed territories through rethinking infrastructure networks.

Infrastructure and lifelines

Infrastructure and the urban condition

The role of infrastructure in dispersed territories has been studied in depth, both in analysis of the present condition e.g., as a way to "splinter urbanism" (Graham and Marvin, 2001), and in future

scenarios e.g., networks of water and roads as a "project of isotropy" (Viganò, Fabian and Secchi, 2016). Infrastructure in these cases can be interpreted as basic (and largely technical) systems of water, mobility, energy, and telecommunications that act as terms for urbanity. This type of infrastructure is sometimes also referred to as hard infrastructure, opposed to soft infrastructure which represents institutions such as healthcare, education, and government systems. Because of the spatial approach of this research the emphasis in this paper is on the first group, the physical infrastructure, and this will further be addressed simply as infrastructure.

In the context of the Anthropocene, notions such as "planetary urbani[s]ation" (Lefebvre, 1970, 2003; Brenner, 2014) have challenged theoretical concepts such as urban, rural and natural as separate categories and rather consider urbanity as a condition that stretches beyond density of population and services. The urban condition has also been described as offering an "ecology of choice", at the same time generating "positive externalities and the surplus of use value and meaning" (Dehaene, 2018, p. 270). The concept of externalities in the urban context can be illustrated by the example of the hygiene crisis in mid-nineteenth-century London during a hot and dry summer (Dehaene, 2018, pp. 270–271). In the summer of 1858, the low levels of the Thames River caused a tedious odour which bothered all social classes and thus became a collective concern. Consequently, an underground sewage system was set up, which eventually also lead to a new urban reality aboveground, resulting in new public spaces available to both wealthy and impoverished inhabitants [fig.1]. This example demonstrates how overcoming collective challenges or urban questions through infrastructure interventions created positive externalities that benefitted the whole population.
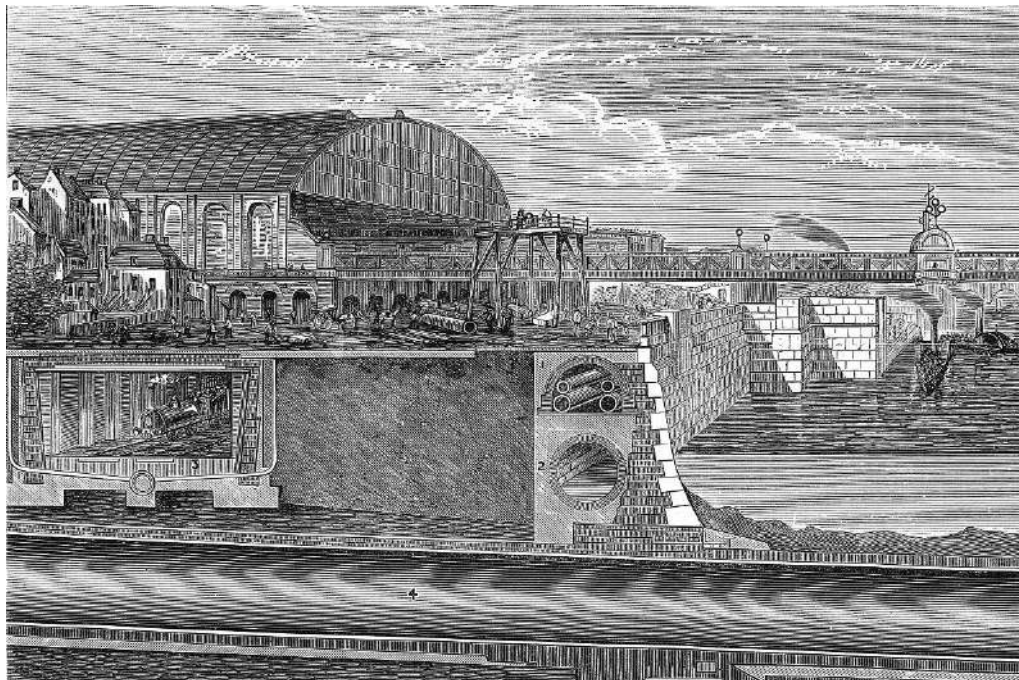
[fig.1] Section of the Thames Embankment showing the newly constructed subway, sewage collector system, the Metropolitan Railway and the Pneumatic Railway. Source: Sir Joseph Bazalgette, Illustrated London News, Vol 67/1, 1867, p. 632 © Science Museum/Science & Society Picture Library

These technical interventions in infrastructure can thus not be seen separately from their externalities or socio-spatial effects on urban questions. In literature, the urban question has been studied as part of urban sociology, relating to concepts such as the right to the city, collective consumption and urban ideology (Castells, 1972, 1977). More recently, twenty-first-century collective challenges of "changing environment, mobility problems, and social inequalities" (Secchi, 2009, 2011) are described as emblematic for the transition towards new systems of production and governance, set in a recurring pattern of crises throughout the past centuries. Today's collective challenges are part of the new urban question, in which "old distinctions […] between city and countryside are redundant, […] requiring an upgrade and a rethink" (Merrifield, 2014, p. x). To question these traditional dichotomies in the context of dispersed territories, it is necessary to understand and rethink the underlying systems of these territories.

Lifelines of the dispersed territory: conceptualisation

Similar to the above-described large-scale societal transitions in the past, infrastructure systems and networks also transform and evolve within these changing socio-economic contexts. One example is the notion of energy landscapes, indicating that the way energy production, distribution and consumption was organised is expressed in the landscape e.g., the extraction of raw materials in mines and pits (de Roo, 2011; Bhatti *et al.*, 2015). This concept motivated previous research that demonstrated that the way these infrastructure networks were designed and constructed, impacted the inhabitation of the dispersed territory and were crucial in creating an urban condition (Leemans, Van Daele and Gheysen, 2023). In this paper, infrastructure networks that are drivers of an urban condition in the dispersed territory are thus considered lifelines of these territories.

Railway 87: a lifeline in a dispersed territory

To investigate the case of a lifeline, this research is set in the dispersed territory of the Eurometropolis Lille-Kortrijk-Tournai (EM) [fig.2]. The EM is situated in the London-Paris-Brussels triangle, covering two administrative regions in Belgium (South-West Flanders and Picardy Wallonia) and one in France (the Lille metropolis). It is a 3.500 km² cross-border territory with 2.1 million inhabitants, which results in an average population density of 585 inhabitants per square kilometre, indicating its dispersed spatial configuration. As a comparison for this density, Paris has 2.1 million inhabitants on a surface of 105 km², resulting in an average population density of 20.000 inhabitants per square kilometre. Furthermore, the region is characterised by the Lys and Scheldt River valleys and a fine-mazed network of creeks and ditches with housing, agriculture, industry, and recreation in between. Apart from the metropolis of Lille and small- to medium-sized cities such as Tournai and Kortrijk, this territory is mostly made up of villages, hamlets, and dispersed buildings.
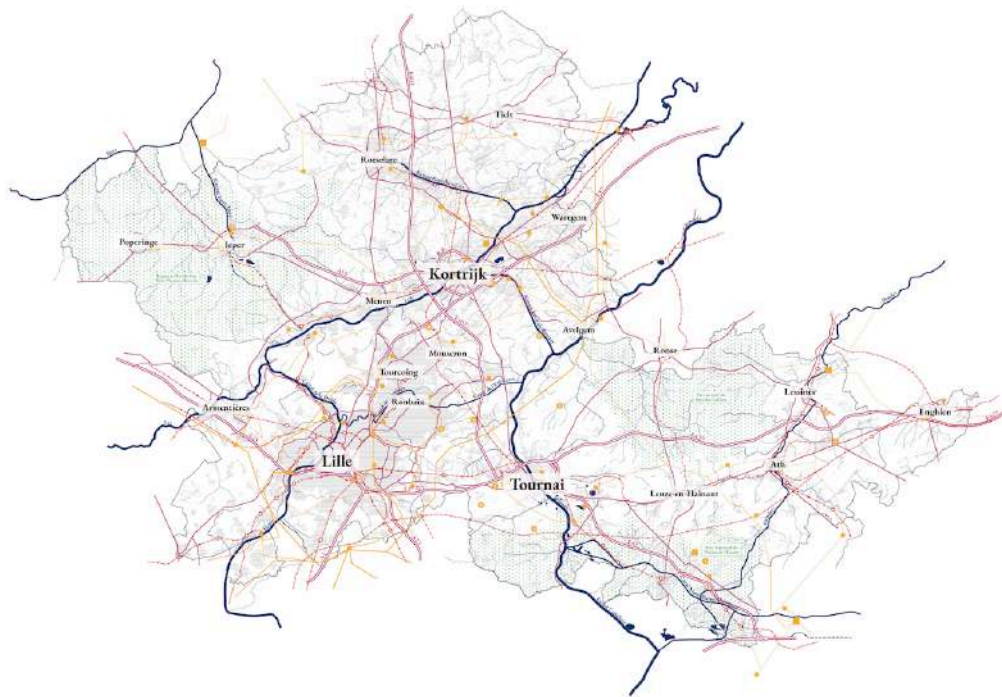
[fig.2] The Eurometropolis Lille-Kortrijk-Tournai is a dispersed territory with mixed functions supported by a fine-mazed network of infrastructure networks such as roads, railways, and waterways. Source: elaborated by Sophie Leemans based on data from Geopunt Vlaanderen, Géoportail de la Wallonie, NGI/IGN Belgium, IGN France, 2020

The EM provides a transnational context to investigate lifelines beyond administrative borders. One such lifeline is former railway line 87, which is the main case study discussed in this paper. This former railway line was active for 80 years after it opened in 1883, connecting Tournai with Ronse, Lessines and Bassily over a total distance of 60 kilometres, after which it connected eastwards to railway line 94 to Halle. Today the railway infrastructure has dissolved, but its footprint runs through

both Flemish and Walloon territory and is situated in some of the most dispersed fabric of the EM, away from the conurbations of Lille and Kortrijk which are connected through the Roubaix-Tourcoing corridor [fig.3]. The construction of railway line 87 was part of a very extensive rail- and tramway network of the nineteenth and twentieth century.
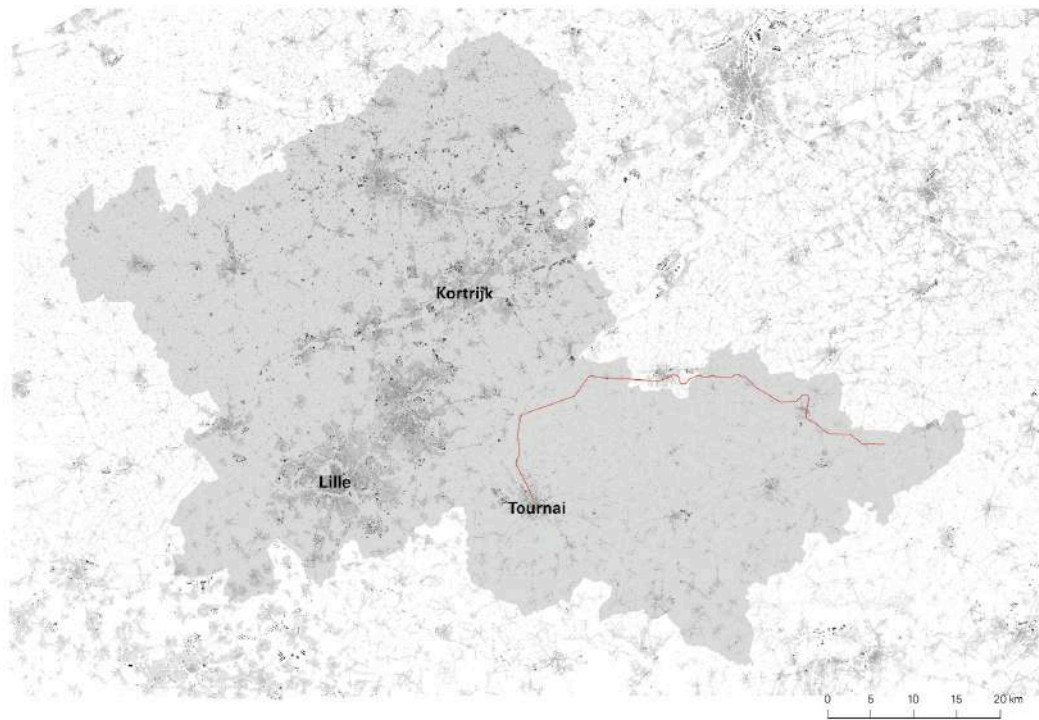
[fig.3] Former railway line 87 (in red) started in Tournai and is situated in one of the spatially most dispersed fabrics of the EM. Source: elaborated by Sophie Leemans based on data from Geopunt Vlaanderen, Géoportail de la Wallonie, NGI/IGN Belgium, IGN France, 2020

Remnant of a rich history

The socio-economic role of the railway network for the urban condition

From the mid-nineteenth century onwards, the construction of an extensive rail- and tramway network has played a pivotal role in establishing an urban condition beyond compact cities. In particular in Belgium, which had the most extensive railway network in the world at that time (Rowntree, 1910), this fine-mazed network was constructed as a way to strengthen the identity of the young state on the one hand, and to make the full territory accessible by tram or train on the other (De Block and Polasky, 2011) [fig.4]. Cheap workmen's fares in combination with laws to stimulate house ownership allowed a growing working industrial population to live a comfortable life in "the countryside" instead of in overcrowded cities as was the case in London and Paris at that time (De Meulder *et al.*, 1999; De Decker, 2020).

[fig.4] Inauguration of the electrified tramway from Kortrijk to Menen (1933). Source: Beeldbank Kortrijk

A dispersed settlement pattern already existed before the construction of this rail- and tramway network in the EM territory, as can be seen on the Ferraris maps (1771-1778). These maps display a mosaic carpet of small-scale agriculture plots, farms, houses, and natural elements connected by a fine-mazed network of paved roads and dirt roads. However, it was only from the second half of the nineteenth century that an urban condition was established in this territory, when a growing middle-class population would commute to factories for work by train and tram. The role of the extensive network of tram- and railways can thus be considered pivotal in creating this urban condition. Later, in the second half of the twentieth century the popularisation of the car and the construction of highways took over the role of this rail- and tramway network, as its maintenance became too expensive, and the network was quickly thinned out and was largely replaced by bus lines [fig.5].
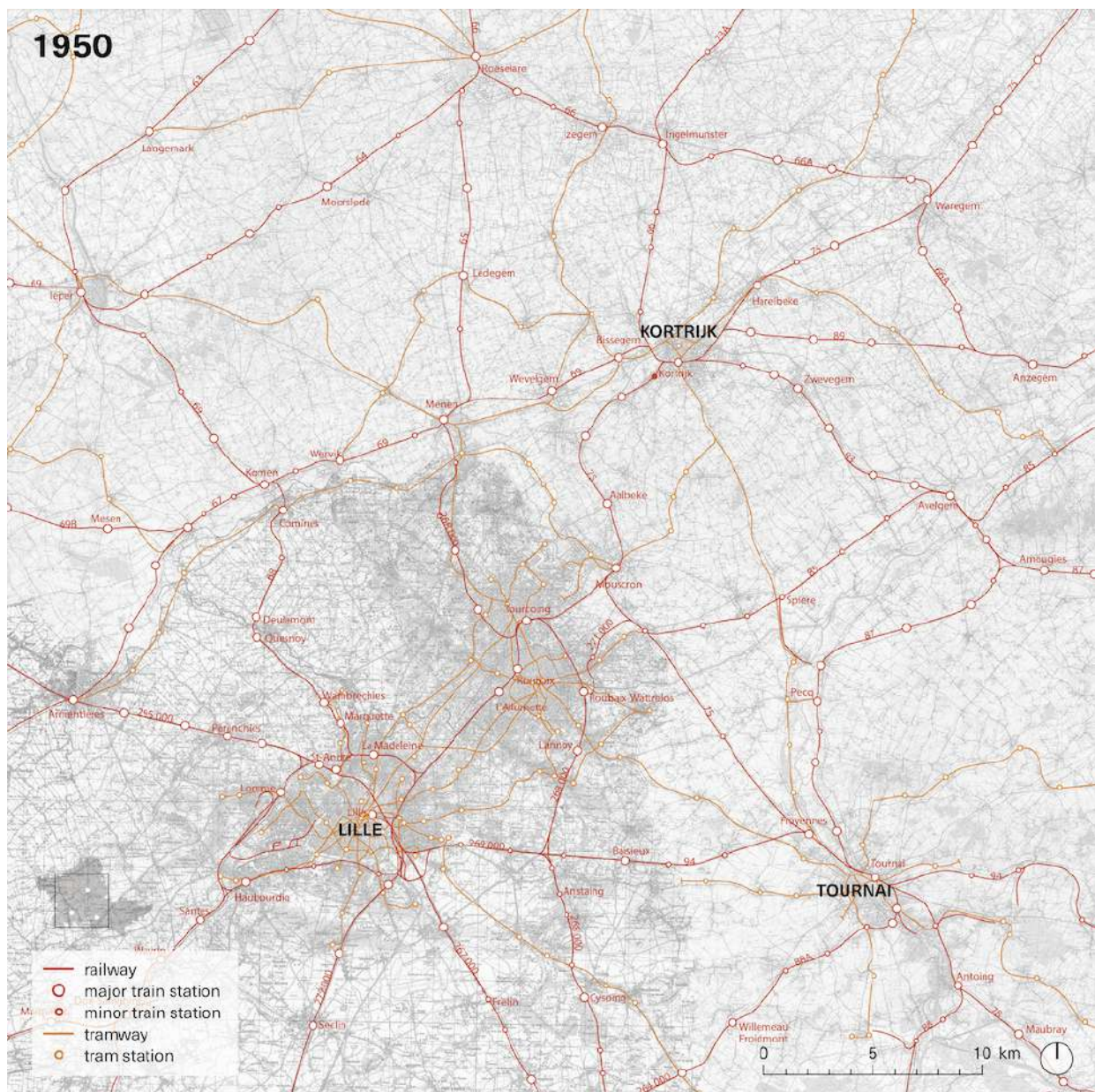
[fig.5] The extensive rail- and tramway network in the EM around 1950 made the territory accessible from cities to the smallest villages and hamlets. Source: elaborated by Sophie Leemans based on data from Geopunt Vlaanderen, Géoportail de la Wallonie, NGI/IGN Belgium, IGN France, 2020

The railway network's morphology: lines and nodes
The railway network was designed as a standardised engineered construction meandering through the landscape [fig.6]. Directly underneath the railways layers of ballast provide the necessary stability, drainage, and support for the moving weight of the railroad cars. Depending on the existing topography, underneath the ballast an embankment of compacted soil was constructed, as the incline of a railway is limited to a maximum of 2,5%. The substrate underneath this embankment had to be

slightly inclined from the middle outwards to facilitate drainage of water towards ditches on both sides. Local train station buildings were also designed in a standardised way, according to specific typologies used by the state indicated by the first year of use such as "1881", "1893" or "1895" [fig.7]. The employee in charge of the train station would live on the upper level with his family, while the counters, a waiting room and a warehouse were located on the lower level.

Locally, the presence of a train or tram stop often had a direct impact on the development of villages and hamlets (Leemans, Van Daele and Gheysen, 2023). It was not uncommon for the train stations to be located slightly out of direction from the central part of the village it served. Consequently, a *Stationsstraat* [Station Street] would then connect the main village square to the station, which later played a role in "densifying the road network" as an axis for the construction of new houses or transversal connections between the railway and the supralocal road network (De Meulder *et al.*, 2010, p. 116). Except for its stations, the railway line did not interact spatially with its direct surroundings. These lines were a mono-functional mobility corridors, built for the transportation of goods and people. On a larger scale, the railway system can thus be morphologically understood as a standardised network of lines and nodes.
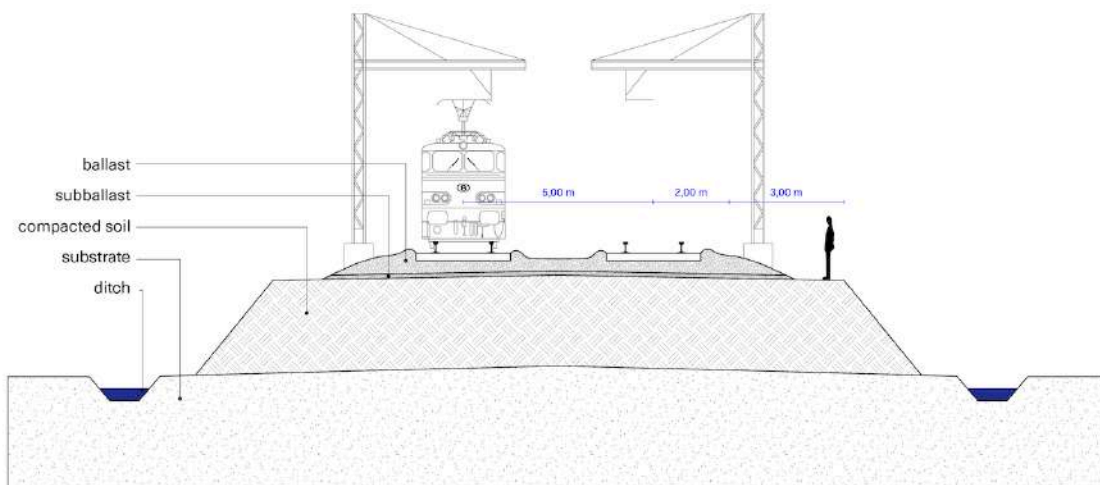
[fig.6] A standard section of an early twentieth-century railway in Belgium. Source: Sophie Leemans, 2023
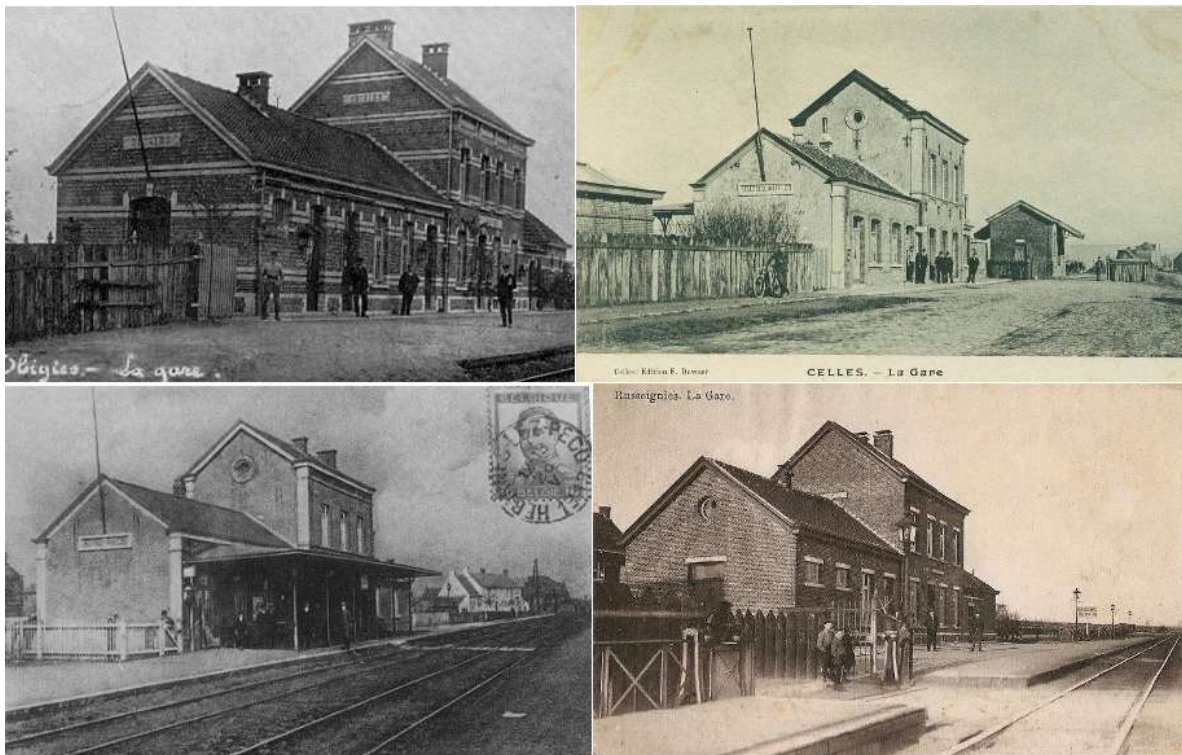
[fig.7] Former train stations along railway line 87 in Obigies, Celles, Hérinnes-Warcoing and Russeignies show a recurring station typology. Source: garesbelges.be

Rethinking railway line 87

Today's tendency to tinker at the edges

Today, a large part of the tram- and railway network has been dismantled and only a limited number of railways are still in use [fig.8]. Tramways which typically ran along an existing road have often completely disappeared and have been replaced by an extra car lane. However, the railway network was a separate system with its embankments and ballast due to the speed and loads of the carriages and were therefore not directly used in the development of the fine-meshed car network. Even though the railway tracks, ballast and overhead lines have mostly been removed, the embankments often still exist remain visible in the landscape, as is the case for railway line 87 [fig.9]. Initiatives to redevelop these embankments into walking or long-distance cycling infrastructure exist both on regional level e.g., *fietssnelwegen.be* in Flanders and RAVeL in Wallonia, and on European level e.g., EuroVelo routes. Between Ronse and Lessines, former railway line 87 has largely been turned into walking and cycling infrastructure, part of EuroVelo 5. Plans exist to extend this path westwards from Ronse towards Escanaffles, where it would connect to the existing path along the Scheldt River. A similar tendency can be detected for the station buildings, of which many have been either been dismantled or abandoned, or retrofitted into private houses, or bars, cafés, or restaurants [fig.10].
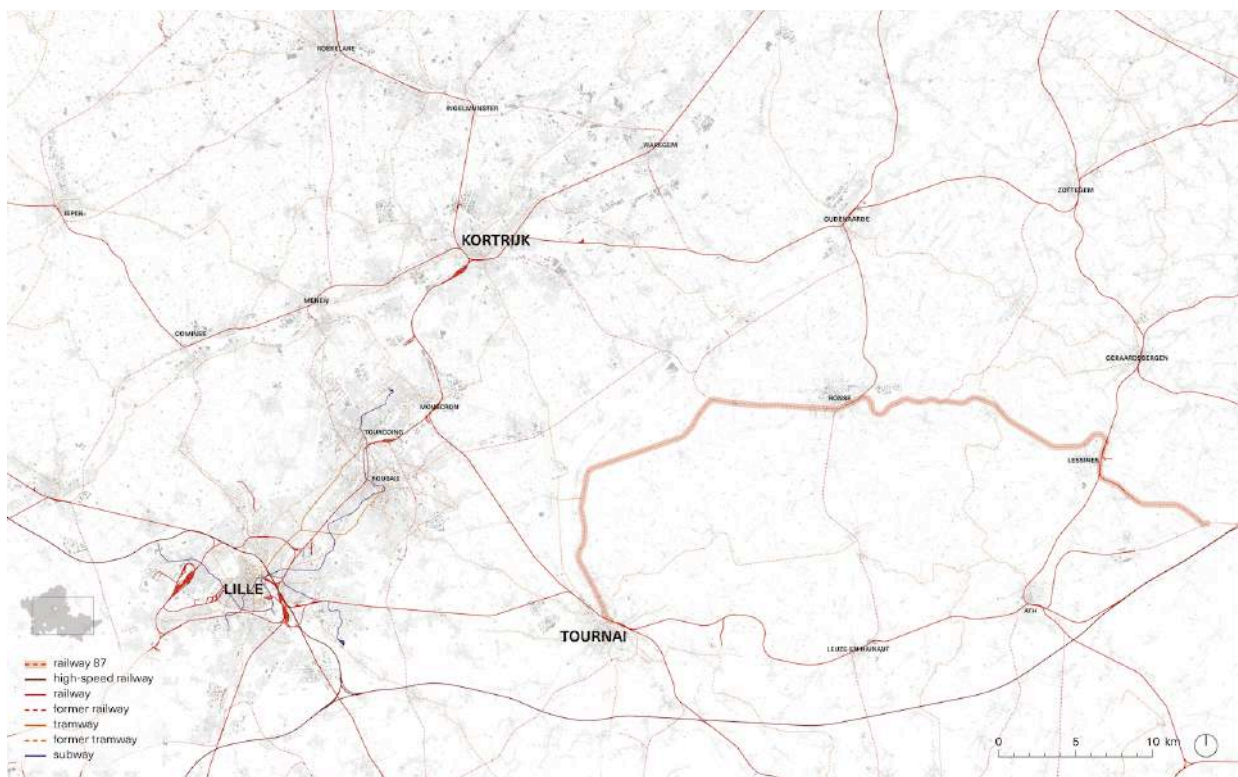
[fig.8] The (abandoned) rail- and tramway network and the built environment today. Source: elaborated by author based on data from Geopunt Vlaanderen, Géoportail de la Wallonie, NGI/IGN Belgium, IGN France, 2020

[fig.9] In Bassily (Wallonia), at the eastern end of former railway line 87, the trajectory of the railway is still visible in the landscape due to the trees and other vegetation that grew on its embankment. Source: elaborated by Sophie Leemans based on images from Google Earth and Street View, 2023

[fig.10] Former train station and railways along the former railway line 87 in Ollignies (left) and Ghoy (right), located before and after the stop in Lessines. The station in Ollignies is vacant and abandoned, while the one in Ghoy is retrofitted to a house, two common situations for former train stations in the EM. Source: Sophie Leemans, 2022

These examples along former railway line 87 emblematic for the tendency to retrofit infrastructure in an individualistic and/or recreational way. One can wonder whether the full potential of these structures is utilised, as their former role as lifelines in creating an urban condition in the dispersed territory is lost, while this territory is facing urgent collective challenges that require a thorough rethinking of these lifelines. Even though retrofitting the remaining embankments into soft mobility infrastructure can be considered part of a modal shift to stimulate transport by bike instead of by car, the effects remain limited to making soft mobility more attractive. This strategy continues a tradition of pigeonholing to think of infrastructure design and planning in a singular way, while the collective challenges of the dispersed territory today require integrating systems of waste, energy and mobility with water cycles, biodiversity, and food production.

Up to today, many of the linear plots of land of this former railway network are owned by the National Railway Company (SNCB/NMBS), even in parts where the embankment is not distinctively visible (anymore) [fig.11]. This existing network therefore forms an ideal testing bed to rethink infrastructure in the dispersed territory in a more integrated way by interacting with local conditions and as a mediator between urban and rural, city and land, human and nature. To make this possible, this paper analyses the different local conditions of the embankment along former railway line 87.

[fig.11] Along former railway line 87, just like for most of the former railways in Belgium, the pathways are still owned by National Railway Company (SNCB/NMBS) and therefore offer an opportunity for a research-by-design prototype to rethink former infrastructure in an integrated way. Source: elaborated by Sophie Leemans based on data from Google satellite and Geopunt Flanders, 2022

Four local conditions

Along former railway line 87, different local conditions can be distinguished. This paper focuses on four zooms of 2,5x2,5km in Obigies (1), Celles (2), Ronse (3) and Ellezelles (4), representative for the various land use patterns of the built environment, agriculture, and vegetation [fig.12]. Each of these zooms show a different evolution of the railway line since it was taken out of service between 1960 and 1975.

In the first zoom, the former railway embankment forms a border between the Scheldt River in the west and the main street of the ribbon settlement Obigies [fig.13]. The area between the embankment and the river is mostly used as agricultural land, but is at the same time largely marked as a Natura 2000 area protected under both Birds and Habitat Directives (European Environment Agency, s.d.). This biologically valuable area coincides with a historical wetland along the meanders of the Scheldt River before it was straightened and widened from the end of the nineteenth century onwards (Ferraris, 1771; Kiden and Verbruggen, 2001). Topographically, the railway embankment itself acts as a flooding barrier as all land between the embankment and the river is classified as a flooding zone.

In the second zoom, the former railway line runs through a predominantly agricultural, biologically poor area, with scattered buildings situated west of the village of Celles [fig.13]. This area is dominated by arable farming of winter wheat, corn, chicory, potatoes, and sugar beet with small plots of meadows scattered in between. This spatial configuration is illustrative of the agricultural intensification, one of the four "anthropogenic pressures" recently defined as drivers of European bird population decline in farmlands (Rigal et al., 2023). The decrease of elements such as hedges, and wooded edges leave little space for little space for animals and plants to thrive and migrate. In this zoom around Celles, trees and shrubs are limited to the verges of the former railway embankment, which forms the largest continuous area of this type of vegetation and thus makes it the most biologically valuable zone in the surroundings.

Compared to the first two zooms, in the third zoom the former railway line runs through a dense built environment in Ronse, partially coinciding with a railway line that is still in operation [fig.13]. The agricultural land use is limited, and the vegetation largely exists of privately owned gardens. The former railway line forms a topographic barrier in different directions. At the station, it mediates between the lower historical centre in the north and the residential expansion areas of the second half of the twentieth century in the south. West of the train station, the former railway line runs through a trench of 50 metres wide and 5 metres deep. Southeast of the station, after exiting the residential neighbourhood, the line has been redeveloped into a walking and cycling path called *Mijnwerkerspad* (Miner's path), referring to the workmen that commuted daily with this line during the

nineteenth century. Today, this path has become a collective space for social interaction and recreational activities.

In the fourth zoom, the former railway line runs through a mosaic landscape of arable land, meadows, forest, and housing [fig.13]. For topographic reasons, the railway line was constructed over a kilometre north of the village of Ellezelles and therefore stimulated residential ribbon development around the station along existing streets. In the west, a connection to former railway line 94 is visible through a diverting band of forest. Today, the line has been fully redeveloped as walking and cycling path and due to the differences in topography, in its high and deep verges plants and trees have flourished over time, making it clearly distinguishable in the landscape. Consequently, it functions as a connector between the fragmented land uses.

[fig.12] Four different spatial configurations and compositions of the built environment, agricultural land use and vegetation can be distinguished along former railway line 87 in Obigies, Celles, Ronse and Ellezelles. Source: elaborated by Sophie Leemans based on data from Geopunt Vlaanderen, Géoportail de la Wallonie, NGI/IGN Belgium, 2023

[fig.13] Plan-section analysis of transversal interaction between the former railway embankment of line 87 and the different spatial configurations in Obigies (upper left), Celles (upper right), Ronse (bottom left) and Ellezelles (bottom right). Source: elaborated by Sophie Leemans based on data from Geopunt Vlaanderen, Géoportail de la Wallonie, NGI/IGN Belgium, 2023

Inverting the networks' logic
The plan-section analysis above showed that the former railway line 87 runs through different local conditions with their own spatial configurations of built environment, agriculture, and vegetation. This analysis revealed that in each of the different zooms, a new role as lifeline has been created: as a flooding barrier (in Obigies), as a corridor for biodiversity (in Celles), as a collective space for social interaction (in Ronse) and as a connector in a fragmented landscape (in Ellezelles). Further in-depth analysis of these zooms through sections confirms that railway line 87 has evolved from a transportation line (the railway tracks and embankment) with nodes (the train stations) to a network with a thickness and edges that enter into dialogue with their surroundings [fig.14]. These local conditions have altered the formerly monofunctional infrastructure through processes of water catchment, erosion, appropriation, retrofitting, rewilding and so on. What this seems to indicate is that the network's logic has thus been inverted.

The case of former railway 87 illustrates the potential of rethinking infrastructure in a plural, multifunctional way. This approach is highly needed, as the current urban questions force us to make connections between different infrastructure systems. We can no longer design mobility infrastructure e.g., for electric bikes without taking renewable energy production into account, set up

biodiversity projects without considering their relationship with water cycles, think of food production without addressing waste and so on. To find answers to the complex urban questions present in the dispersed territory, its future lifelines will have to address multiple challenges simultaneously, considering locality as an advantage and as a starting point. Therefore, this paper advocates for spatial projects that step away from pigeonholing and mono-functional infrastructure and rather stimulate inter- and transdisciplinary design of future infrastructure systems with collaborations between architecture, engineering, landscape, and planning.
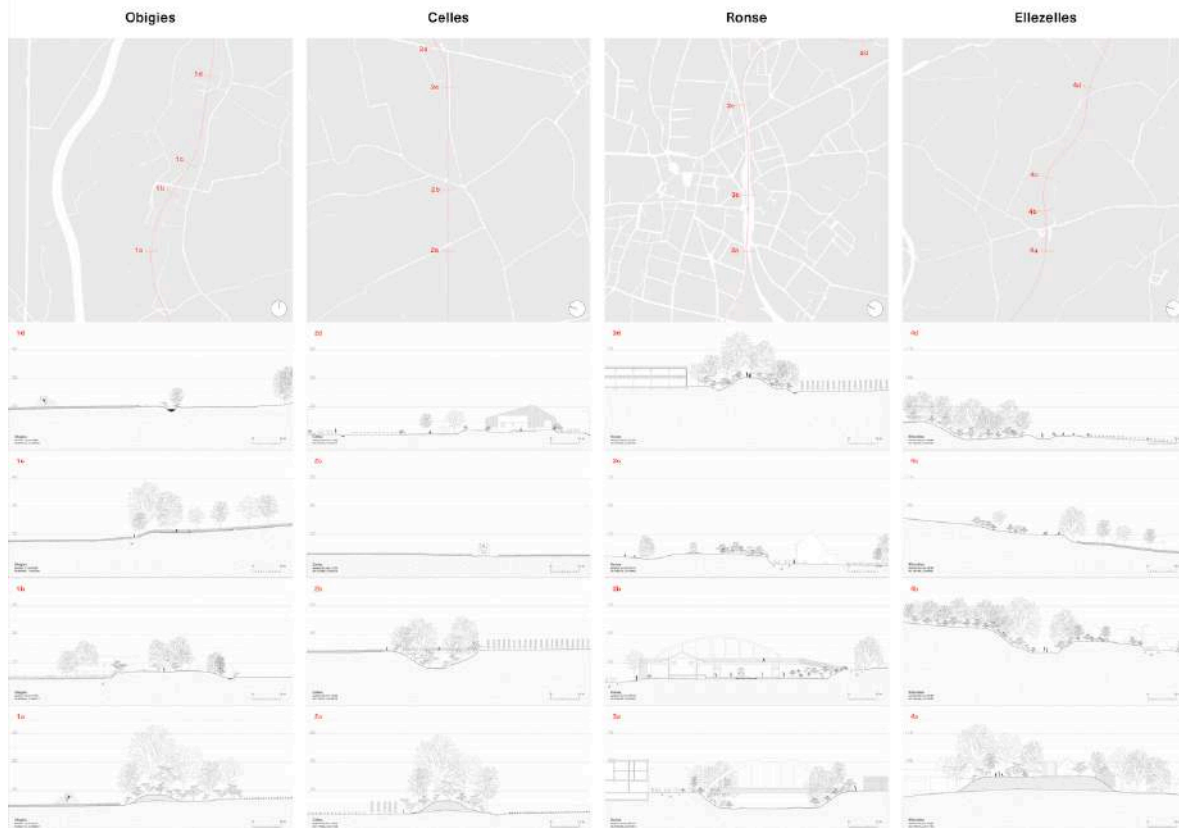
[fig.14] Local cross-sections (100m) of the former railway embankment of line 87 and different spatial configurations in Obigies, Celles, Ronse and Ellezelles. Source: Sophie Leemans, 2023.

Conclusion

Dispersed territories are increasingly confronted with urgent collective challenges and complex urban questions. This paper started from the idea that lifelines i.e., infrastructure networks that are drivers of the urban condition in these territories, could be a way to rethink these territories. Over time, these lifelines have transformed in interaction with their socio-economic contexts. The extensive tram- and railway network in the EM is such an example, evolving from a tool to strengthen the identity of a new nation state and to stimulate economic development to playing a pivotal role in creating an urban condition in the dispersed territory. Today, this network is entering a new transition, which offers the opportunity to rethink the case of former railway line 87 as a prototype alternative to the traditional, monofunctional design approach of infrastructure. However, this also means that the current reinterpretation of former railway lines as long-distance cycle routes is inadequate as it is a new variation on the existing approach: rethinking mobility infrastructure into a new type of mobility infrastructure.

A transition is needed to design infrastructure in an integrated way, linking energy systems with water cycles, food production with mobility and so on. In this new design approach, it is crucial to design lifelines that enter into dialogue with the surrounding landscape, local conditions and most importantly, other infrastructure systems. Through the analysis of the case of former railway line 87, this paper has illustrated that the former standardised line with nodes can evolve towards a multi-layered lifeline with edges and dialogues, potentially integrating architecture, landscape, engineering, and planning in the design of a new lifeline transition, and thus a new dispersed territory.

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Rethinking extractive landscapes in cross-border areas

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With the gradual cessation of the extractive industry in Western Europe, the 1990s saw the emergence of an awareness of the spatial and cultural values of abandoned mines and quarries. In the wake of the 'industrial heritage tourism', the 'mining tourism' arose, converting derelict extractive facilities into touristic and recreational attractions. In their attempt at economic regeneration, recycling projects for disused extractive plants have often neglected their relationship with landscape, comprising ecosystems and cultural networks pre-existing, contemporary and successive to mining and quarrying time. Adopting an architectural approach, the research explores the manufactured landscape resulting from the exploitation of underground resources, highlighting the spatial, cultural and ecological continuity between underground, sub-surface and surface. Hence, the 'extractive landscape' emerges as a constantly evolving manifestation of human-nature interactions.

Introduction

Whereas extractive basins extend according to the natural distribution of underground geological layers, formed over millennia, landscapes at the surface are often approached from a fragmented perspective, based on relatively recent administrative and sectoral territorial subdivisions. The case of the 'Three Countries Park' cross-border partnership area, stretching between the so-called 'MAHHL-cities' (Maastricht, Aachen, Heerlen, Hasselt and Liège) at the core of the Euregio Meuse-Rhine (BE-NL-DE), is an extreme example of such parcelling out. Here, where economic and social development have been strongly driven by the extractive industry, former mines and quarries form nowadays an 'extractive landscape', comprising far-reaching invisible underground landscapes, whose spatial, cultural and ecological potential is still largely unexplored.

The short paper presents a first development of my PhD research, moving from previous studies conducted by Professor Rita Occhiuto (Occhiuto 2014; Occhiuto 2021) at the Lab. Ville Territorire Paysage, Unité de Recherche en Architecture at the University of Liège, further investigated within the COST Action 'Underground Built Heritage as catalyser for Community Valorisation' (Pace, Salvarani 2021; Martinez-Rodriguez, Pace 2022). The research proposal was developed between 2020 and 2022 through intense exchange sessions with Professor Occhiuto and Dr Anja Brüll, manager of the 'Three Countries Park' partnership.

The text is structured in three parts: the first provides a brief definition of the research terms and method; the second presents an overview on regeneration projects for extractive landscapes in the 'Three Countries Park'; the last gives a preliminary closer view on three focus case studies, situated in the 'Three Countries Park' along the border between Belgium and the Netherlands.

Brief definition of research terms and method

Spatial, cultural and ecological factors define landscape as a system of ongoing and continuous qualitative processes (Foxley 2010), overpassing administrative borders and functional fragmentation of a given territory. The imminent need to regenerate extractive landscapes, which implies the reconsideration of surface, sub-surface and underground space, is here regarded as an opportunity to foster cooperative and sustainable cross-border territorial management and development. The verb 'to regenerate[1]' is here adopted both in its economic meaning, i.e., to bring back to a previous condition of efficiency, and in its biological and material meaning, i.e., to reconstitute damaged parts of an organism or the original properties of a product worn down and impoverished by use and time (Garzanti linguistica 2023, translated by the author).

Talking about regeneration projects for extractive landscapes, the term 'regeneration' refers to the designer's ability of recognising in the landscape a living system, or palimpsest (Corboz 1983), of coexisting materials and meanings, from which to deduce the project in continuity with the ongoing

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[1] Etymologically, the verb 'to regenerate' derives from the Latin composition of the prefix *re-*, with iterative value, and *generare*, 'to generate', with the literal meaning of 'generating again' (Garzanti linguistics 2023).

transformation processes. According to Bernard Lassus, any construction generates a new landscape, where the most indirect relationships are brought together through complementary relationships (Lassus 1981). Hence, the profound dimension of the landscape recalled by extractive landscapes sets the soil at the centre of these complementary relationships, i.e., of the interactions between man and nature over time (Occhiuto 2021). For this reason, working on extractive landscapes puts the designer in a tension between "pandering to the 'technological subjugation of Earth' in the name of its commercial exploitation" and "rejecting it in the name of an emerging 'ecological awareness'[2]"(Gritti 2020, translated by the author).

The research explores the spatial configuration of underground abandoned mines and quarries, investigating their creation, dismantling and reuse processes. From a first survey, it is possible to define these spaces as 'underground landscapes', featuring kilometre-long linear extensions of galleries, given by the composition of solids and voids, where surface and underground, outside and inside, are connected through natural and artificial elements, passages of light and darkness, of noise and silence. A variety of shapes and configurations define underground extractive landscapes based on different extracted materials and employed extraction techniques.

The fieldwork is carried out following a method in four steps: base-knowledge preparation, immersive observation, note-taking and reflective writing. To observe and understand the case studies in their context, the method consists in capturing sensory elements so as to compose one or more narratives, through photographs, video and sound recordings, sketches, and written notes through an analytical and graphic language. A retrospective reflection is then drawn to trace connections between the elements gathered in situ and the materials collected in the preparation step. Using a template-forms to systematize the information collected through qualitative fieldwork as well as through bibliographic and archival research, the study pursues two ambitions: mapping the available knowledge on a selected number of cases, considering the different languages and cultures involved as well as knowledge exchange dynamics; drawing up a cause-effect framework between the exploitation and use of the underground and the transformation of the surface landscape, simultaneously analysing the traces of extractive activity, secondary uses as well as territorial and landscape management and development projects.

Extractive landscapes in the Three Countries Park

In the 'Three Countries Park' area, the research explores various regeneration projects for extractive landscapes in response to the sharp decline of the extractive activity, originating different kinds of extractive surface landscapes relating to different types of materials extracted in the underground (brown and black coal [fig. 1], zinc [fig. 2], lead, limestone [fig. 3], silex, gravel and others).

[fig.1] The Carl-Alex coal mining area in Baesweiler, Aachen (Germany) is now converted into the Carl-Alexander-Park, an attractive pole within the *Grünmetropole* route. © Dominik Ketz, 2020

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[2] Gritti draws his consideration by referring to Karin Wilhelm's words in the chapter 'The earth, a good domicile. Ambivalences of the modern city' in: Klingan, K., Gust, K. (Eds.), *A Utopia of Modernity--Zlín: Revisiting the Functional City of Bata*. Jovis, Berlin, pp. 225-237.

[fig.2] Specimens of *Viola Calaminaria* in Kelmis (BE), a rare and protected flower species that flourishes in sites polluted by fine dust deposited by zinc mining processes. © Anja Brüll, 2022

[fig.3] Characteristic building in the centre of Valkenburg in South Limburg (NL) built with local limestone extracted from an underground quarry in the region © Chiara Caravello, 2022

Considering the time span since the establishment of the 'Three Countries Park' cooperation in 2001, the most relevant[3] architectural and landscape regeneration projects carried out in this cross-border area have been: the *Sint-Pietersberg* project (2003); the Interreg project *Industrielle folgelandschaft* (2005-2008), which gave light to two projects: *Grünmetropole*, a masterplan commissioned to the landscape studio Agence Ter (2008), and *Pays des Terrils* (2008); the *Grensmaas* consortium of industries (2006); the *IBA Parkstad* (2013-2022); the *Jaar van de Mijnen* (2015) and *Mijnerfgoed* (2015) initiatives; and the People-to-People project 'Dear landscape' (2017-2019), followed by the project 'Subterranea' (2022) commissioned by the 'Three Countries Park' to the cartopological research practice 'Dear Hunter'. In addition to these projects, consideration may be given to the active (tourism) entrepreneurs' cooperative *Land van Kalk* and the feasibility study conducted by various stakeholders from Flemish Riemst (BE) and Dutch South Limburg (NL) for the proposal of a UNESCO world heritage site, further resized to a UNESCO geopark, linked to the limestone landscape.

Particularly impactful, the *Grünmetropole* masterplan by Agence Ter [fig. 4] proposed a regeneration project based on a "metropolisation through landscape" concept (Varcin & Helms 2011) which reinterpreted the extractive landscape as a unifying agency to strengthen cross-border identity and cooperation.

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[3] According to the author's research so far.
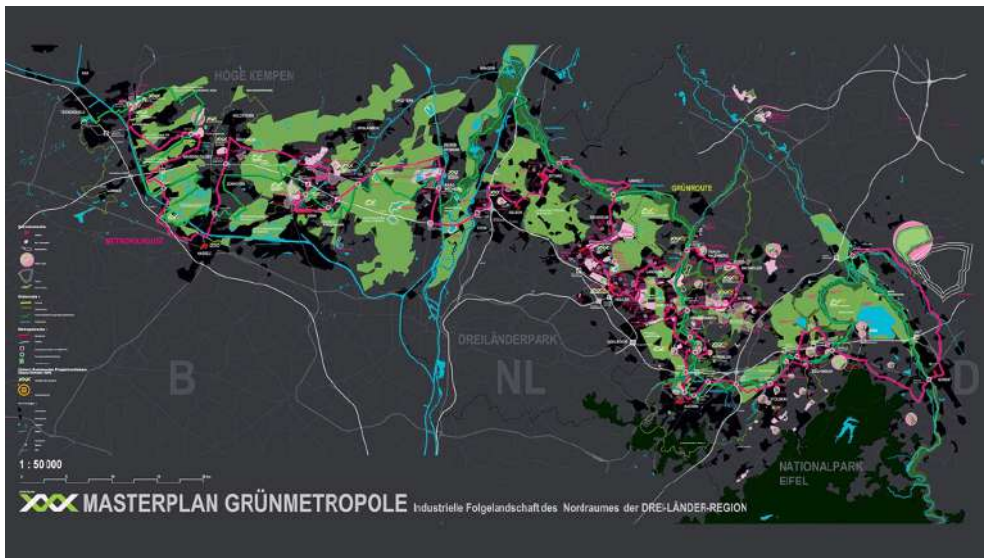
[fig.4] Grünmetropole Masterplan © Prof. Henri Bava, Agence Ter + Prof. Alex Wall, Prof. Stephen Craig, Dipl. Ing. Erik Behrens, 2008

Yet, the project mainly targeted tourist-recreational objectives, focusing on the definition of cross-border slow mobility paths to connect coal mining landmarks above ground. Moreover, it must be pointed out that, while the end of the Interreg *Industrielle Folgelandschaft* funding lead to a successful and still active project such as '*Grünmetropole*', the burden of such a large cross-border scale was not borne as fruitfully by the '*Pays de Terrils*' project, whose traces today are more difficult to be tracked across the border.

Closer view on three focus case-studies

For a number of reasons, among which a clear architectural value given by the liveable dimension of these spaces, I have chosen to focus my in-depth fieldwork on former limestone quarries, whose accessibility allow me to apply the above-described research method. The text introduces three cross-border quarries: '*NATO-berg*', located in the *Cannerberg*, across Flemish Belgium and the Netherlands, with access between the Flemish village of Kanne (Riemst) and the Dutch city of Maastricht; '*Groeve de Keel*' across Flemish Belgium and the Netherlands, with access along the Albert Canal between the Flemish villages of Vroenhoven and Kanne (Riemst); '*Réseau de Caster*' across Walloon and Flemish Belgium and the Netherlands, with main access above the small village of Petit-Lanaye (Visé) in Wallonia, along the eastern slope of the *Montagne Saint-Pierre*, between the *Meuse* and *Geer* valleys[4].

The reason why these three quarries were chosen out of many others mainly depends on two factors: the first is that they are either physically below the national border (*Réseau de Caster* and *Groeve de Keel*) or holder of an internationally strategic position (*NATO-berg*); the second is that they include a broad spectrum, perhaps the broadest possible in the 'Three Countries Park' area, of both limestone extraction techniques and after-quarrying uses. Indeed, secondary uses of the quarries[5] include "burials, church, mushrooms, cardoon and chicory's cultivation, habitation, illegal alcohol distilleries, nature reserve, shelters, storage of field products, touristic tours and war industries" (Orbons 2017, p.38).

The fieldwork reveals how these three quarries relate differently to the surface, not only as a consequence of quarrying, but also (maybe above all) depending on their secondary uses. Through preliminary considerations, we can observe that the access points to the *NATO-berg* have a gate-like appearance, as a series of secure entrances with a guard post, while the access to the *Groeve de Keel* and the *Réseau de Caster* are more blended into the landscape, not so much aesthetically as for the fact that, while preventing human access, they allow the passage as much of biodiversity, such as bats and insects, as of light and air, defining around them an intermediate space between inside and

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[4] All names in italics, written here in French, have a corresponding name in Dutch. In particular: *Cannerberg* (FR)/*Kannerberg* (NL); *Réseau de Caster* (FR)/*Groeve Caestert* (NL); *Montagne Saint-Pierre* (FR)/*Sint-Pietersberg* (NL); *Meuse* (FR)/*Maas* (NL); *Geer* (FR)/*Jeker* (NL).

[5] Referring, according to Orbons, to underground quarries in the so-called *Mergelland* area (Orbons 2017, p. 21).

outside. In all three cases, the quarries are located on a slope[6] and, therefore, horizontally accessible[7], albeit at different heights (the lowest is the *Groeve de Keel* and the highest is the *Réseau of Caster*).

The *NATO-berg* is part of the *Cannerberg*[8], which represents the western border of the *Geer* valley. Various quarries have been excavated into this hill, mainly to extract limestone blocks for the construction sector. According to Notermans, "we know that there was already a system of galleries under *Cannerberg* in the 17th century" and "we can assume that limestone was no longer extracted from the first half of the 20th century" (Notermans 2021, translated by the author). The strategic location and extension of the *Cannerberg* led to one of its limestone quarries[9] being chosen as NATO's secret military headquarters, operative "from 1954 until the end of 1992" (Notermans 2021) as an important communication centre, where military air defence and offensive operations were coordinated (Het Limburgs Landschap 2023). After the closure of the military quarter, asbestos fibres were found on site, and remediation took until 2013, when the *Stichting Het Limburgs Landschap* took over the complex, organizing since then guided tours led by enthusiastic volunteers (Notermans 2021).

On the other side of the same hill, excavated on five levels (Walschot 2010), the *Groeve de Keel* was exploited by employing a wide variety of techniques for the extraction of limestone blocks and powder, as well as flint, between approximately 1750 and 1950 (Walschot 2010, p.16). In fact, according to Walschot, despite its moderate size, the *Groeve de Keel* is the only quarry where all kinds of limestone extraction techniques can be seen (Walschot 2010, p. 7). Traces of various secondary uses can be seen in the quarry, which functioned as a shelter during the wars, and was further used "until 1962 as a mushroom farm and clandestine alcohol stockyard, later as a hiding place for stolen expensive cars, and more recently on several occasions as a house party hall" (Walschot 2010, p. 7, translated by the author). Similarly, the *Réseau de Caster* is the result of numerous quarrying phases since the 13th century (Silvertant 2010, p.23) until last century, allowing for the observation of numerous extraction techniques for blocks and limestone powder (Amendt et al. 2010). Nowadays both the *Groeve de Keel* and the *Réseau de Caster*, as many others, are nature reserves. Indeed, in addition to their great historical, geological, landscape and cultural, these quarries have "exceptional chiropterological interest" (Lamotte 2005). The *NATO-berg* is also located in a 'Natura2000' area, the '*Sint Pietersberg & Jekerdal*' established in 1998 (Natura 2000 viewer) and is part of the nature reserve '*Cannerbos en NAVO-hoofdkwartier*' owned and managed by *Het Limburgs Landschap* (Het Limburgs Landschap).

Conclusion

This preliminary comparison highlights at least two fragility factors affecting regeneration projects for extractive landscapes in cross-border areas. The first factor is the unequal cross-border distribution of founds and knowledge dissemination, responsible for an uneven project efficiency at the local level, with strong repercussions on long-term territorial development (see the different developments of the Interreg project *Industrielle Folgelandschaft*); the second is the so far limited nature of the regeneration projects in exploring and implying the landscape's vertical relationships between surface, sub-surface and underground. In fact, while for example the *Grünmetropole* concept is based on the relationship between the underground coal layer and the extractive industry development in the northern-central area of the Three Countries Park (from North Rhine-Westphalia in Germany to Flemish Region of Belgium via the Netherlands) its relationship with the underground remains limited to the distribution area of the raw material.

This approach may have been influenced by the recurring understanding on territorial developments as a stratification of functions and structures distributed on a flat horizontal surface. In fact, if the territory's functionality is efficiently described by this narrative medium, what results sacrificed in this generalisation is its complexity (Secchi & Voltini 2020). The problem does not lie so much in the actual use of layers as in their superficial understanding, in the reduction of these to

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[6] In the case of the *Groeve de Keel*, the entrance is not located along a natural slope, but on the vertical rock wall resulting from the shearing of the rock in the area between the Flemish villages of Vroenhoven and Kanne (Riemst, BE) carried out for the construction of the Albert Canal.
[7] Although it can be imagined that the quarries had several entrances throughout time (including probably shafts and stairs), the author is only familiar with currently official access.
[8] The Dutch suffix '-*berg*' indicates the presence of a hill.
[9] In particular, the *NATO-berg* was located in a quarry previously known as *Bosberg*.

simplified strata denying the multi-directional continuity of landscape. In fact, if the superposition of layers is represented as a vertical addition, each single layer is being depicted on a horizontal plan. Yet a systemic understanding of the territory necessarily involves an interpretative synthesis of both horizontal and vertical landscape's continuity elements.

Talking about extractive landscapes, the territory's multi-directional continuity is self-evident. In fact, if the horizontal strata point out the contrast between the fragmentation of the territory on the surface (administrative and property borders, functional zoning, etc.) and the continuity in the underground (watercourses, biodiversity, geological strata, etc.), the vertical strata highlight the spatial, cultural and ecological relations, finally acknowledging a connecting dimension between the ground as a whole (surface, sub-surface and underground) and the sky (air, water and their cycles).

Today, particularly in the aftermath of the energy crisis related to the ongoing war between Russia and Ukraine, a possible comeback of the extractive industry in Europe is being discussed[10]. In this sense, the current crisis has certainly increased our awareness of the fact that the need to downsize the extractive industry cannot be solved in its exportation elsewhere. What we need is a cultural change in our approach to the ground a multi-directional system, considering all its dimensions as allies in designing cooperative and sustainable territorial and landscape (regeneration) projects.

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I.c

Productive territories: circularity and conflicts

Manufacturing spaces in the Marais (Lille) and Heyvaert (Brussels) districts: hybridization and conflicts

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The manufacturing production areas within metropolitan territories are the object of the recomposition of geographical distribution of industry and the objective of public authorities to reintroduce or maintain manufacturing production within urban environments. This reasoning is in line with the aspirations of the multifunctional city and the dense city, which have been institutionalized for several years, particularly through the limitation of soil artificialization or sealing in France and Belgium. Urban public policies in Lille and Brussels participate directly in local economic development and in the production of economic space, through public spatial action and planning on a local scale, as reflected in their intervention on land and real estate. The integration of industrial activities within the metropolitan territories reveals the conflict inherent in the relationship between these activities and the city. It is materialized by a set of conflicts and by the effect of competition between the different urban functions, which are the expression of the encounter between antinomic uses, interests and values about the metropolitan space.

This article focuses on two case studies and examines the conflicts that arise within these sites. The first case concerns the rivalry between the Parc de la Sennette project and the productive activities on the D'Ieteren site in Heyvaert, which provides an insight into the conflicts inherent in the contradictory injunctions of urban planning and their impact on land resources. The second case study concerns the Refinal site in Lomme, and highlights the complexity of the social construction of the acceptability of pollution and nuisances, and the associated urban public policies. It also examines the concept of land ownership as an institution. In this sense, we are interested in the different forms of conflicts inherent to this hybridization of urban morphology and social forms and their consideration in the framework of urban planning tools.

Introduction

The strategic and regulatory planning documents of both the Brussels-Capital Region and the European Metropolis of Lille emphasize the objective of developing and preserving industrial activities on their territories. However, the eviction of manufacturing activities from urban fabrics has been a feature of tensions and conflicts between residential areas and industrial zones since the 19th century. These conflicts stem mainly from the pollution and nuisance generated by industrial activities (Massard-Guilbaud 1999; Barles et al. 2009; Le Roux 2009, 2014; Fressoz et al. 2014; Bécot 2019; Letté and Le Roux 2019). Also, competition between different urban functions leads to urban development oriented towards the construction of housing and office space, with real estate investors particularly interested in these activities deemed more profitable (Strale 2017).

This paper is part of a more general thesis on how urban public policy considers the conflicts that drive the integration of manufacturing spaces within the metropolitan territories. More specifically, the question at issue is the role played by the conflictual nature of manufacturing spaces in their location and the spatial forms they generate. In this context, how do urban public policies consider the conflicts inherent in urban functions and industrial spillover ? We will begin by highlighting the inherent conflictual nature of manufacturing spaces within metropolitan areas, then turn to two case studies and the conflicts that emerge within them. The case of the competition between the Sennette park project and manufacturing activities on the D'Ieteren site in Heyvaert provides an insight into the conflicts inherent in the contradictory injunctions of urban planning, and their crystallization in land resources. The Refinal site, in Lomme, illustrates the complexity of the social construction of the acceptability of pollution and nuisances, of pollution management policies, and questions the concept of land ownership as an institution. These two contrasting case studies are part of the logic of "monograph comparisons" or "small N comparisons" (Pinson 2019). Thus, the fields are understood through their specificities and not through the comparison of variables (Ragin 2014). They aim to highlight the multiplicity and complexity of relationships and representations vis-à-vis land ownership and urban competition articulated in manufacturing spaces.

In this study, we adopt the mapping method, which aims to examine associations and oppositions in collective situations, drawing on actor-network theory and using ethnographic and semiotic approaches (Venturini and Munk 2021; Latour 2007). The aim is to study the cumulative interactions characteristic of the construction process in manufacturing spaces, to understand how actions carry collective meaning and highlight the social and political character of decisions taken in the context of urban planning. Our methodology aims to understand and articulate the interpretations and statements of actors - both human and non-human (Latour 2007) - and the network that emerges from their interactions. Analysis of this heterogeneity highlights the changing and unstable nature of the social, technical, natural and aesthetic framework (Yaneva 2016). Semi-structured interviews are combined and cross-referenced with other qualitative data collection methods, specifically a study of urban planning documents, which aims to collect and examine written documents and other forms of material trace created in the situation under study (Hodder 2003). These documents are apprehended through their discursive and regulatory dimensions, and through their role as "material mediations" (Söderström 2001) of the choices made.

Urban Conflicts and Conflictuality in the Urban Planning of Manufacturing Areas

The multiplicity and proximity of uses make space conflictual. Thus, because of its relational character, the production of space as a "specific configuration of coexistence" (Ledrut 1976) is the result of contradictions and tensions relating to the appropriation of space and the definition of use values and quality of life (Harvey 1976). Thus, in the case of manufacturing areas, conflicts arise from the opposition between the living environment and environmental protection, on the one hand, and the "overflow" caused by industrial pollution and nuisance, on the other. In this sense, urban conflict emerges with the processes of production, management and use of the "built" urban environment (Harvey 1976), characterized by collective use or concerned by the interventions of public authorities. Thus, the conflictual dimension of these structures results from their collective character, in terms of ownership, management or use, and from the externalities due to private decisions regarding their use (Fainstein and DeFilippis 2016). This conflict over space is the result of a double dynamic of inclusion and exclusion of uses and functions operated by urban planning (Mazza 2009; Pacchi and Pasqui 2015), also to be compared with the concept of "invasion" developed by (McKenzie 2009).

The object of conflict inherent in urban planning is particularly characterized by its political nature and by the balance of power it generates through its decision-making character (Davidoff, Reiner, 1962, 109). In the context of decentralization and participatory democracy, i.e. "the increasing empowerment of subsystems in society" (Le Galès 1995), urban planning integrates the consideration of conflicts through the implementation of negotiation tools aimed at elaborating compromises (Castells 1969). The concurrent nature of urban space, as a "sedimented product of multiple intentionalities", is at the origin of the "composition effect" (Grafmeyer and Authier 2020), a process that is rooted in time and space, notably through the dynamics of urban segregation - whether undergone or chosen. Recurrently, conflict is apprehended through its visible manifestation, concretized by a protest action, a situation (Melé 2013) or an event (Gualini 2015). According to Mössner & Renau (2014), this reduction of conflictuality to protest contributes to the invisibilization of conflict within a logic of idealizing consensus. A more encompassing reading of the concept of conflict, based specifically on the consideration of positions and words, lets us apprehend conflicts that have not yet acquired an organized form (Bulle and Tarragoni 2021). Conflict is thus observed through these different forms of opposition, antagonism and competition, based on distinct logic (D'Alessandro 2013).

Heyvaert District: Balancing between Urban Park and Productive Activities

A district of flows

The Parc de la Sennette project runs through the Heyvaert District, in the municipalities of Anderlecht and Molenbeek. This neighborhood is marked by the presence of the Canal, a historic industrial axis that constitutes both a physical and symbolic boundary (Rosenfeld 2015), reflecting the socio-economic inequalities between the western and eastern territories of the Brussels region. The neighborhood's economic activity is historically marked by the presence of textile activities,

slaughterhouses and the car trade (Claudel and Schohier 2014). In this context of ex-urbanization of activities linked to the wholesale meat trade (De Caluwé 2013; Rosenfeld 2015), from the 1990s onwards, the abandoned warehouses were gradually taken over by activities linked to the export trade of used cars from Europe to West Africa, leading to a concentration of ancillary activities and services, according to the logic of proximity.

It's a neighborhood with a high flow of people, which means intensive use of public roads. The importance of these flows in the district also concerns people, as it is a working-class district characterized by a marked diversity of origins and nationalities. For several decades, it has played an essential role in welcoming the poorest and migrants, against the backdrop of an increasingly tense regional real estate market (Chabrol and Rozenholc 2015). The area is currently facing accelerating urban transformations, particularly in inner-city neighborhoods, with the multiplication of planning tools, major urban projects and renovation strategies. These transformations are likely to induce gentrification dynamics (Sacco 2010; Van Criekingen 2002, 2006) and the eviction of productive activities as residential development proceeds (Casabella and Bouillot 2018).

Competing functions and contradictory injunctions: between calming public spaces and economic dynamism

The Parc de la Sennette project represents a green promenade of over one kilometer long, in a neighborhood with a dense morphology and little green space. Its aim is to establish a landscape continuity between the Parc de la Rosée, the Porte de Ninove and the Liverpool plain, highlighting the importance of making the historic course of the Senne de Ransfort visible in the urban space. In this way, the park's layout crosses the blocks largely occupied by garage activities, and the specific D'Ieteren plot which was historically dedicated to wheel manufacturing and car assembly activities since the early 19th century. After housing car dealership activities and a mechanical workshop until 2020, when these activities were relocated, the site is now temporarily occupied by Circularium. This 20,000-square-meter space is being redeveloped by the 51N4E office, to support craft activities, workshops linked to the circular economy and events, in an incubator logic (Carlier et al. 2021).

The development of a regional park project along the Sennette route has been envisaged for several Contrats de quartier, such as Chimiste, de la Rosée and Compas. However, it has taken some time to materialize, due to the inherent complexity of an urban fabric compartmentalized by multiple landowners. Today, the park's layout is part of the vision and allocations of the Heyvaert Master Development Plan (PAD), while its operational component is part of the "Heyvaert-Poincaré" Urban Renewal Contract (CRU). This project raises the question of competition between different functions and highlights the contradictory injunctions expressed within the area, particularly about the objectives of developing green spaces, economic activities and housing. Furthermore, there are oppositions between different forms of economic activity, specifically between "old activities" such as motor trade and "new productive activities" such as crafts or micro-production, which are in line with the regional logic and strategy focused on attractiveness and favoring economic activities linked to the circular economy, local production or sustainable development (Orban et al. 2021).

Motor trade activities are perceived as a source of a nuisance, particularly according to some residents (Schohier 2018). They are seen as a problem in need of resolution by institutions (Rosenfeld and Van Criekingen 2015; Sacco 2015), which are putting in place a range of legal and urban planning tools aimed at framing and limiting this activity. In this respect, the park project seeks both to de-densify the blocks occupied by this activity and to calm the public space, widely invested by multiple flows, as a consensus-building entity. This objective can be in the broader context of the evolution of landscape representation in Brussels planning (Hubaut 2021), characterized by a shift towards a vision incorporating references to the natural environment and ecosystems. This shift is reflected in the emergence of new landscape approaches manifested in linear and networked structures, where the landscape is explicitly associated with watercourses and valleys. In the context of the PAD, the Compas-Heyvaert-Liverpool-Mons block aims to ensure continuity between the Parc de la Sennette and the Liverpool plain, and to open up the D'Ieteren site. The project focuses on the valley floor and aims to re-establish contact with the soil that has been artificially altered, by making the old course of the Sennette visible, with the aim of recovering a certain symbolism linked to this natural environment. It translates representations of a double

imaginary: that of "slowness" (Hubaut 2021; Pelgrims 2018) and that of the "link" (Hubaut 2021; Scherrer 2004) attributed to the landscape.

However, the PAD also aims to maintain and integrate productive activities within the neighborhood. The productive and active edge is a new tool that mainly concerns first floor spaces and aims to encourage the coexistence of different functions while preserving areas specifically reserved for economic activities and community facilities. However, the PAD prescriptions restrict the depth of these spaces to just 30 meters, which is very limited to encourage the development of this activity. Consequently, some stakeholders point to the risk that these spaces will not attract the desired economic activities and will remain empty, or that they will host other activities less beneficial to the neighborhood. Indeed, the PAD also allows the development of other functions such as offices or hotels, which are much more profitable for developers, perpetuating competition between urban functions.

Land Conflict: Balancing Planning and Intervention Scale

The conflict of functions is reflected in a competition for land that crystallizes the rivalries for space, and the strategic and speculative logic implemented by the various players. Despite the lack of solutions for relocating activities as part of the expropriations to build the park (Casabella and Bouillot 2018), the owners of the garages located on the Liverpool-Mégissiers urban block have adopted the logic of the property developers and negotiated the sale of their land. However, tensions between public and private players over land ownership are more marked in the case of the plot belonging to D'Ieteren Immo. This subsidiary prefers to retain ownership of the land and the economic function of the site in the short term. The conflict is based on a strategy based on anticipating the evolution of externalities, in conjunction with the emergence of new positive externalities integrated into the common good (Hardt and Negri 2011) of the district. These new externalities include the presence of green spaces, the emergence of new types of residential spaces and the development of new economic activities. These elements play an essential role in the long-term valuation of real estate and land within urban areas, enabling their profitability to be maximized. This type of temporary occupation could be described as "offensive" (Andres 2013), the aim of which is to enhance the value of the site while guaranteeing the legacy of temporary uses, while retaining control of the space. The spaces proposed for temporary occupation of Circularium remain inaccessible to local initiatives and players, and the activity present has few local roots. 51N4E's plan for the organization of the spaces is in line with this same logic of closure and maintaining the spatiality of the plot.

The park project and the inherent competition raise questions about the ownership of this land. The planning documents, specifically the PAD and the CRU, define in part the transformations of the program and the spatial aspect, and the accessibility of the site. However, the manager and ownership of the site have yet to be defined. Ownership, as a concept and an institution (Alexander et al. 2009), influences urban planning and development practices. As a subjective entity, embodied notably in representations and actions, ownership and its enactment reflects land conflicts and oppositions relating to the regulation of land use (Leffers 2018). In this context, the classification of part of a plot as a green space zone implies responsibilities and constraints regarding the use and development of this zone. Specifically, the public authorities are considering the possibility of choosing a developer to sell the land, with the aim of avoiding the development and maintenance charges associated with ownership and defined by planning documents.

However, the limitations imposed on private property in planning documents give rise to a dual perception on the part of property developers. On the one hand, they are foreseeable 'obstacles' that have been known about for several years and that needs to be overcome as part of the neighborhood regeneration project. On the other hand, they are also seen as an opportunity to take advantage of the land (Leffers 2018). It should be emphasized that the urban planning decision-making process, involving multiple actors and ideas, constitutes a dynamic political and strategic action space (Lowndes and Roberts 2013), in which property developers play a key role. In this context, it is important to note the influence they exert on trade-offs and decisions related to planning documents. In the case of the D'Ieteren site, programming remains very flexible and aims to mitigate opposition to the park project.

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Refinal plant: industrial spillover and land ownership

At the crossroads of residential and industrial fabrics
The foundry, established in 1946 and acquired in 1992 by Refinal (Derichebourg Group), specializes in melting aluminum scrap. It covers an area of around 4 hectares, on the north bank of the Canal de la Deûle, between the municipalities of Lomme and Sequedin. The facility is classified as an Installation Classée pour la Protection de l'Environnement (ICPE). It is located in the heart of a dense urban fabric, very close to the first residential areas and close to many other industrial sites along the Canal, specializing in metallurgy and recycling. To the south, on the other side of the River Deûle, lies the Produits Chimiques de Loos plant, a SEVESO site subject to a Technological Risk Prevention Plan (PPRT), and the A25 motorway. Historically, this has been an industrial district, with a strong presence of the textile industry, metal and metallurgical industries, electrical and electronic construction industries and workshops, and chemical industries established along the banks of the Deûle. Because of these industrial developments, the district also saw the construction of facilities and housing for workers, by the Lomme plan drawn up in 1934. However, against a backdrop of deindustrialization that began in the 1980s, the district set about rebuilding its economic weight and its development, notably through the project to convert the former Leblanc spinning mill into the Euratechnologies center of excellence (Collectif Degeyter 2017) and representations of the creative city (Ambrosino and Guillon 2010).
This working-class district, close to the priority district of the West Sector of Lille and the Bois-Blanc district, is the subject of renewal projects, particularly following the Rives de la Haute Deûle project. Besides the significant presence of production and logistics activities, this urban area is characterized by a specific interconnection between old factories and historic residential areas. A notable feature is the configuration of the banks of the Deûle, where the port frontage is made up of land belonging to establishments with direct links to the waterway.

Environmental Conflicts and Industrial Spillovers
Refinal Industries operate on a site that is subject to regulations governing facilities classified for environmental protection. By a prefectural decree dated 02/04/1999, the company is authorized to increase production at its aluminum refining plant and to continue to operate a platform dedicated to the recovery of ferrous and non-ferrous metals. The residents, grouped together in a collective whose aim is to raise awareness of the environmental problems associated with this site, establish a link between the appearance of nuisances and this increase in production. They highlighted various types of pollution and disturbance associated with the site's activity, particularly in terms of air and soil quality, noise pollution and nuisance caused by heavy goods traffic. With the support of the municipalities of Lomme and Lille, the residents could obtain the necessary procedures to request environmental studies aimed at quantifying the nuisance and pollution generated by this industrial facility. As a result, Lomme town council and the prefecture have demanded that a study be carried out over a twelve-month period, starting in June 2020. However, the results of the environmental studies are insufficient to provide conclusive answers due to the complexity of the situation. Indeed, some indicators studied, such as fine dust in the air, show values that are within the established regulatory limits, which could suggest compliance with these specific aspects. However, for other indicators, such as dust falling on the ground or the presence of aluminum in the air, it should be noted that there are no clearly established standards or reference thresholds.
Moreover, in the case of technical studies of pollution and policies for managing industrial pollution and spills, the limits of this approach are due specifically to the logic of relating harmful effects to factors that are almost impossible to isolate in the complex system of industrial production (Beck 2001). Another problem is the lack of synchronization between environmental assessment and studies on the one hand, and action on the other. The measures and tools put in place to mitigate environmental impacts and pollution are confronted with the fact that they are incomplete, because they are part of a logic that aims to maximize the prevention of the most significant damage (Douglas and Wildavsky 1983; Douglas Mary et al. 2001). Values and uncertainties are fundamental components of any acceptable risk problem. Consequently, it is impossible to find totally value-neutral processes for choosing between different risk alternatives.

The search for an 'objective' method is doomed to failure and risks obscuring from researchers the value-laden assumptions they make (Fischhoff et al. 1980).

The heterogeneity of representations of pollution and nuisance between different social groups is linked, specifically, to the perception of the spatial environment, the role of social position and practices within institutions (Douglas and Wildavsky 1983). The risk management process is marked by a conflictual dimension, as it seeks to reconcile prevention and safety against industrial accidents, on the one hand, and economic or urban development on the other. Depending on the era and the situation, compromises are made on different bases and the hierarchy of interests evolves (Bonnaud and Martinais 2005). The conflictual dimension is characteristic of risk management procedures and the drafting of prevention documents, but it can also manifest itself during the environmental studies phase - which results from the asymmetry and power relationships between the various stakeholders and institutions (Frère et al. 2017; Frère and Zwarterook 2016), and a lack of consultation (Grembo et al. 2013).

This conflictual nature emerges specifically in the context of contradictory visions between the various institutions, which in France is part of a context of hierarchies and complex legal relationships between the various public entities, resulting from decentralized town planning, the development of the inter-municipality and the integration of sustainable development into all public policies. While the DREAL presents the results of studies as inconclusive to assert that the plant exceeds environmental standards, some local authorities build their arguments not on regulatory standards, but rather on representations of the acceptability of nuisances about visions of quality of life: "If you compare the environment of Refinal with a traditional town center, you can see that it is impacted"[1], emphasizes the mayor of Lomme.

Land Conflict: Representations and Property
The company purchased the adjacent land, originally owned by the Chamber of Commerce and Industry (CCI), for €7.6 million. The land extends over a long strip of 4 hectares, parallel to the river Deûle, and is located between the communes of Lomme and Sequedin. Following the sale of the land, conflicts of interest arose, particularly between Lomme town council and the company. Against this backdrop, the municipality applied to Métropole Européenne de Lille (MEL) to exercise its right of pre-emption over the area. However, this request was rejected, leading to a disagreement between the parties concerned. At the municipal level, this land is considered to be a key strategic location for opening up the Marais District. More specifically, the municipality of Lomme had planned to extend the industrial boulevard across this land, thereby creating a link between Sequedin and Avenue Hegel, while facilitating the passage of a future high service-level bus line from EuraTechnologies. This logic of connection is also emphasized on a metropolitan scale, with the aim of strengthening the interconnections between the various districts and creating links between the waterway and the metropolitan center. This area, which borders on the banks of the Canal, is therefore the focus of various interests and ambitions, particularly on the part of the MEL through the studies carried out in this zone, with the aim of achieving a "harmonious sharing of the Deûle" (Bariol and Decoupigny 2022). Thus, the transformations promoted by urban projects and programs aimed at creating an interface between the city and the port, particularly by integrating the development of residential and service functions, are accompanied by conflicts and competition between the different interests (Mazy 2014).

Local authorities have used regulatory tools, specifically environmental regulations, and legal tools such as the right of pre-emption, to deal with these various conflicting issues. Thus, in this conflict, we can observe the emergence of legal and regulatory approaches. Economic conflicts over land use tend to be transformed into legal disputes, incorporating both the economic contradictions of exclusion and expansion, and the link between the legal and social relations of ownership and the socio-economic relations of production (Plotkin 2009). Beyond legal considerations, the idea of property also encompasses a moral representation of the meaning of property rights and what they are intended to protect (Alexander et al. 2009). As such, it can be the impetus for political action to challenge or change the legal framework (Freyfogle 2010). Communities have therefore sought to implement "regulatory disruption" (Rose 2000), with the aim of bringing about changes to property

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[1] La Voix du Nord. 19 mai 2023. « Les premiers relevés autour de Refinal Industries ont Parlé »

rights, from an environmental perspective. Given that the local authorities were largely involved in the decision to carry out environmental studies to highlight the pollution generated by the site, they sought to limit the company's rights both to extend its activities and the site. The company's industrial excesses call into question the nature of ownership of the site, because although property rights are limited to a plot of land, this is not isolated and forms part of a territory giving access to other collectively shared resources. In other words, ownership of a piece of land also confers access to resources such as air, water and wildlife, which can normally cross property boundaries held by several owners.

Conclusion

The manufacturing areas in Lille and Brussels are subject to a context of competition between the different urban functions determined by the logic of contradictory players. This takes the form of a series of conflicts relating to planning, the environment or uses, and the effect of competition between the different urban functions, which are the expression of the meeting of antagonistic interests for access to resources, and specifically to spatial resources. In the context of this thesis, this analysis is intended to be informed by the study of the role and approaches of public policy in addressing the conflicts inherent in urban functions and the spillover effects of industry. Public policies and urban planning are directly involved in the production of economic spaces, particularly about their decision-making dimension (Davidoff and Reiner 1962; Pacchi and Pasqui 2015)', through their intervention in the land and real estate. The link between the various forms of conflict, particularly those relating to the nuisance and pollution and those relating to land resources, contributes to the dynamics of exclusion from production uses and functions.

The example of the conflicts between the Sennette park project and the production activities on the D'Ieteren site in Heyvaert highlights the conflicts resulting from the contradictory imperatives of urban planning and their impact on the land. Similarly, the study of the Refinal site in Lomme reveals the complexity inherent in the social construction of the acceptability of pollution and nuisances, and the policies for managing these issues. At the same time, these case studies give rise to in-depth reflection on the concept of land ownership as an institution.

The question of land ownership, which is common to both case studies, is approached as a subjective entity, materializing through the representations and actions of the actors involved. Land ownership is a central element that reflects land conflicts and oppositions linked to the regulation of land use. The limitations imposed on private property in planning documents are perceived as both obstacles and opportunities by property developers, who play a key role in the urban planning decision-making process. It should also be emphasized that the physical boundaries of ownership of manufacturing spaces are part of a vast entity made up of the surrounding territories and the resources that surround them. Industrial spillovers highlight the fact that the environmental impacts and nuisances generated by productive activities are not confined to the boundaries of properties. On the contrary, they often affect collectively shared resources that cross property boundaries.

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The Walloon industrial axis: a figure of the 21th century

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The Walloon industrial axis, located at the heart of Western Europe, along the Sambre-Meuse and Haine Valley, is a spatial territorial entity that spans across the provinces of Hainaut, Namur, and Liège in Belgium. With its rich industrial heritage and diverse landscapes, this territory has undergone significant transformations throughout history. However, similar to other post-extraction territories, the Walloon industrial axis continues to be perceived negatively with a radical image from an external perspective. The Wallonia region requires a fresh narrative and, consequently, a renewed representation. In the 21st century, it is poised to become more than just a historical and cultural hub. It has the potential to emerge as a prominent territorial figure with its own distinct identity, capable of addressing contemporary urban challenges and play a pivotal role in shaping the future of urban planning and design in Belgium.

After a brief introduction, this paper will present a preliminary approach (three urban spatial figures) and propose some action research (case studies, exploration of the border, analysis of regional planning tools).

Introduction: the 'tired heroes of the Industrial Revolution'[1]

In the European space, a new 'geography of oblivion' is emerging. Territories of extraction and deindustrialization such as the Walloon industrial axis, in Belgium, the mining area of Nord-Pas-de-Calais in France, the Ruhr Valley in Germany, are part of this geography. However, these territories are critical to address growing challenges such as social cohesion, inequalities, and redistribution of wealth.

This research focuses on the Sambre-Meuse and Haine Valley, in Belgium, a former coal mining territory in the middle of Europe. In the 19th century, this axis was a place of attraction and enormous wealth, first for coal mining, afterwards for glass and steel production [fig. 1].
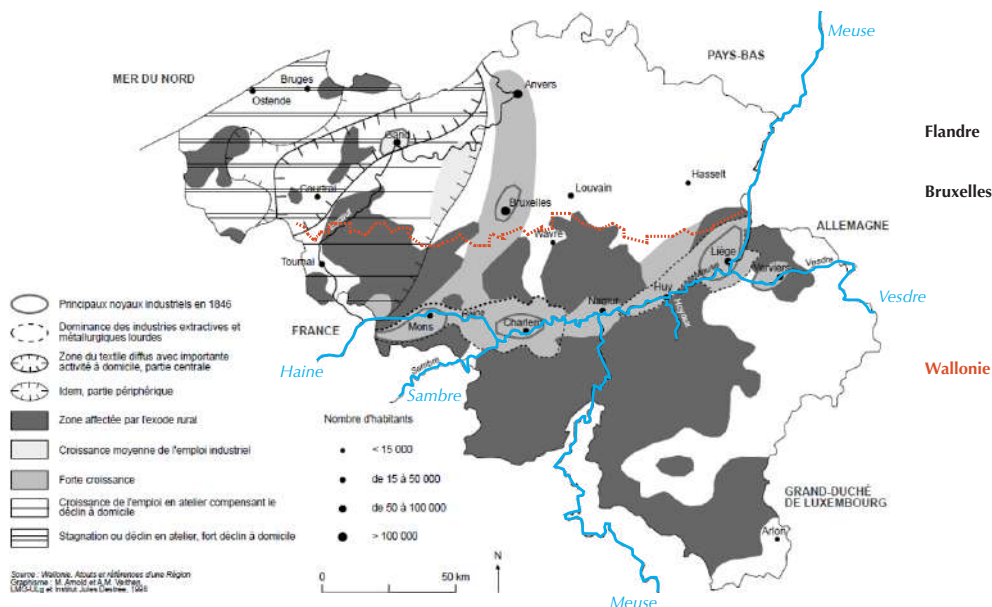
[fig. 1] An attractive European region in the 19th century. Source : *Wallonie : atouts et références d'une région*. LMG-Ulg et Institut Jules Destrée, 1998

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[1] Pasleau 2002

Nevertheless, in the 20th century the momentum of the second Industrial Revolution in Europe was deflating, the discovery of a new fuel (petroleum), more efficient and cheaper to produce, gradually reduced the economic importance of coal, and therefore of the Belgian mining towns.

The process of deindustrialization was violent and left the region empty of resources and prospects. Cities such as Charleroi, La Louvière and Liège are still paying the price in terms of poverty, inequality, and unemployment. Demographic and economic decline, an aging population, incomes or GDP below the national average, low education levels are all evidence of this. The consequences on the spatial capital, in terms of soil and groundwater pollution, are also inestimable.

To the outside view, the Walloon industrial axis has still a radical and negative image [fig. 2].

[fig. 2] *Le cœur noir de l'Europe*, World Press Photo @Giovanni Troilo

A part of the new industrial and productive narrative of Wallonia is still developing in the same space, but in different conditions. The resources of these areas, such as soil and landscape, are exploited by richer territories. Often, industries settle in the valley for multiple reasons: to take advantage of tax breaks, to enjoy large spaces available and to use hydraulic and railway infrastructures inherited from the first and second industrial revolutions.

Nevertheless, these factories no longer employ local people, whose schooling and training are no longer adapted to their needs. The big companies attract engineers and researchers with high levels of qualification, who are rather reluctant to settle next to the workplace, preferring cities of greater wealth, better connections and facilities such as the first or second urban belt of Brussels.

We can deduce that incomes are still generated in the Walloon axis but spent in different places.

While the major cities, like Charleroi and Liège, take individual initiatives, the intermediate territories suffer more easily from external interests.

However, as the former industrial Walloon axis is at the heart of Europe, next to the major wealthy areas, it benefits from the exceptional landscapes of Haine, Sambre, Meuse valleys, good accessibility, as well as from the proximity of hospitals and universities.

How to reconcile the productive and the presential economy? How to make the Walloon axis an attractive space for qualified workers and their families? How to include in the future transition the population already residing there? How to preserve the ecological assets of the valleys facing the challenges of climate change?

The Wallonia region requires a fresh narrative and, consequently, a renewed representation.

The current spatial potential of industrial and productive Walloon axis figure has never been exploited[2], beyond a common history linked to coal mining.

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[2] The scientific literature on social and economic issues of the Walloon industrial axis is extensive. Conversely, there is a lack of literature focusing on spatial analysis. To my knowledge, the urban planning research about the Walloon industrial axis has focused on specific spatial sequences or specific themes (e.g.: Furlan's doctoral thesis focused on the wasteland areas around Charleroi ['On worn out landscape. Mapping wasteland in Charleroi and Veneto central territories']; E. Baldin doctoral thesis is about landscape regeneration approach of brownfields with case studies in the Wallonia region and Northern France industrial basin; as postdoctoral researcher, D. Peleman lectured the course Theory of Urban Design and his research 'The Laborious Landscape' dealt with the historical interaction between, industrialization, urbanization, and *labour* in Belgium.). This research seeks to bridge this gap.

The strategic planning tools in the Wallonia region still reflect in terms of areas, poles and axes inadequate concepts that do not help understanding its overall value and which leave entire areas outside the positive economic dynamics.

Regarded as a unique territorial figure, with its landscape, infrastructure and human capital, the Walloon industrial axis may be able to federate projects and actors and become a tool for sustainable development.

An approach

Title
The title has a threefold significance.

'The Walloon Industrial Axis.' This specific territory is the field of research as a part of a 'geography of oblivion,', which is strategic for a more balanced development of the European space.

'Figure.' The contemporary European city has taken on new forms, leading to a questioning of traditional urban planning practices. The concept of 'fragment' in contrast to 'continuity' is often employed to describe the nature of the contemporary city (Secchi 2001). While previously, expansion was the focus, the present goal is to reconfigure the entire urban or territorial structure based on a shared, long-term vision. 'Figure' refers to a specific urbanistic approach that considers the project and the design as the knowledge producers (Viganò 2017).[3] First, the project requires a long descriptive process, then a prospective effort, through a new organization of space. The figure is a tool of spatial re-composition, a technical device for urban design and urban planning.

'21st century.' "A century never begins on the first day of its calendar and never ends on the last." (Secchi 2005) We are already two decades into the 21st century, but the 20th century appears to have a long aftermath and still influences many of the choices made in the current planning decisions. However, the new century has starkly emphasized the impacts of climate change and the depletion of resources, as well as the resulting social inequalities (Secchi 2011). Cities and territories will need to prioritize the solving of these issues. However, tackling the environmental challenges requires long-term planning and consensus among different regions regarding a shared vision of the future. Images and metaphors serve as complementary and conceptual tools in describing and envisioning this approach. They often prove effective in fulfilling this role, as they offer both foresight and intuition.[4]

Theory and practice
The theoretical framework of this research is currently being developed. Until today, I have relied on my professional experience where practice and theory have consistently intertwined, but the theoretical part has never been made explicit and described.

This research presents an opportunity to bridge this gap by defining cognitive strategies and reconstructing my personal references within the expansive realm of urban design theory.

Hypotheses and thesis
The thesis argues that the entire Walloon industrial axis constitutes a single territorial figure capable of addressing the challenges posed by climate change and socioeconomic transition. The hypotheses are grounded in design explorations conducted within Paola Viganò's practice (La Louvière, Val de Sambre, Herstal) as well as my own research in LAB705 practice (Liège, La

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[3] The importance of the project as a tool for revealing places and planning for sustainable development will be highlighted throughout the research. Indifferent to the accelerations of the contemporary city, every territory is made up of slow stratifications (Corboz 1983), traces of which inevitably remain. The task of the project is to detect them. The urban or territorial project is understood here as an instrument capable of articulating different scales of urban planning, both in its spatial and figurative aspects and in its social and economic ones, through a morphological axis (space) and a process axis (time) (Palazzo 2010).

[4] Today, their capacity is measured both negatively and positively. The appellation '*Pays noir*' for the Charleroi region, for example, is a persistent image (label) that is difficult to erase; the appellation 'Green Metropolis' of the cross-border region between Rhur, Aachen and Limburg is an attempt to reprogram a territory, also by acting on people's imagination; Sheffield, with its heavy industrial past, is now known as 'the greenest city in the UK'. Jean-Louis Subileau, commissioned to draw up a report on the state of the Bassin minier in the Nord-Pas-de-Calais region, writes: *"Il faut jouer sur tous les atouts susceptibles de provoquer ce changement d'image. La mutation 'de l'archipel noir en archipel vert' doit être rendue visible de façon éclatante grâce à la mise en valeur de la Chaîne des parcs et des canaux et à l'offre de véritables usages dans cette armature exceptionnelle d'espaces."* (Subileau 2017)

Louvière, Tubize). These explorations have unveiled similar phenomena resulting from deindustrialization across distant territories[5]. Nevertheless, the responses to these phenomena differ, as do the spatial sequences that compose the figure. This thesis aims to demonstrate that taking a transversal design approach to the industrial axis can yield coordinated responses that are more effective than individual initiatives.[6]

A portrait: social, economic, or ecological space?

The strategic location of the axis, positioned between major Belgian urban centers such as Brussels, Liège, and Charleroi, as well as its proximity to the economically prosperous European diagonal (Blue Banana, GDP 2019 in the EU), presents a range of opportunities and challenges for its development. The first part of this thesis will focus on analyzing the territorial shape. This will involve describing the existing infrastructure, transportation networks, and land use patterns, assessing their effectiveness in promoting regional connectivity, economic growth. Additionally, this study will explore the cultural heritage, landscapes, natural resources, and ecosystem services of the Walloon industrial axis, recognizing their potential as catalysts for sustainable urban development.

The urban history and morphology of the Walloon industrial axis are closely intertwined with various elements, including water and the global valley's landscape, coal, iron, heavy industry, and, more recently, the motorway and the phenomena of metropolization and dispersion. The following is an initial outline of the sub-figures that will be investigated.

Figure 1: The city on the water in the Middle Ages

During the Middle Ages, the Sambre-Meuse valley was a thriving and populated space characterized by lush grasslands, orchards, and villages. The process of urbanization in this area established a unique and intimate relationship with water resources[7]. During the Middle Ages, a network of interconnected villages linked by *chemins vicinaux* (local paths) existed alongside the prominent water features. This can be observed through the presence of ancient farms, medieval churches, and squares, which form a small architectural heritage scattered throughout the villages along the Walloon industrial axis.

In the 18th century, the Ferraris map provided evidence of a secondary system of territorial organization that emerged during the coal mining era, marking the advent of proto-industrialization.

Figure 2: The 'coal town' and the industrial machine

At the transition from the 18th to the 19th century, the map of the mining concessions reflected a transformative division of the territory. Urbanization followed a new trajectory as new towns emerged around mining sites, while small rural villages expanded and transformed into vibrant centers characterized by bustling commercial and cultural activities.[8]

From that point onward, significant infrastructure projects were undertaken to reshape the river courses, leading to the systematic channeling of the rivers. Additionally, a new network of canals was constructed to connect various industrial basins[9]. New railway lines were built along the main channels of the Meuse and Sambre rivers.

As a result, a dense network of railways and trams snakes through this new urban system.

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[5] Currently, there are significant gaps in my understanding and depiction of the figure. New case studies, such as Charleroi and Mons-Borinage, will be incorporated into the research during the PhD. These segments of the study will draw upon the work conducted by other researchers, the existing literature, and future professional engagements.

[6] Recently, a pilot project called *Contrat de Bassin minier, vers une valorisation durable coordonnée du réseau des terrils wallons* was undertaken. This marks the initial step towards a comprehensive and coordinated examination of the industrial axis, with a specific focus on the *terrils*. These *terrils* hold significant cultural and historical importance, representing the unique heritage that defines the post-industrial landscape of Wallonia.

[7] For strategic reasons, Charleroi, Namur and Liège were originally fortified cities built on high points at confluences. In the Basse-Sambre region (between Charleroi and Namur), the watercourse of the Sambre is sinuous and its main channel (*lit majeur*) is deeper. Towns and villages were built at a distance from the minor channel of the river to protect themselves from flooding, while still being close enough to utilize the rivers as communication routes (as seen in Auvelai and Jemeppe-sur-Sambre). The Meuse River, around Liège, consists of shallow bends, and the villages settled closely to the water, forming filaments that thicken at micro-confluences with smaller watercourses.

[8] This settlement pattern can also be observed in the villages of the Haine River, Haine-Saint-Paul, and Haine-Saint-Pierre, located in the region of La Louvière.

[9] One notable example of the canal network is the Canal du Centre in la Louvière, which connects the Sambre with the Scheldt system.

Simultaneously with the development of extensive infrastructure in the region, major steel mills[10] (Charleroi and Liège), glass factories and chemical industries (Val de Sambre) were established in close proximity to the water. Like 'stones'[11] in the valley, the 'city of steel'[12] emerges as a formidable figure, with high-smoking objects and gigantic industrial buildings that gradually lose contact with the historic centers. 'Cities within cities' [fig. 3], with houses, schools, and gardens for their workers. The landscape is dotted with smokestacks and prominent black hills, the *terrils*.[13]
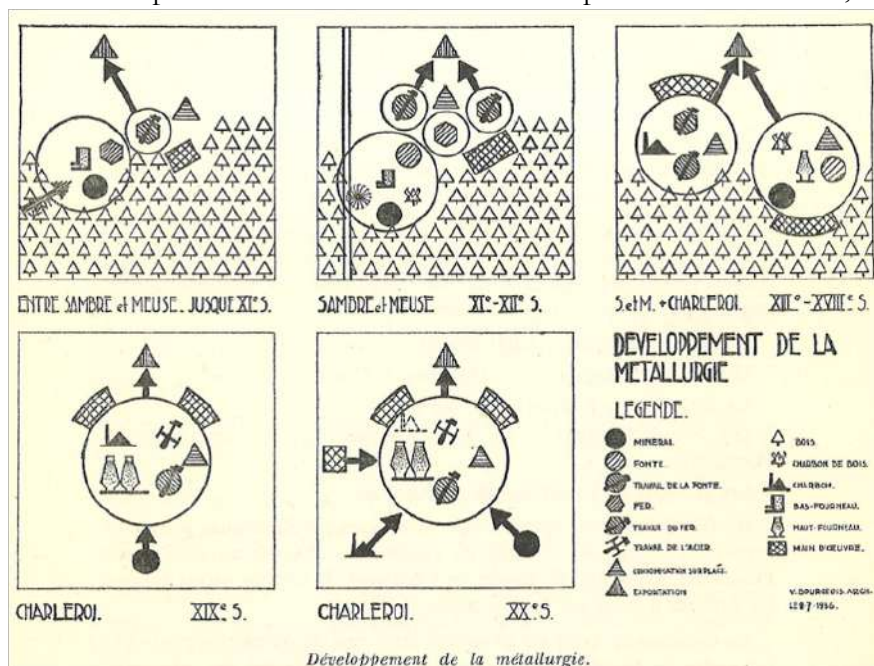
[fig. 3] Development of the metallurgy industry. Source: R. De Cooman, V. Bourgeois, *Charleroi, Terre d'Urbanisme*, 1946

Figure 3: The Higher City and Lower City

In modern times, reliance on the automobile is endless, motorways are promoted as a more efficient means of transport than the railway. Consequently, a significant portion of the extensive rail network has been dismantled.

The *Autoroute de Wallonie* (E42), designed in the 1950s to promote the reconversion of the Walloon industrial axis, spans the region from East to West. The construction of this motorway occurred in the 1960s, marking the beginning of a new era of urbanization. The motorway nimbly crosses agricultural *plateaux* and avoids major rivers. It serves as the foundation for various new infrastructures, including the Liège, Charleroi, La Louvière, and Mons ring roads, as well as the two Walloon airports and large industrial sites. Metropolitan facilities gradually shift away from city centers and gravitate towards the newly developed road network. This period witnesses a competition between brownfield sites and greenfield sites (Halleux 2011) and the suburbanization of both economic activities and residential expansion.

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[10] See Leboutte's book *Vie et mort des bassins industriels en Europe, 1750-2000*. The book begins with a description of the writer Marguerite Yourcenar as she approaches the city of Liège: "*Lors de mon séjour en Belgique en 1956, le souvenir de la gravure restée en ma possession me fit désirer voir Flémalle. Un taxi m'y mena de Liège par une interminable rue de faubourg ouvrier, grise et noire, sans une herbe et sans un arbre, une de ces rues que seuls l'habitude et l'indifférence nous font croire habitables (par d'autres que nous) et dont j'avais, bien entendu, connu l'équivalent dans deux douzaines de pays, décor accepté du travail au XX siècle. La belle vue sur la Meuse était bouchée : l'industrie lourde mettait entre le fleuve et l'agglomération ouvrière sa topographie d'enfer. Le ciel de novembre était un couvercle encrassé.*" (Yourcenar 1974)

[11] Stones and sponges are conceptual metaphors that have been used in various studies by Secchi-Viganò to describe the lower or higher porosity within an urban fabric.

[12] In 2012, Studio Secchi-Viganò and CREAT conducted a feasibility study for the implementation of a tram line in Liège. During the analysis phase, four city typologies were identified at a regional scale, each associated with a specific landscape, infrastructure, and settlement pattern: the 'dense city', ancient and compact, located between the river and the hills, the 'steel city' in the main course of the Meuse River, the 'city of mines,', around the abandoned coal deposits, the 'emergent city,' connected to new infrastructures such as highways and major metropolitan facilities.

[13] Today, the *terrils* not only represent are a very important spatial marker in the Walloon landscape, but they also hold great cultural and identity for local inhabitants. Furthermore, they are also spaces where nature has taken over. Biologists have discovered rare plant species on certain *terrils*, whose existence is intricately linked to the unique soil characteristics found on coal hills.

As previously mentioned, some large industries still occupy space near the water[14], while others close down and sell off polluted lands[15]. Many companies prefer setting up at the periphery of the industrial axis, benefiting from the agricultural land that is well connected to highways. Urbanization undergoes the same process. Those who can afford it buy a single-family house in new *lotissements*, far away from a heavy past. [fig. 4].
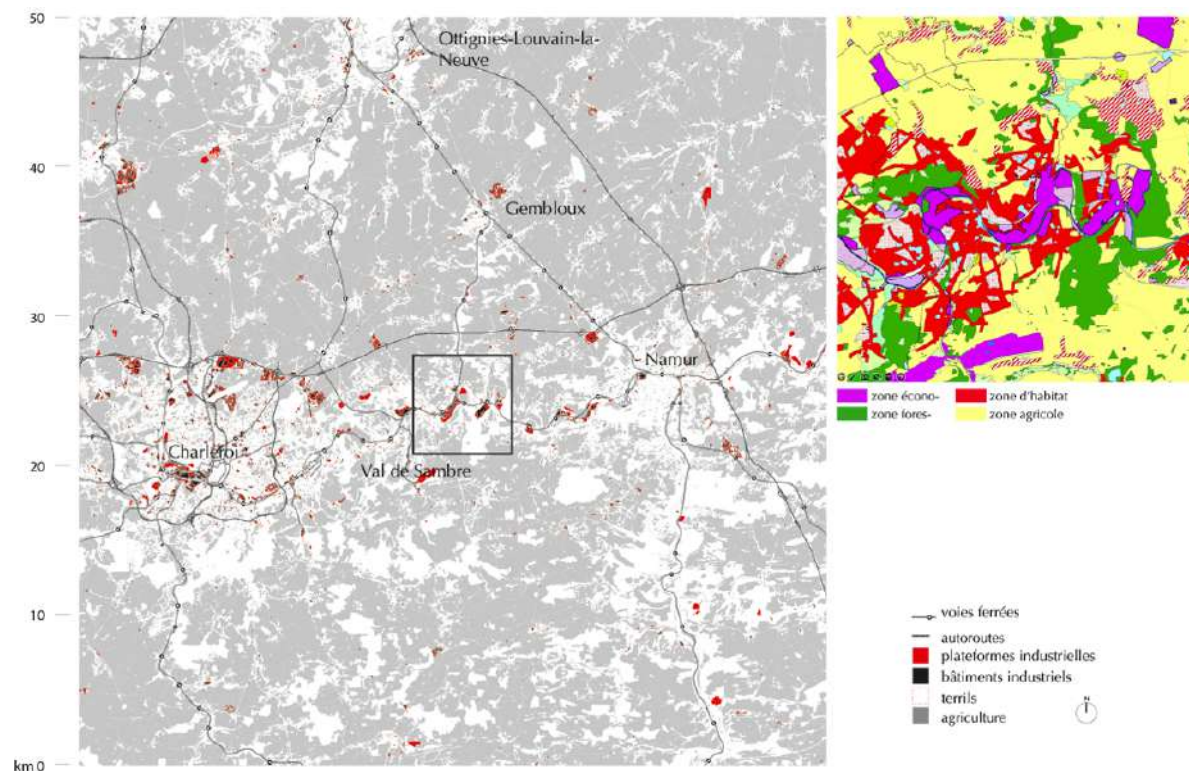
[fig.4] Productive landscape. Source: Horizontal Metropolis @studiopaolavigano

Planning tools

In addition, the thesis will investigate the current governance structures and planning frameworks. The regional implementation of European goals such as No net land take has encountered many difficulties. The main regulatory land use planning tool (*Plan de secteur*) is outdated and no longer adequately addresses current challenges.[16] The strategic planning tool (*Schéma de développement du territoire*) has been under review for several years. Although a revision was approved in 2018, it was never adopted due to being deemed overly ambitious and unrealistic. A new version was approved in March 2023 and will soon be presented to the public.

Exploring the border

A comparative study takes an integral part of this research, focusing on territories that are similar to and adjacent to the Walloon industrial axis. The aim of the study is to understand the similarities, differences, and potential challenges encountered by these territories, particularly in their post-industrial transformation. By analyzing these aspects, a deeper understanding of the various

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[14] AGC and Inovyn in Val de Sambre, NMKA in La Louvière

[15] Saint-Gobain, in Val de Sambre.

[16] The *Plan de secteur* provides the overall strategic vision and guidelines for land use planning in the Walloon Region, while the *Code du développement territorial* (CoDT) translates these guidelines into specific rules and procedures for development projects. The *Plan de secteur* sets the long-term direction, while the CoDT governs the day-to-day implementation and regulatory aspects of urban development like building permits, environmental impact assessments, urban planning, zoning regulations, and architectural requirements.

The *Schéma de développement du territoire* (SDT) is another legal instrument used in Wallonia to guide and plan the long-term spatial development of the region. It differs from both the Sector Plan and the Territorial Development Code (CoDT) in terms of scale and goals. Its primary role is to define the broad orientations and overall objectives for territorial development and focuses on cross-cutting policies and priorities at the regional level, such as mobility, economy, environment, land use, housing, etc.

dynamics and processes involved in the transition from industrial to post-industrial landscapes can be gained.[17]

By examining these areas, we seek to identify best practices, lessons learned, and innovative approaches that can be applied to the revitalization of the Walloon industrial axis and to design a new territorial and strategic figure. Through this trajectory, we also aim to foster opportunities for future collaboration between different territories (and research).

Conclusion

Through a multidisciplinary approach that combines urban planning, environmental studies, cultural heritage, and governance analysis, this research seeks to shed light on the spatial potential of the Walloon industrial axis as a territorial figure of the 21st century in the heart of Europe able to become a genuine laboratory for ecological, economic, and social transition, but also an opportunity for innovation in the planning tool field. By examining its cultural heritage, natural resources, infrastructures, and governance frameworks, we seek to contribute to the ongoing discussion on sustainable urban development and provide practical recommendations for policymakers, planners, and stakeholders involved in shaping the future of the Walloon industrial axis.

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[17] Case studies in Europe: Bassin minier in Nord-Pas-de-Calais, Euroregio, other cross-border European programs.

Designing (with) soil in circular built environment transformations

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This paper analyses potential roles of soil and soil-related processes in the circular transformation of industrial sites into healthy multi(eco)systems. Even though soil and soil science can play a significant role towards the realisation of the United Nations Sustainable Development Goals (Saskia D. Keesstra et al., 2016), it is (literally and metaphorically) often overlooked in urban landscape planning processes. Design research on the Flemish industrial sites of Haasrode and Kortrijk-North, engages with soils dual function as a living system and valuable non-renewable resource in order to understand what consequences designing (with) soil can have for circular built environment transformation. By doing so this paper tries to create a bridge between urban landscape design and earth and environmental sciences. Furthermore it reflects on how little urban landscape designers know about the living system under our feet. And how to start turning this around and include soil as a regenerative living system.

In Flanders, Belgium, industrial parks are high on policy agendas for re-investment and upgrades in terms of carbon neutrality, spatial efficiency, and circular economy (CE). Conventional architecture planning, even when designing 'eco-industrial parks', looks at industrial park planning from a technical, economical and human-centred perspective, while having more space for businesses and economic growth on the agenda with efficient use of natural resources and cleaner production. Industrial parks are not perceived as landscapes of living (eco)systems. Open and sub-surface space, are considered as new fronts of domestication and circular economy is mostly addressed through technical innovations such as the optimization of resource flows and closing waste flow loops. Such an approach overlooks the regenerative multi-purpose potentials these mostly spatially scattered, infrastructurally oriented, monofunctional landscapes have. For example, in the case of Haasrode the visualization of water within the litho- and hydrosphere has shown a tension between the infrastructural and natural water system, and the potential of regenerating the soil for a sustainable regional drinking water network.

The methodology of this paper is based on desktop research, expert interviews and interpretative mapping. Firstly it uncovers and interprets the online available soil data from the different fields. Within a systemic transect it combines this data with the invisible natural systems, the chemical, physical and biological living systems in the soil, the carbon cycle, the water cycle, vegetation and root networks,…, that interact and co-exist on the industrial park of Haasrode. Combining this data with (historical) human and natural interactions in conceptual drawings (photocollages, interpretative maps, systemic sections,..) allows a thorough analysis of the existing canvas of the built environment to pinpoint the gap in knowledge around soil. This paper considers the soil as the connecter of different aspects of life, integrating different biogeochemical cycles in a first attempt to tackle the following questions. How to design with soil on an industrial site so that the design has a regenerative impact on all living systems present, human and non-human? What is necessary for an urbanism and architectural point of view to step away from seeing the soil as an inert and technical surface? What earth and environmental sciences soil knowledge is necessary to be able to reinforce its regenerative capacities (intrinsic value and its status) through urban landscape design on a specific site? And what then are the different steps to put the living soil (back) on the map?

Soil as a foundation for circular built environment transformations

[Fig. 1] A plot at Haasrode industrial park showing a before and after excavation of valuable topsoil in preparation for the construction of a new industrial site and building. First image of Google maps, second image of March 2022 and interpretative drawing made by the author.

"Soil is the source of life on Earth. Everything here comes from the soil and returns to the soil. If we take care of the soil, the soil takes care of us and all our needs. The soil gives us food, trees, and water. The soil holds us and our dwellings on her back, yet she is so humble that she always remains under our feet." (Kamur, 2023). Satish Kumar describes in a beautiful and poetic manner how soil, the upper earth layer, in conjunction with water and oxygen, form the biosphere, the very essence and origin of all life. Additionally soil is a foundation and vital (re)source for how humans inhabit the world through our built environment. Soil provides a stable foundation for plant roots, enabling them to anchor and access essential nutrients and water. It acts as a medium for the intricate web of life, supporting diverse ecosystems and serving as a habitat for countless organisms. Soil plays a significant role in environmental processes making the earth liveable for humans. It acts as a filter, purifying water as it percolates through the ground, making it suitable for consumption. Soil also serves as a carbon sink, sequestering carbon dioxide from the atmosphere and mitigating climate change. From an anthropocentric perspective, soil and the earth layers it covers serve as primary 'matter' for the construction sector. It is covered, cut, excavated, polluted then cleaned up, displaced, dumped, processed. It is literally foundation, space humans build upon and widely (ab)use. For example clay-rich soils have been used for centuries in the creation of bricks, the most ubiquitous building material in Flanders. Furthermore soil materials such as sand, gravel, and crushed rock are essential components in concrete production, providing strength and stability to buildings and infrastructure. Soil's dual functions as a support system for life and a source of materials for construction make it an invaluable but non-renewable resource. The field of earth and environmental sciences studies soil as habitat, whereas the building sector, with a few exceptions, considers soil as a resource that can be colonized. Within the field of architecture and urban design, the aspect of soil as life support system first resonated in the 1980's with a growing social awareness about the role of soil. Around this time Architect Bernardo Secchi published 'Progetto di suolo' at the 13th congress of the International Soil Science Association in Hamburg.(David Peleman, 2022) More than 40 years later, in 2022, OASE – journal for Architecture - published a new issue on 'the project of the Soil' with the intent to "use the journal as a 'vehicle' to further explore the conversation on urbanism as 'working on territory' and the 'role of the land in the city'".(David Peleman, 2022) This PhD research wants to engage further into the discussion by constructing bridges between earth and environmental sciences and urban landscape design. To do this the topic of soil as a regenerative matter is studied on two case studies. With visualizations as a medium to translate knowledge between the disciplines and expose data gaps. Most urban design drawings show an ignorance towards soil by portraying it as big black line or undetermined brown blob with an indication of blue-green structures on top. This paper perceives soil as a basis, a foundation for the circular built environment transformation of two Flemish industrial sites following the traditions of landscape urbanism of 'working with, and not against

nature'.(Bruno de Meulder, 2010) Circular economy discourses have become popular within government and corporate sectors for tackling the socio-ecological challenges of the Anthropocene and desire changing the negative impact of mining and construction processes on local ecosystems in positive ones. (Calisto Friant et al., 2020, Julie Marin, 2021) In 2019 Marin and Demeulder proposed a 'ladder of Lansink' for a circular (landscape) urbanism. Where the most reductive form of circular urbanism is fulfilled by circular (new) construction, since new demountable buildings still require material extractions and land occupation. Then in ascending order recirculating materials, repurposing buildings, not building and finally, as the foundation of circular urbanism, regenerating nature. (Julie Marin, 2021) Regenerating nature incorporates regenerating soil in circular urbanism. Regenerative design means designing in such a way that all living things benefit from it and have space to fulfil their natural cycles, to leave them in a better state than before. So what does regeneration of soil of these specific industrial sites transformation entail? For a transformation of the sites going beyond domestication and space occupancy. With the knowledge that (top)soil is in a constant flux, different at every square meter and changing every minute, every day, every season (Bardgett, 2016). But also taking into account site specific opportunities and logics such as different (historical) development patterns , contaminations and use of soil as a resource?

Soil knowlegde from earth and environmental sciences as support for regenerative urban landscape design

The story of the soil starts with the biosphere. The biosphere is made up of the parts of Earth where life exists and represents the collective of following spheres: the lithosphere (earth), atmosphere (air) and hydrosphere (water). (Kim Rutledge, 2023) Within the Earth System Sciences this zone is called the 'Critical Zone', described by the Critical Zones Collaborative Network 'CZ Net' (former Critical Zone observatories) as "the living, breathing, constantly evolving boundary layer where rock, soil, water, air, and living organisms interact. These complex interactions regulate the natural habitat and determine the availability of life-sustaining resources, including our food production and water quality." (Frédérique Aït-Touati, 2022, CZNet, 2023). This living system, the most productive and biologically active soil layer, situates itself until a depth of approximately two meters, as the interchange between oxygen is vital for these organisms to survive and thrive. For about 3.5 billion years this zone has evolved into a complex network where food and energy are exchanged into a self-supporting and self-regulating system. Throughout time this system of bacteria, fungi and other organisms evolved into the ability to break down, decomposing, dead animals and plants. These processes release nutrients back into the soil and ocean, nutrients that are then reabsorbed by growing plants and the cycle continues. (Kim Rutledge, 2023) The formation of soil is extremely slow, and takes hundreds to thousands of years or approximately 0,1 mm a year, making healthy topsoil an invaluable resource.(Bardgett, 2016) Furthermore incredibly fascinating as soil qualities can radically differ within one square meter. Since the industrial evolution this system has been under severe pressure with the introduction of chemical fertilizers, an explosion of urban development and associated soil sealing practices in addition to the development of vast networks of subterranean pipes, wires and conduits and the extraction of soils precious metals and minerals as a resource. (Bardgett, 2016) All causing an instant transformation of materials that took the earth slow and powerful forces and vast timespans to create. (Graham, 2016) With scientist voices rising that the problem of soil degradation is even more urgent then global warming - it even adds to the effect of global warming - and that if nothing is done, the world has less than 60 years of harvest left. (Oosterheerd, 2021) However scientist and policymakers worldwide have become increasingly aware of the importance of the soil in relation to food production for a growing world population, mitigating climate change by reducing greenhouse gas emissions, regulating the soil moisture levels and boosting carbon storage in soil. The soil is after oceans, the second largest natural carbon sink, surpassing forest and vegetation. (Bardgett, 2016, Agency, 2019)

The way how soil health is determined is also evolving. Within Earth and environmental sciences, soil scientists have made enormous progress toward understanding soil organisms, their roles in ecosystems and what to study in order to determine the vitality and health of soil (E.C. Brevik, 2015) Until recently the state of the soil was only determined by looking at the physical properties - informing about the soil structure and its particle size and water buffering capacity – and by its chemical properties such as pH value and the different nutrients within the soil. However soil

scientists are now turning to the biological properties of the soil such as soil life and biodiversity. The soil life plays a role in the numerous functions the soil has, such as the structural formation, water-storing and purifying capacity, nutrients for plant growth and climate regulation. So the position that soil life has within the biosphere is eminent. (Oosterheerd, 2021) This soil life is a vibrant bunch, as in one teaspoon of soil contains more living organisms than the amount of people on earth. (Oosterheerd, 2021) The micro-organisms range from bacteria, to fungi, protozoa, nematodes, arthropods and many more that still are yet to be discovered. While soil-animals living in the first 100 cm of the soil can be grouped in 10 main groups: Woodlice, millipedes, centipedes, beetles, earthworms, slugs, snails and arachnids, ants and the mole. (Oosterheerd, 2021) In order to discover this soil life, few easy methods can be applied to determine the quality. For example with the teabag index, two types of tea bags are buried in the soil. This method gives insight in how rich and active soil life on that location is and of the rate of decomposition. (Bodemleven, 2023) This can also be determined by burying a cotton undergarment for two to three months. Visual examination can be done of structure of soil, the presence of visible soil animals and by linking biotic and abiotic specificities. Sampling earthworms are a good indicator group to evaluate soil health. Soil compaction can be tested through the use of a penetograph or taking soil samples. These samples can then also be tested in a lab on chemical and microbial biomass.
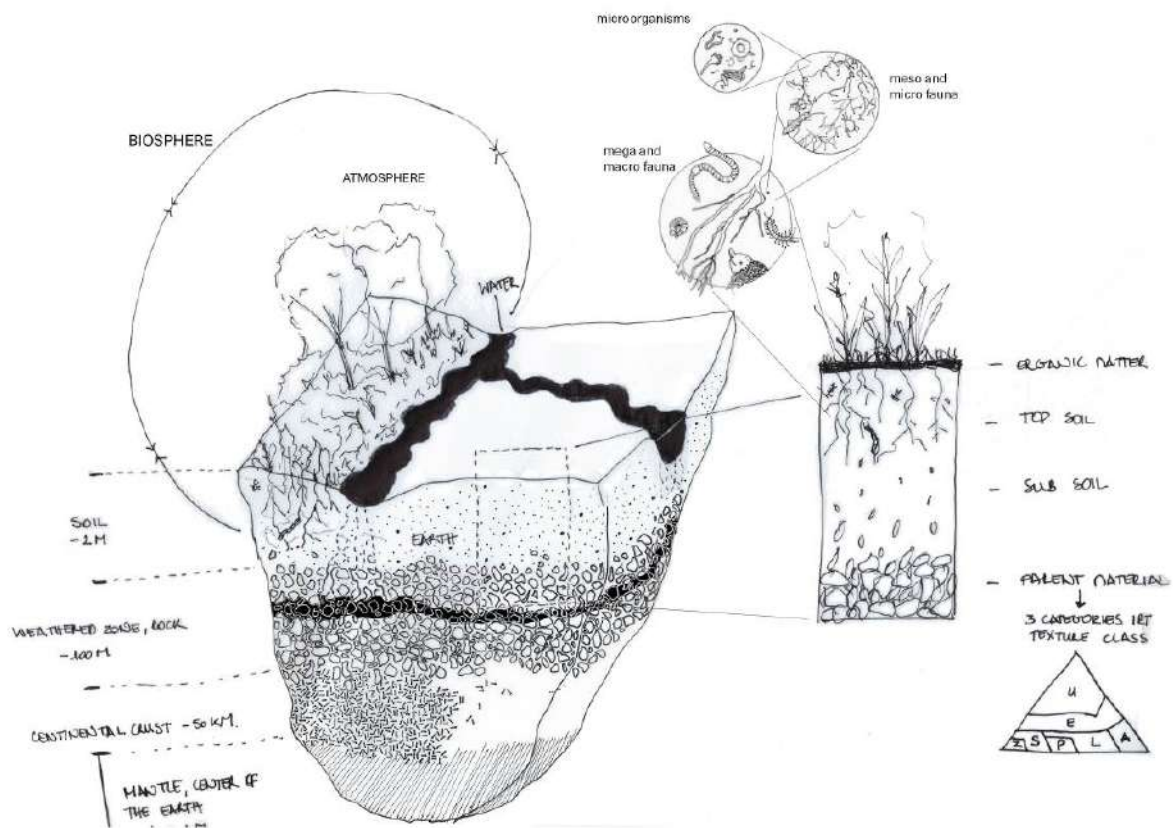
[Fig. 3] Drawing in progress on the biosphere, the living, breathing constantly evolving boundary layer. The basis for circular built environment transformations. Made by author.

The role of soil in urban planning and design of 'eco-industrial parks'
In Flanders we see a growing awareness towards soil through different policy programs such as '*Grond+zaken*' and the '*open ruimte platform' (omgeving)*, through citizen science programs such as '*CurieuzeNeuzen*' (Curieuzeneuzen, 2023) collecting data around drought and heat in private yards and '*Bodemleven*' (Bodemleven, 2023) collecting data on soil life in the region Limburg through the use of the 'teabag index'. Furthermore the Flemish policy institution OVAM advocates for good soil practices on a chemical level in relation to soil contamination, and in relation to the quality of the living soil.(Ellen Luyten, 2023) However, the integration of this importance towards the urban

design field in general and on industrial sites stays more absent. Different pioneer research projects can be found that actively integrate soil within urban areas. In the study of Atelier Track design, a collaboration with an environmental scientist from the UHasselt led to the integration of phytoremediation as landscape design to remediate BESIX historical soil contamination.(Joris Moonen, 2016) In Amsterdam a research by design study of 2021 'BiodiverCity, A matter of vital soil' advocates to create, implement and upscale biodiversity-based measures in public space directly related to soil. (Joyce van den Berg, 2021) In Brussels a co-creative interdisciplinary research investigation 'Super Terram' setup to investigate Urban nature of the 'Schaerbeek Forming' and the railway corridor till North station. The project was the outcome of an urban design studio organized in the winter of 2020 at the Université libre de Bruxelles (ULB). The site of Schaerbeek Forming can be determined as a 'waste-scape', an underused former railway shunt station, creating the perfect conditions for experimental landscape design investigations on soil and nature based solutions. This principle of experiment is something reoccurring when looking at post-industrial landscape design. Examples such as '*Buiksloterham*' (Merckx, 2020), 'Fresh Kills' (Graham, 2016), use nature based solutions and landscape in order to address, solve and/or control, historic industrial soil contamination and restore the land. Taking a look at economically running industrial sites today and 'eco'-industrial park design, the integration of in depth knowledge of the vital soil is not taken into account. For these sites it seems that the best designers, businesses, municipalities, decision makers around the table can, and want to do is invest in clean production and a more efficient use of natural resources.(forum, 2021) This is also visible on the two case study sites. One of the most recent developments on Haasrode depicts to be very sustainable and ecological as they follow an 'almost energy neutral' building design, an efficient energy management, re-use of rainwater and the implementation of more than 30 charging stations for electric cars.(Simac, 2021) From the perspective of soil this resonates with Latour's statement that soil is often not even on the map, on operational industrial sites it clearly isn't.(Latour, 2022) It rather stays perceived as an inert and technical surface with a layered network of infrastructural systems in it. Soil serves as a mere foundation upon which the built environment rests and was and is meticulously shaped over and over again. (Latour, 2022, Graham, 2016, ULB, 2021) How can urban landscape designers prioritize this reasoning and experimentation of post-industrial transformation on operational industrial sites in need of transformation and anticipate for today's and future environmental challenges? This paper works on the case studies of Haasrode and Kortrijk North in an attempt to integrate and conceptualize this reasoning. Haasrode and Kortrijk North are located on different types of landscape with different historical backgrounds. Haasrode is situated on a sandy plateau, an important drink water infiltration area. While Kortrijk North's underground has been marked with layers of archeological remnants and historical soil pollution. To address today's environmental challenges of drought, flashfloods and biodiversity loss, it will not be sufficient to transform these industrial sites only by applying industrial symbioses, additionally integrating an experimental urban landscape design in line with nature is necessary.

A reading of the soil: Haasrode and Kortrijk-Noord industrial sites.
Available soil data and knowledge to urban planning and design.
As an urban designer or planner, the first step you take embarking a new assignment, or question, is to analyze the 'site'. To read the landscape, topography, infrastructure's through a first glance at available geo datasets and aerial photographs, to quickly assess and analyze the area for interesting and suitable data, throughout different scales. In Flanders a large amount of geodata-sets and different viewing portals such as *geopunt*, *bodemverkenner*,… are publicly available [fig. 4]. However some site specific information such as detailed street profiles with indication of the underground and location of underground pipelines and cables stay difficult to retrieve. Obtaining this information for the case studies has not yet been successful.

PLACE SPECIFIC SOILDATA IN FLANDERS				
Name website	URL	Ownership?	For whom?	accessible?
De grote Grondvraag.	https://www.degrotegrondvraag.be/	OVAM - Vlaams	For all landowners in Flanders. To quickly check whether their soil may be contaminated.	free
Bodemattest	https://ovam.vlaanderen.be/hoe-vraag-ik-een-bodemattest-aan	OVAM - Vlaams	The soil certificate lists all relevant data known to OVAM about the soil. Linked to the above website. It informs a buyer of 'land' about its soil quality.	paying
OVAM Geoloketten	https://services.ovam.be/ovam-geol	OVAM - Vlaams	Geocounter on: 3M site decision, 3M phased approach remediation, 3M environment, OVAM soil file information, Landfills, Type environment and litter, Recycling centres.	free
Bodemdossier	https://ovam.vlaanderen.be/inzage	OVAM - Vlaams	To view a large number of files, you must first request the information and pay a sum for this. This information is often not yet digitised.	paying
Woningpas				?
DOV verkenner ondergrond Vlaanderen	https://www.dov.vlaanderen.be/portaal/?module=verkenner	VLAAMS	Delivers information on the underground of Flanders, the depostions and different soil formation layers.	free
Subsurface viewer	Program	VLAAMS	The 3D SubsurfaceViewer allows you to view and manipulate 3D models of the subsurface in 2D and 3D. You can pierce the model yourself and create vertical and horizontal cross-sections or profiles. You can view the position of different (hydro)geological units in the subsurface.	free
Kabel- en leidinginformatieportaal	https://klip.vlaanderen.be/public	VLAAMS	To prevent excavation damage, you need to know which cables and pipelines you may encounter in the ground when you want to carry out earthworks, That is why you are obliged to make a KLIP request. Applicate to prevent excavation damage and because you are usually not insured for damage during excavation work if you have not applied for plans.	paying

[Fig. 4] An image of a database in progress made by author to get an overview on available soil data. Differentiating as well the incentive for whom these portals were developed.

Geodata sets with potential of learning more about the soil of the two cases and the interplay with the biosphere were used to create a first 'atlas' of maps of the cases [fig. 5]. On each site, a strategic section was delimited based on interesting soil information such as locations of landfills, quarries, contamination, vegetation, groundwater extraction, underground infrastructures and pipelines, water purification infrastructure and so on. In the book 'Terra Nova', Latour stated that since the introduction of digital mapping with the use of geodata, although map-makers try to capture the reality with geodata, have mainly been creating technical maps for soil, that are emptied of life, showing an available space that can be conquered or colonized. (Frédérique Aït-Touati, 2022, E.C. Brevik, 2015) To start repopulating the underground, interactions and integration of the different spheres, different regenerative time frames and space, this paper uses site specific photocollages and systemic transect as a basis to build upon. (Julie Marin, 2020)

[Fig. 5] Left aerial map of Haasrode industrial site, on the right aerial map of Kortrijk-North. Indication of the built up of the 'atlas'. Made by author.

For the interpretation of the soil types on the different sites a closer look at the emergence of the soil association map of Flanders is needed and crucial. This map was published in 1972, after the Institute for encouragement of Scientific Research in Industry and Agriculture (IWONL) worked on a systematic and detailed recording of the soil of Belgium's territory since 1942. Soil classification was based on lithological and geomorphological criteria and had a strong agricultural focus. (R. Marechal, 1974) Because it was impossible to obtain a general overview of the soil conditions of the country, this map was accompanied with virtual soil samples across the Flemish territory. The soil association map and virtual soil samples have been digitalized over the recent years, however, they were not updated. So when we search for the soil type map of Flanders or go to the 'Databank Ondergrond Vlaanderen' (DOV) for the virtual soil samples, they still operate on samples that originate between 1950 and 1970. Providing sections, on the deeper soil parts, but have no information on actual soil life and health where important interactions occur. Furthermore, urban areas were not included in this research and stay underexplored. Through layers of historical remodeling of the environment the status of urban underground is unclear and stated as 'artificial',

'manufactured' ground or 'Technosols', built up with layers of construction debris, trash, green lawns, rock ballast and so on. (Graham, 2016) The soil association map is a commonly used map to talk about soil within urban (landscape) design, however due to its age and the aforementioned, the map does not provide a good backbone to refer to alone in terms of the 'underground'. Other information is needed to address soil health and soil layers of (historical) development in the built environment.

Case studies
The two industrial sites that are introduced as case studies were developed in the 1960's-1970's and are currently in need of a circular built environment transformation to comply to policy goals and requirements of the Flemish Government. Requirements to decrease CO_2 emissions of the transport sector with 35% comparing to 2005 and a circular economy by 2050.(Allacker, 2019) Each site that is about to be enrolled has its own spatial character, historical background and soil qualities as living system and resource.

Haasrode industrial park (IP) is located on a sand-loam plateau in the vicinity of Leuven next to the E40 highway. Historically these dry sand-loam soils did not lack water and did not suffer from flooding. These soils were described from the soil association map as soils that were suitable for demanding crops (e.g. wheat, sugar beet) and very suitable for less demanding crops (e.g. potatoes). When the soil association map was developed the landscape of Haasrode IP knew a historical use of this land as fertile agricultural fields. With the development of Haasrode IP in the 1970's these fields were turned into big plot structures with vast spaces of concrete, monofunctional use of buildings, building functions and of (open)space, lawns. And the soils that didn't suffer from drought or flooding, are affected by it today, and this will only increase due to climate change if we don't start taking action through regenerative landscape design. This is even more important since Haasrode IP is located on a juridical protected drinking water infiltration zone. From a landscape and natural point of view making Haasrode IP an important location to maximize rainwater infiltration and recharge the superficial aquifer. However the function of the industrial park is in strong conflict with this natural opportunity to tackle future environmental challenges such as drought. From a juridical point of view rainwater falling on the enormous dimensions of pavement and concrete need to be treated as waste and today be redirected towards the sewer system to prevent contamination seeping in the soil towards the aquifer. Leaving not only soil as a neglected resource but also water within this case. A strong regenerative opportunity lies on Haasrode for a moratorium on new construction on the one hand and design of landscape as a sponge in the other. A stop on new buildings and intake of land, for maximization of water infiltration. Today's monoculture lawns, present since the first developments on Haasrode, don't have the best ability to maximal infiltrate water due to their (lack) of soil life and lack of biodiversity. These lawns often have to deal with a form of compaction, making it more difficult for water to infiltrate. On the other hand the size of the plots and unbuilt character expose a huge possibility for integrating different landscape designs and regenerative uses; permaculture, forest with circular management of wood as a resource (the time you use the resource takes at least as long as it takes to regenerate it in nature), wild grass fields. Starting from a healthy soil, providing food, wood, increase in biodiversity,… The sand(loamy) soils around Haasrode IP today also know a different use. Several active sand quarries are located around the industrial park. The sandy soils are excavated as resources for building materials. When these quarries aren't productive anymore they are set up as landfills. While some landfills are used to store displaced (top)soils from building sites, other are used to store domestic waste. The landfill south of Haasrode is used to store soil of category one, meaning non contaminated soils. With point pollution, there is sp rake of pollution from a clear core. Landfills in general, just as damaged sewers and the storage pollutants can generate point pollution within the soil.
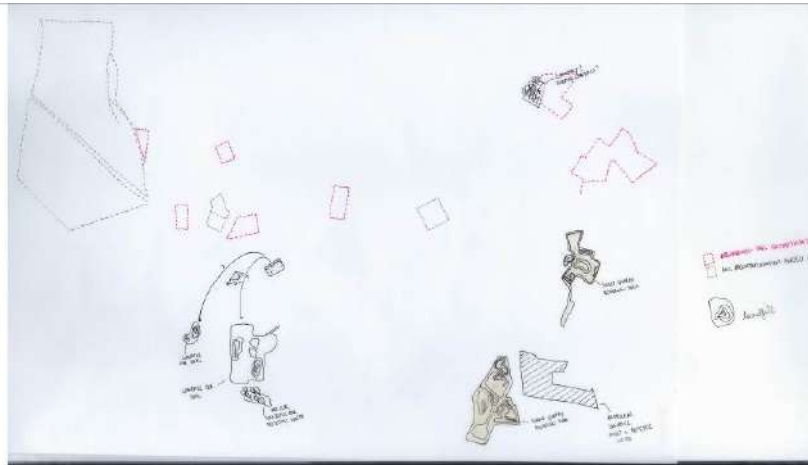
[Fig. 6] Draft indicative map of position landfills, quarries and contaminated plots in and around Haasrode IP. Made by author based on information from geoloket of OVAM.

In [Fig. 7] a first attempt to draw the current soil life on the Interleuvenlaan at Haasrode was made. However with many uncertainties concerning the soil and the underground. Going from the positioning of sewage pipes, to trying to distinguish differences in the 'brown blob'.
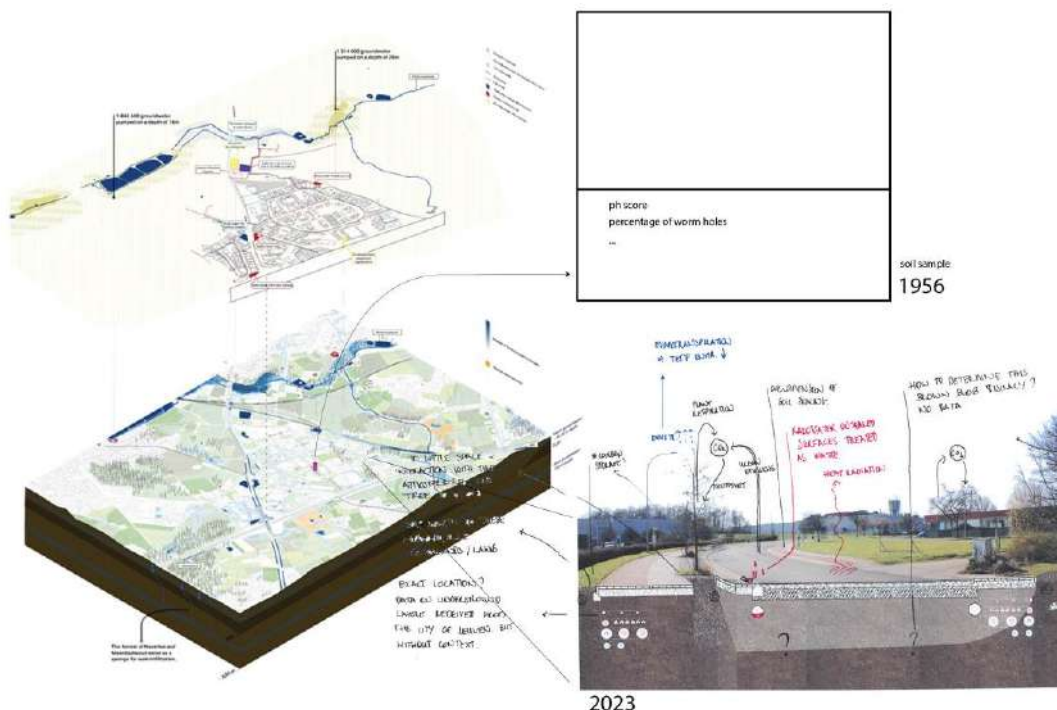
[Fig. 7] Visualization of the natural system of Haasrode with the imposed infrastructural system of the industrial site. For Haasrode a tension exists between these as the layout of the industrial site goes against nature and the importance the area has to be developed as a maximal natural rainwater infiltration zone. The photocollage on the right shows a section through the *interleuvenlaan*. A first attempt to visualise the different interactions within the biosphere, with many unknown factors and uncertainties. Drawings in progress, made by author.

The case study of Kortrijk-North starts from a rich historical background, anchored in the history of the built environment. Kortrijk-North today is a densely developed industrial site. However industrial activities of the past have left many sites with a historical contamination. The soil was seen as a waste pit, a 'sink' where people could dump their waste unseen and unbothered.(Tarr, 1996, Hemelrijck, 2021) This was also the case for Kortrijk. The industrial revolution of the 19th century was dominated by the heavy industry of coal, steel and steam power, ensuring that a smoke screen remained permanently in place in many cities. Intensive coal burning left the city with carbon precipitation and created acid rains. Kortrijk was mainly known for is Clay and Flax industry. The industries present on Kortrijk today are spin-offs of this historical activity. Fiberboard industry that is derived from the flax industry, Food industry processing waste from the flax industry, textile industry (bleaching, printing) and conserve and frozen vegetables. This industry however is a source of soil contamination.(Hemelrijck, 2021) Due to this historical placement of industries, on the soil association map the site of Kortrijk North is allocated as 'technosols' or 'urban soils' with no information on composition due to human alterations. An idea can be formed by looking at the direct vicinity. The industrial park is located in the West Flanders sandy loam region where light sandy loam and loamy sandy soils dominate.(Defrancq, 2016) Soils that are on the one hand too wet in winter and sometimes slightly too dry in summer. And on the other hand moderately dry light sandy loam soils with thick and well humus layers. Next to soil contamination, an archeological research was executed on the Noordlaan. In and around Kortrijk North, different archeological sites can be found, with findings from the past. Architectural heritage of rural character, neolithic finds, artefacts from the Roman period and several '*walgrachtsites*' from the Middle Ages. Consequently, the discovery of *walgrachtsites,* medieval timber and stone construction and waste pits is to be expected. (Defrancq, 2016)
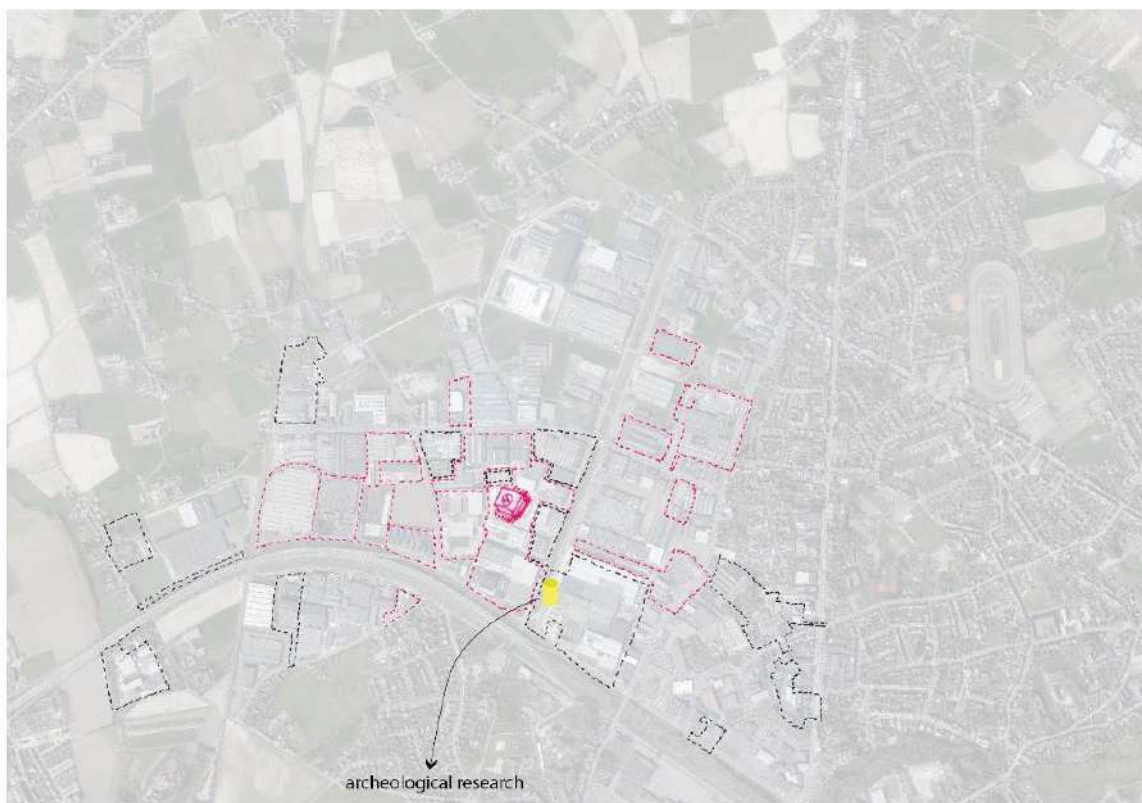
[Fig. 8] Present plots with processes of describing soil contamination (pink) and running and finished soil decontamination projects (black). On all of these plots contaminations where found and are now in the process of eventual soil remediation. Information gathered from geoloket OVAM. Made by author.

These historical and archeological conditions create a whole different story of regenerative circular built transformation for Kortrijk North then for Haasrode. The site of Kortrijk North is saturated with concrete and industrial buildings that are side by side. It is not sure what will be found in de underground, but first gains can be made in desealing part of the industrial site. A first step for

further developing the analysis of Kortrijk North is to develop the systemic transact with the archeological artefacts integrated.

What now?

The gaps in knowledge and data of the living soil on the two sites are evident. Actual soil samples of the two case studies are not available. The basic layers provided by geo datasets are not sufficient to determine the health of soil, but they give a first indication of what could be expected in the underground. For this the integration of earth and environmental science knowledge is necessary. Within this PhD research, the next step is to retrieve this soil data, on four to be determined locations on a specified section of Haasrode and Kortrijk-North, in collaboration with the Department of Forrest, nature and landscape. The methodology to receive this knowledge on soil life were already described above and are the following; tea bag index, visual examination, sampling of earthworms and the collection of soil samples. This sampling method will take place in the summer of 2023.

Conclusion

In conclusion, it is evident that the soil cannot be taken for granted as a 'renewable' resource any longer, given the alarming rate at which we are losing the deep, rich soil. This vibrant soil is the basis for al life. Therefore, it becomes crucial to bridge the gap between urban landscape design and earth and environmental sciences. Facilitating the transition towards a circular built environment by integrating the knowledge on the soil as a living system and soil as a valuable non-renewable resource on the redesign of industrial sites. This integration ask for specific knowledge of the two disciplines that should be assimilated. Not only an integration of disciplines is necessary also an ambition of experiment with nature based solutions regarding regeneration of nature on industrial sites in transition, pushing it further then creating industrial symbioses. Currently, the soil remains relatively unknown due to its highly place-specific and ever-evolving characteristics. Existing geodata sets provide a certain backbone for urban landscape design in line with nature, but a gap to determine living soil still exists. To address this, we have to start getting our hands dirty and heed by the words of Bruno Latour "be explorers again and repopulate our urban design drawings". By consistently incorporating the (living) soil into our design processes and drawings, an awareness can be cultivated within in the field of urban landscape design of its existence and its indispensable role.

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Dalmine: From Company Town to Hybridized Productive Habitat

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The establishment of company towns played a significant role in developing both urban and rural areas in Europe during the nineteenth and twentieth centuries. By combining historical and urban research, this study provides findings about the industry's political influence on the region. Using the company town of Dalmine as a case study, it is observable that the steel pipe industry still shares today, one hundred years after its foundation, spatial, political, and social dynamics. Over the past few decades, Dalmine transitioned from a one-company town to a mixed-productive habitat, shifting from its productive hegemony to sharing space with the university, start-ups, and other productive entities. By embracing this multi-faceted composition, Dalmine exemplifies the concept of hybridization, wherein different forms of production coexist and interact. In this condition, hybridization into new forms of production demonstrates the possibility of the survivability of a company town.

Introduction

One company town. The design of these cities followed the need to integrate the innovation induced by two productive models into the production processes. Fordism and Taylorism aimed at improving economic efficiency and labor productivity through standardized mass production. Nevertheless, the industrialist was aware that the simple implementation of these models needed to be improved per se to improve the company's productivity. The emergence of the hygiene movement in the eighteen-century sought to address the pressing need for improved living conditions and health standards. As a result, new productive areas began to sprout near watercourses, either in previously unexplored regions or ancient settlements, leading to a decentralization of production from urban centers to the countryside. The emergence of these new productive areas and the decentralization of production from urban centers to the countryside paved the way for visionary urban designers to propose alternative spatial rationalities. Ebenezer Howard and Raymond Unwin (1903) introduced the garden city concept, while Tony Garnier (1917) envisioned the *Cité Industrielle*. These examples, among many others, exemplify the diverse range of urban design and utopian visions that engaged with the evolving dynamics of this period.

Indeed, company towns developed projects around the need to increase the health and safety of spaces and individuals, promoting and coordinating all the facilities, including the houses, stores, schools, and even the chapel, and attempting to provide an inhabitable environment (Garner, 1992). In this context, the company town appeared to transform rural areas into ex-novo industrial potencies. The company towns were settlements entirely owned by an entrepreneur or a company, which built and managed the community following business and production needs (Porteous, 1970).

From the end of the Second World War until the third industrial (technological) revolution of the early 1990s, the expansion of trade markets, globalization, and the growing interdependence of the world's economies lead to tremendous economic development worldwide. In turn, some large industrial sectors collapse or start to decline (Becattini & Dei Ottati, 2006). In particular, the unionization and workers' strike during the 60s and 70s and the following financial crisis led to the shrinking of several company towns. The formation of new mixed industrial districts also characterizes this period. Company towns also served as a dispositive of colonial settlement as temporary pioneering devices (Porteous, 1970) that extended these productive habitats as a worldwide economic and urban model, predominantly in nations undergoing rapid economic growth. Whether characterized by exploitative and extractive settlements in the Global South or high-tech, self-sustaining innovation hubs in post-industrialized nations, this model reflects an urban policy that showcases how the economy and the relations between work and life evolved during the last two centuries. This logic was translated into the space in order 'to concentrate; to distribute in space; to order in time; to compose a productive force within the dimension of space-time', in which the company managed the time inside and outside the production spaces. The isolation and alienation of the individual were instrumental in maintaining the community in a state

of need, a growing machine that works in favor of regulating the use of space. This space could be examined at two levels (Stanek, 2013). On a micro-scale, where biopolitics dictates the rules of working-class housing construction and forcibly enters workers' domestic lives. On a macro-scale, in which the modern city is planned as a self-sufficient container environment for the control of social action. In the company town, paternalism touched the most intimate part of people's lives: the necessity of heliotherapeutic care, or even the type of products chosen in the company store, show an incursion of biopolitics into the most intimate spheres of modern man (Orazi, 2017). The biopolitical system molded citizens' values so that the workers tended (more or less unconsciously) to reproduce discipline and norms in domestic contexts. In other words, in company towns contexts, corporate paternalism and domestic patriarchy were two sides of the same coin.

This research aims to explore company towns as significant case studies that shed light on the historical and contemporary dynamics of productive habitats. By transcending traditional forms of governmentality, these hybridized approaches offer new possibilities for the long-term viability of company towns. The study aims to examine the potential for alternative forms of governance in industrial cities and to investigate the various modes of hybridization that can enable the survival and evolution of company towns over time.

Especially from the second half of the twentieth century, existing company towns encompassed a transition process, which in some contexts led to the physical dismantling of the original company town and a shift from the industrial management of the city to more democratic forms of governability. This process contributed to a radical change in the modes of inhabiting these industrial cities. It slipped these cities into three main ends: first, the complete disappearance of the city, by the failure of the industry as well the company welfare facilities, letting behind several brownfields (a); second, by the reuse of the industrial building in other forms of production and consumption, especially associated with the services and cultural sectors (b). Nonetheless, in rare cases today, some of these company towns still produce in the same industrial area (c). One remarkable example is the city of Dalmine and the company that funded the city in 1906, Dalmine S.p.A[1]. The city of Dalmine in Italy is an ideal case study to substantiate these hypotheses. Remarkably, even a century after its foundation, the city, and the industry continue to share not only the name but also the physical space, as well as political and social dynamics.

Study Design

By conducting a comprehensive study encompassing historical, archival, and urban research, the research engages in a sort of *longue durée* (Braudel, 2009) exploration of the traces that manifest the industry's influence and power within the territory. By examining a private business archive with historical documents and questioning the actual condition of habitability of the city nowadays, this study uncovers traces of the industry's influence on the territory and the changes toward different forms of governance. The city of Dalmine serves as a primary case study due to its unique characteristics, as it continues to bear the name, space, and political and social dynamics of the industry, even a century after its foundation. Additionally, recent transformations in Dalmine, characterized by a shift towards hybridized forms of production, provide insights into the potential for the evolution and sustainability of company towns.

Digging into a private business archive

The principal source of historical documents related to the company town of Dalmine is the archives of the Fondazione Dalmine, an entity founded in 1999 by TenarisDalmine to valorize and conserve the industrial heritage. The archives conserve about 140,000 files, 100,000 photographs, 5,800 drawings and sketches, 900 objects, 900 audiovisuals, 2,000 historical, and 6,000 current volumes. Three fieldwork periods of two to three months inside the Fondazione Dalmine from 2021 to 2023 have been conducted. The primary sources contain (1) the administrative minutes of the board of directors from 1906 to 1937; (2) The cartographical records of agriculture properties owned by Pro Dalmine; (4) the *Affari Immobiliari* records. Among secondary sources, the entire collection of the magazine *Conversazioni* covers the period of extensive development of the company town from 1954 to 1981.

Exploring the territory to find new coexistences

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[1] Today known as TenarisDalmine, the multinational is a leading supplier of tubes and related services for the world's energy industry and certain other industrial applications.

Besides the archival research, exploring the city was essential to read about the transformations the city went through in the last 100 years. The territorial exploration took a series of targeted visits to (1) blue-collar, (2) white-collar, (3) rural areas, (4) Bergamo University engineering campus and (5) Point Bergamo for Innovation. The register was done through sketches, photographs, and a travel journal, as well as through discussions with some figures of the local community. Such exploration was marked by discovering different dynamics outside exclusively industrial dynamics. While visiting both the blue-collar and white-collar neighborhoods, observing the residents who still inhabit these areas, and pondering the enduring influence of the industry on their quality of life. What would it be like to live in a company town without a clear end in sight? By examining the town's present circumstances in a general panorama not directly linked to this paper, the research investigates the underlying factors contributing to its enduring presence within the territory.

When the industry builds the city

In the first half of the 20th century, Dalmine reflected many characteristics of a company town: (a) it has been settled on an agricultural and unexploited territory; (b) the production site was surrounded by welfare facilities for the employees, including health services, housing, and leisure utilities; and (c) this housing policy imposed residential segregation, an instrument the company used to exercise its biopower over the citizens-workers.

The steel pipe company was established in 1906 between Milan and Bergamo by the German Mannesmann Tube Company with the financial support of Deutsche Bank and the Italian Metallurgical Society. In 1920 was renamed Dalmine S.p.A, under Italian management. When the city of Dalmine became a municipality in 1927, the city's mayor was also the Manager Director of the industry, reflecting the intrinsic relation between the political power of the industry and the territory, which Mussolini strongly supported during the fascist regime.

In the early 1930s, the factory occupied an area of 650,000 m2, and the company reached about 5,500 m2 in 1940. After World War II and the fall of Fascism in Italy, the industry gradually transferred the ownership of housing and welfare facilities to the city council. However, these transformations did not lead 'to a radical discontinuity in its social policy' (Varini, 2010). The continuous strikes of the 1960s and the industrial expansion in other Italian regions and abroad marked another important transition for the company. In the following decades, the production site of Dalmine underwent a deep technical-industrial restructuring which continues to this day (Ricciardi, 2014). Relevantly, in 1996, the Italo-Argentinian company Techint (of the Rocca family) acquired Dalmine S.p.A, changing its name to TenarisDalmine, the company's governance, and its international perspectives.

Two hybridization phases in Dalmine
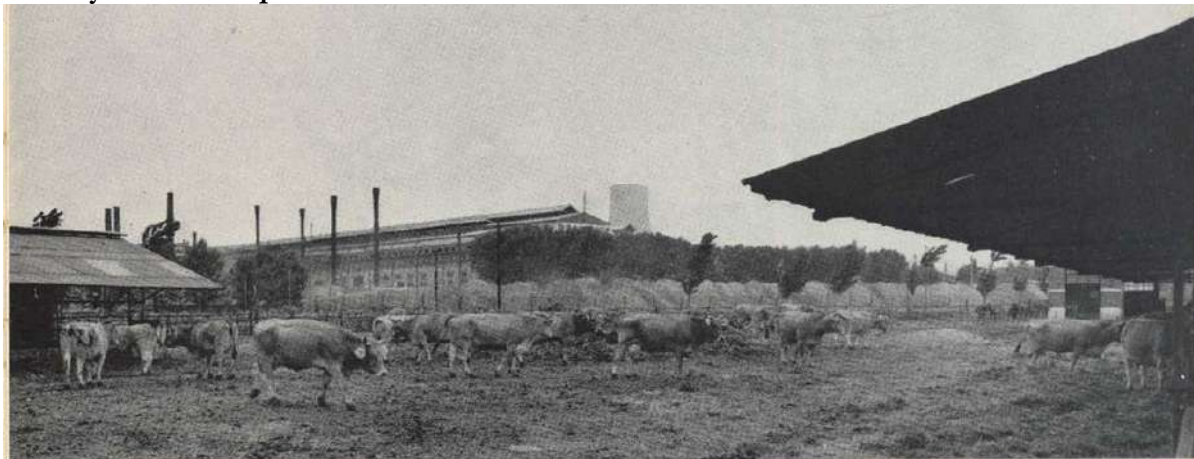
[fig.1] Smokestacks, humans, and non-humans cohabited under the governance of the industry. The agricultural business led by the industry itself used the rural areas around the plant for food production. Source: Dalmine S.p.A. (1962) Conversazioni., July – August 1962. Special edition in color. © Fondazione Dalmine.
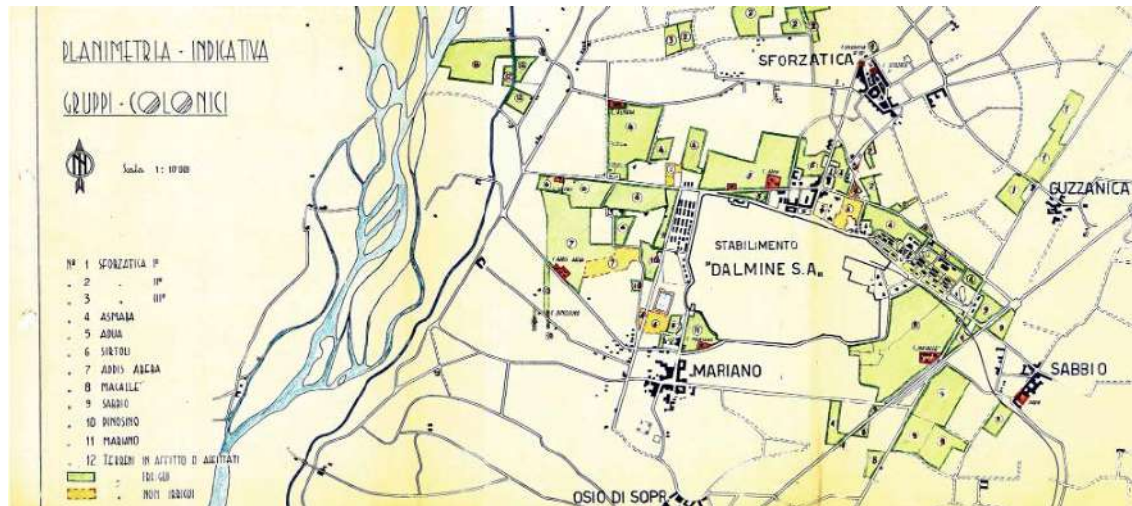
[fig.2] Cartography from the 1940s that indicated all the irrigated and not irrigated rural properties of Dalmine. Source: Dalmine S.p.A. Planimetria indicativa Gruppi Colonici. © Fondazione Dalmine Archives.

According to Fontana (2003), Dalmine has ranged from consolidated models of social works (*le opere sociali*) to public-private ventures in social housing to an 'institutionalized urbanity.' To put into practice its social project, in 1935, the company established the founded the Società Anonima Pro Dalmine (established in 1935 and then merged into Dalmine S.p.A in 1973), which managed the operations outside the factory by regulating housing, food production, and social and cultural activities in the town, e.g., health care, and leisure activities for workers and its families, which provided an articulated system of activities that constituted a real connective tissue of a strategy of consensus-building and community creation' (Lussana & Tonolini, 2003). The company constructed welfare facilities between the 1920s and 1960s, such as food cooperatives, milk factories, and water management services. The countryside was not detached from the industrial colossus but was integrated with the project to promote quality food and the care of the city's surrounding environment [fig.1]. These included the Agricultural Company, which produced food for city consumption and managed the agricultural spaces of sharecroppers adjacent to the city. The enterprise also built irrigation systems for its agricultural areas, with more than 20 different plant cultures and animal stables distributed in 12 colonial groups coordinated by the agricultural company of the industry [fig.2]. The industry had control over steel production and surrounding agriculture. This approach to industrial, social, and agricultural management lasted until the beginning of the 1970s, when the industry underwent significant reformulations within its industrial area.

Between old and new productive habitats

[fig.3] One of the several research laboratories of the University of Bergamo, using the old warehouses, reconverted into classrooms.

[fig.4] The multiple start-ups and high-tech enterprises share space in the former company buildings near the TenarisDalmine factory.

From the 1970s, with the adequation of a diversified market, the production plant, and the new rolling mill, the company began to expand its territorial needs and prioritize the investment in technological innovation inside the industry while selling out the properties outside the plant. The *Affari Immobiliari* records testified the sale, concession, and transfer of various assets of the industry's property within the territory, such as workers' houses and land adjacent to the industry, to private and public entities. The company also adjust its own space to the new master plans of the municipality of Dalmine in the decade of 70 and 80. In this context, the industry led the urban growth process causing meaningful changes in the local landscape and the urban ecology.

In recent decades, the relationship between the company and the town has undergone significant transformations, leading to shared efforts in democratizing the spaces.

This transition involves several actors. First, other large factories have been installed in the city of Dalmine, such as SIAD (*Società Italiana Acetilene e Derivati*) and the Swedish-Swiss multinational ABB.

The campus of the University of Bergamo in the 1990s used some former company buildings with different usages, such as the ex-ENEL power plant, the former worker's retirement home, and the bike storage room that became spaces for classrooms, laboratories, and offices. The campus comprises the School of Engineering, the Department of Engineering and Applied Sciences, and the Department of Management, Information, and Production Engineering, each accompanied by their specialized laboratories. The University Sports Center and the small students housing with 40 rooms is nearby, and Buildings A, B, C, and D complete the complex [fig.3]. According to the current Rector of the UNIBG, this campus, however, does not fit anymore in the expansion of the University of Bergamo for the next ten years.

In 1996, the Bergamo Province Technology Innovation Pole (Point) was created using former industrial buildings to allocate 26 regional enterprise and start-up incubators for 'territorial development' [fig.4]. It demonstrates the attractiveness of the city of Dalmine to new forms of production linked to the high-tech and innovative models of diversification.

In late 2023, the establishment of a Cultural Center supported by the industry to promote industrial culture will be launched in the former labor guesthouse (*ex-Foresteria*) and become a center for free educational activities for the entire Dalmine community and area cities. Indeed, the prominent expression of the industrial power in the territory nowadays is the industrial culture promoted by

the industry, which spreads acknowledgment of the importance of the company in the construction of the town and builds a continuous consensus among new generations.

Dalmine and the transition from the modern to the contemporary city

With Dalmine, the first expression of hybridization with the choice of the company to control not only the factory and the city but also the countryside in favor of another productive logic – that of providing all kinds of goods for a self-sufficient environment – in fact, searched not to detach the peasant steelwork-minded man from its origins, even if the company biopolitics transformed into a modern subject with new behaviors, rhythms, and moral ideals. The resulting biopolitical project of modernity significantly impacted citizens' values and daily lives, blurring the boundaries between 'social living' and 'biological living' (Arendt, 1958).

The second and most recent expression from the last 30 years demonstrates the city's ability and the company's attractiveness to merge in new productive coexistences, namely the academic and innovative high-tech sectors, that dynamize the spatial uses and give different rationality to the city uses, not only anchored to the one-company model. This research shed light on the entanglement of production, biopolitics, and urban rationalities in constructing identities and spatialities within productive habitats. The case of Dalmine highlights the potential for alternative forms of governance in company towns, challenging the traditional paternalistic models of governmentality that company towns are used to be identified. Moreover, the emergence of hybridized production models demonstrates the adaptability and survivability of company towns in contemporaneity.

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II.a

New insights into History: building and planning

Construction History meets Planning History

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Urbanisation, the process of forming, expanding and restructuring the urban agglomeration, is intimately related to an act of building. Curiously however, Urban History and Planning History paid little attention to the production of the city . Despite the close interconnection between urbanism and the day-to-day practice of building, urbanists and architects are essentially engaged with the pre- and post-history of construction. Conversely, however, it is equally true that the city has not exactly grown into a central theme within the field of Construction History, since it became an independent discipline of history in the late 1980s. This research aims to establish the dialogue between Urban Planning History and Construction History. What can one discipline do for the other and what questions and opportunities arise when we invite the different histories to the table?

Setting up a dialogue

In the spring of 1928, the city of Antwerp prepared for the Joyous Entry of Prince Leopold III and Princess Astrid of Belgium. When the princely parade passed by the city boulevard De Meir on 19 May, it is cheered by a dressed-up crowd gathered on the deck of a decorated 'ship' (fig. 1). This 'ship' makes a rather odd appearance in the prestigious boulevard. When descending below its 'waterline', however, we discover what this 'ship' is actually trying to camouflage. At the moment of the royal visit, major urban construction works were carried out at De Meir, to arch the underflowing canal with reinforced concrete. The so-called 'ship' was in other words, no less than a very luxurious site fence to keep labour, noise, dirt and dust out of the public space (fig. 2).

This short anecdote is in some way emblematic for the almost paradoxical relation between the city and the production of it. Upon today, the construction site is a place that seems to 'invade' or 'interrupt' the well-organised public realm, and its chaos and debris are hidden behind site fences and road blockages (Angillis 2022). Although the day-to-day practice of building is part and parcel of a city, "le chantier représente un interdit de penser que complète l'interdiction d'entrer placardée sur les clôtures de chantier" (Serra, 2020, 4). Indeed, architects, urbanists, planners and historians alike are essentially engaged with the pre- and post-history of construction, and not so much with the city that is in the course of being built. Nevertheless, though the production process has seldom been the focal point within Urban Planning History, it is vital to get an understanding of the city that is in the process of change. (Clarke 1992)

In 1985, the publication of the essay '*What is the History of Construction?*' by the British architectural historian John Summerson, gave rise to the field of Construction History, a new independent, sub-discipline of history (Dunkeld 1987). Construction History, predominantly starts from the side of production, as it is engaged with the technological, structural and material aspects of the building practice (Broes et al. 2023). Apart from a few notable exceptions, however, (f.eg. *Building Capitalism* (1992) by Linda Clarke or *Remaking Cities* (1980) by Alison Ravetz), the city and the urban, have rather rarely, been the subject of in-depth construction history research. Therefore, this sub-discipline of history offers an interesting, new lens that bears the potential to confront Urban Planning History with urban construction activity and vice versa.

Within the framework of a larger EOS research project (*Construction History: Above and Beyond*[1]), this doctoral study, which started in January 2023, tries to set up the dialogue between Planning and

Urban History on the one hand and Construction History on the other. The dialogue focusses specifically on the demands produced by the process of metropolitan transformation in the 20th century, both in the formation, restructuring and expansion of the urban agglomerations of Brussels, Antwerp and Liège during the interbellum period and the Trentes Glorieuses. The specific opportunity that emerges from this dialogue is to look at the ways in which, in specific moments of construction, societal demands and urban questions converge .

[fig.1] Cloison du chantier camoufflée en bâteau décoratif. Picture of the 'ship' that was erected on De Meir on the Joyous Entry of Prince Leopold III and Princess Astrid (19 May 1928) Source: Felixarchief Antwerpen

[fig.2] Betonnière et Gun (canon à ciment). Picture of the 'hold' of the ship that was used to hide machinery, dirt and dust from the public space. Source: Felixarchief Antwerpen

Distinguishing an approach based on production

Urbanization has rarely been defined as itself a product of social human labour. Nonetheless, any hamlet, village or city exists only because it was produced and thereby replaced the 'former space' (Clarke 1992). In other words, building precedes the built environment. Plans, ideas and rhetoric need a pragmatic translation into asphalt, concrete and clay before they can be used and experienced. The act of building can, in a certain way, be understood as the transformation of 'matter' into 'object' by labour. Any object, however simple it may be (being a house, a hospital, a road, a park, a monument etc.), is the physical crystallisation of an immense range of possible forms and materials. When these objects are put together, they form an environment, that, once a certain critical mass of objects is achieved, we can call a 'village', a 'city', a 'metropolis'. The conscious act of building the city, 'city-making', is an almost symbolic, modern supremacy that anticipates the complex reality of all the small transformations that take place in that city (Uyttenhove 1990). Following this interpretation, urbanisation – the process of forming, expanding and restructuring the urban agglomeration – is intimately related to an act of building. In this sense, the city is the collective building edifice, or – since the city is never really finished and constantly being changed – the collective construction site, of a society that relentlessly builds, transforms and demolishes.

When thinking of the city as a historical sequence of producing and reproducing space, the city becomes a fascinating image of successive social constellations. The reasons why and the (socio-economic) context wherein a community has decided to occupy, inhabit and fashion the available space, and the means, materials and tools with which it tamed the land and erected its buildings (objects), illustrates more than solely the vision of an architect or planner or the demands of a specific consumer (Lefebvre 1991). The city, evidently visualizes the complex social event of producing and reproducing space as a process that is fundamentally determined by various actors and factors that go far beyond the purely architectural.

Therefore, the specific kind of city that is being built – characterized by its appearance, its 'style', its use and its amenities – is not purely the result of what one wants to be built, as it is largely

dependent on what can be built (Ravetz 1980). The making of the city thus depends on the whole available social labour process engaged in production (Clarke 1992), including both materials (stone, sand, wood, clay etc.), matériel (technology, tools, language, land, instructions, agendas, regulations etc.) and (skilled) labour (Lefebvre 1972).

Such an approach, where urbanization is conceived as a social production process, contributes to a more evident dialogue between Urban Planning History and Construction History. This framework allows us to understand the specificities and evolutions of the respective 'construction aspects' (material, matériel and labour) through the process of urbanisation, but also conversely, is helps us to unravel the city's DNA through successive construction practices. Within the context of the process of metropolitan transformation in the 20th century, the interaction between the two disciplines in History leads to a number of intriguing questions. To what extent is the city the result of evolutions, constraints, capacities and opportunities within the available building process? But also the other way around; to what extent has urbanisation itself adjusted and fuelled the way we build? Which construction practices became dominant, and which building material is the 'right' one to use? Furthermore, it also raises questions about the relationships, interactions and collaborations between contractors, wage labourers and material suppliers on the one hand and the public (urban planning) administrations on the other. This dialogue, in other words allows us to identify the transformations within the construction sector at the time of metropolisation.

These observations contribute to a reading of the city that goes beyond the city as one, indivisible social-urban metabolism, and puts the city as an assembly of multiple social practices, differentiated milieus and multiple kinds of 'urbanisms' to the fore (Broes et al. 2023).

The city as an assembly of construction practices
When we want to initiate the dialogue between Construction History and Planning History, can we also read the city as an assemblage of building practices? What is built, with what capital, with what materials, on what land, by what kind of contractors, for what needs and what audiences, and what kind of environments do these practices produce?

In an attempt to find answers to these questions, this research starts with a focus on pioneering activity in the fringe. In the urban fringes of cities like Brussels and Antwerp, new multifunctional centralities emerged along new, easily accessible highways and ring roads. The collective infrastructure of the welfare state, with its sports venues and cultural centres, its apartment buildings and its petrol stations, its parks and hotels and its supermarkets and shopping centres, typically served as catalysts for the development of a new (kind of) centrality in the urban periphery (Vanhaelen & Leloutre 2017). When looking at some of these typical post-war multifunctional milieus, it is striking how urbanism can almost literally be read as the juxtaposition of diverse, specialised contractor practices (Broes et al. 2023). As a search strategy, we started from the activities of the Belgian supermarket chain GIB. In 1961, the GIB-group, one of Belgium's largest conglomerates in the post-war period, comprising Grand Bazar, Innovation and Bon Marché, built Europe's very first hypermarkets in the Brussels periphery in Auderghem and Anderlecht (Grimmeau 2013). In the years to follow, GIB built several hundreds of supermarkets, hypermarkets and shopping centres in Belgium, typically in the urban fringes. The industrialised construction methods, which in the pre-war period were mainly used to build warehouses and depots, proved also ideally suited to efficiently accommodate the rapid deployment of shopping centres in the Belgian welfare state from the 1960s onwards. Next to the shopping centres, contractors specialised in the construction of big apartment buildings (f.eg Van Kerkhove & Gilson n.v., Etrimo, Amelinckx, Broens) built their flats, next to which specialized truss-contractors (f.eg. Kunstwerkstede De Coene n.v.) built their sports venues, and so on. In other words, in these kinds of milieus, urbanism can almost literally be read as an assemblage of different contractor practices.

The unprecedented scale and speed with which these new centralities came about, and the new typologies, materials and aesthetics that were used to give these milieus a 'modern' physiognomy, suggest that the post-war city not solely served as a testing site for architects and planners, but also as a laboratory or learning school for a construction sector in change.

Archives

The foregoing observations suggest already several considerations, reflections and departure points that can inspire a fruitful dialogue between the different disciplines of history. In addition to a conceptual reading of the city and its relationship vis-à-vis the construction process, this research also requires effective historical 'evidence' to get a better understanding of why the city is as it is today, and to shed a light on the different structures, actors and parties that were involved in the city-making process.

Our built heritage, however, hardly tells us how it came into being; only the traces of ancient use and customs partially disclose this past to us. To get an in-depth understanding of the complex interrelation between the different spheres of this study, and in order to grasp a city that is going through a process of change, we cannot be satisfied with merely the built materials. Archival evidence will therefore be an important angle to substantiate this doctoral research.

Construction plans, pictures from the on-site developments, administrative and technical documentations, themed magazines, and the correspondence between contractors and public administrations, are only a few of the possible entries to document the production process. Urban History on the other hand is typically involved with the paper trail of urban development plans and schemes (APA/BPA). On the overlap between Urban History and Construction History, the building permit might serve as an important source which connects technology and urbanisation in a fairly straightforward manner. As the administrative 'memory' of urbanisation as a process of building production, the building permit bears the potential to examine a history that represents the gross national product of our built environment.

Since the GIB served as the middleman between planning and construction activities, the GIB-archive, provides a final interesting point of entry for further research. The extensive GIB-archives, preserved by the Université Libre de Bruxelles (ULB), contain a wide range of documents (settlement strategies, communication with the construction sector and the city, pictures of construction sites, etc) that allow investigation of the group's building activities.

The Belgian context, with its weakly institutionalized national and regional planning tradition and the emphasis on municipal autonomy, offers a rich context to study the local regulation of built production and the urban concerns addressed within them.

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The anarchist thread of urban planning history: Reconstructing the continuous influence of anarchist ideas on the history and present of urbanism

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The thesis reconstructs the historical continuity of one of the major under-presented influences on urbanism — the anarchist roots of the urban planning movement. Leaning on the recent research from anarchist geography and planning history, the thesis deepens into Peter Hall´s hypothesis presented in seminal book *Cities of Tomorrow*. Hall stated that many of the first ideals of the twentieth century urban planning movement "arose from the anarchist movement, which flourished in the last decades of the 19th century and the first years of the 20th century.". Following work offers a more panoramic, nuanced insight into the anarchist strain of the history of urban planning and further, contextualize its key ideas and figures within the field's contemporary tendencies towards ecological urbanism. The intended outcome would define, not just one anarchist perspective on urbanism, but an interconnected network of social practices, utopian speculations and biographical references between the key actors that reframe urban planning as social ecology, not only a professional discipline.

Anarchism and built environment: new old relevance

To reconstruct the historical continuity of one of the major under-presented influences on urbanism - *the anarchist roots of the urban planning movement* - means to follow an evolution of understanding how built environment and access to resources shape and are shaped by collaborative social action and pursue of autonomy – or in other words, understanding why do we build. The argument goes that the built environment is made by political subjects who tend to employ mutual aid, self-initiative and direct action to achieve social reproduction, relative individual freedom and regulate sufficiency. In that the anarchists propagators and modern day planners essentially share the same objective: decentralising the process of space making by downscaling it to each and every person's need within the resource balance. The historical thread of anarchist influences is in that sense just one of many histories of ideas on human-environment relationship. What authors presented in the following text have in common is understanding that through the freedom to build (and plan), one or many achieve control over their environment and that next to other essential needs like food, sleep and safety this one is high on priority list of human culture. This (over)view re-frames urbanism as radically different concept – a multitude of planning cultures in complex social ecology of built environment.

Leaning on the recent research from anarchist geography and planning history, the following text deepens into Peter Hall´s hypothesis presented in seminal book *Cities of Tomorrow* (1988). Hall stated that many of the first ideals of the twentieth century urban planning movement *"arose from the anarchist movement, which flourished in the last decades of the 19th century and the first years of the 20th century. That is true for Howard, for Geddes and for the Regional Planning Association of America, as well as for many derivatives in the European continent"* (Hall, 1988, pp.4.). [fig.1] Moreover, Hall noted another key area of anarchism's influence: the notion of bottom-up urbanism. *"Built forms of cities should"*, writes Hall, *"come from the hands of their own citizens; that we should reject the tradition whereby large organizations, private or public, build for people, and instead embrace the notion that people should build for themselves. We can find this notion powerfully present in the anarchist thinking (...), and in particular in Geddesian notions of piecemeal urban rehabilitation between 1885 and 1920 (...) It resurfaces to provide a major, even a*

dominant, ideology of planning in third-world cities through the work of John Turner – himself drawing directly from anarchist thinking – in Latin America during the 1960s" (Hall 2014, pp.9)

Nevertheless, the current state of the arts reveals even more important connections in the thread. Here on, we follow the historical thread by focusing on figures that have a pivotal role in shaping and disseminating the influence of anarchist ideas on urban planning.
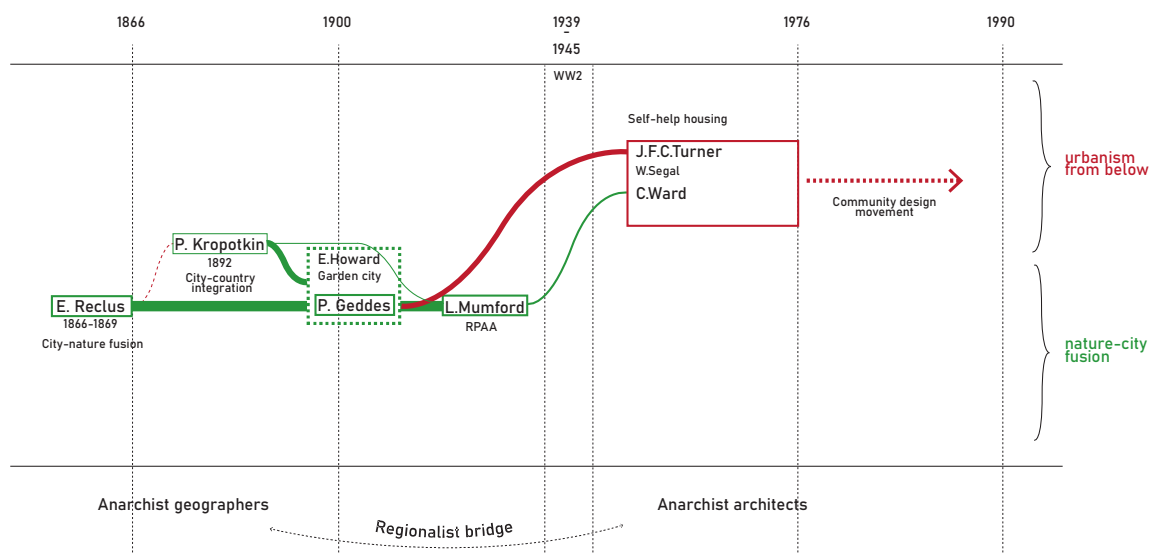
Fig.1: Peter Hall's references in the thread.
Source: Author. Note: The diagram was previously published in Oyón, Jose Luis and Kuzmanic, Jere. 2022. 'The anarchist strain of planning history: pursuing Peter Hall's Cities of Tomorrow thesis through the Geddes connection, 1866–1976'. In: Welch Guerra, M., Castrillo Romón, M., Pekár and Abarkan, A. (Eds), *European Planning History in 20th century*. Routledge, New York.

Peter Hall and state of the art

Not a few authors pointed towards this explicit connection between pioneers of classical anarchist thought and urban planning: i.e. Turner 1948; Doglio 1953; Ward 1992,1974; Pesce, 1981; Hall and Ward 1998; De Carlo and Bunčuga 2000; Masjuan 2000; White and Kossoff 2012; Ferretti 2019. However, there are significant gaps, especially in the recognition of Hall's influential thesis, and in constituting the continuity of the thread. Since 2000s, there is a growing interest in anarchist geographies (Breitbart 2009; Ince 2012; Springer et al. 2012; Springer 2013; Araujo et al. 2017; Ferretti 2019), particularly around post-statist geographies (Springer 2012; Ince and de la Torre 2016; Kinna 2019, etc.) and critical studies of urban and political movements (i.e. (Pickerill 2007, Clough and Blumberg 2012; Rouhani 2012; Mayer 2013). Part of this interest in giving a fresh view on anarchism's role in formation of urban planning has been pioneered in doctoral theses such as that of Mat Hern (1997) at the Union Institute Graduate School and Anthony Ince (2010) at the University of London or theses on particular authors such as Graham Purchase's (2003) thesis on Pjotr Kropotkin's geographical thought and Stefania Proli's work on Carlo Doglio (2011). However, this growing interest did not yet encompass a comprehensive presentation of how anarchist ideas and experiences are rooted in the history of urban planning.

The few studies of anarchist geography dedicated to the city have been so far limited to nineteenth-century anarchist geographers. No traces of Peter Hall's book can be found there (Pelletier 1999, 2007; Ferretti 2014). The only reference to the planning historian, by Lopes de Souza (2012), is critical of his work. Nevertheless, Homobono, from sociology and urban social anthropology, and Oyón from planning history clearly associate Reclus's and Kropotkin's urban thinking with Geddes and Mumford and further to Ward and Turner, following Hall's thesis (Homobono 2009, 2013; Oyón 2011; Oyón 2018). In 2012, White and Kosoff also recognized Hall's argument in the article that links anarchism to environmentalism. They recognize the influence of Kroptokin and Geddes on Ward and Bookchin as a stream of thought within the historical debate on planning which *"moves from advocacy of garden cities and city gardens to championing the virtues of allotments, participatory planning, ecological technology and urban direct democracy. And further recognize that the claim of anarchist urbanists, [...], potentially make important contributions to contemporary discussions of the importance of 'sustainable cities'"* (White and Kossoff 2012, pp.2). The segments of historical thread of the influence of anarchism on urban planning further implicitly feed into a growing relevance of ecological urbanism as a spatial and political concept (McHarg 1969; Mostafavi et al. 2010; Hagan 2015) and within it, on the renewed interest in urbanism from below (Haughton 1999; White and Kossoff 2012).

Therefore, while on the one hand, it is unavoidable to ´ecologize' urbanism around the immediate and global urgency of climate change, on the other the same pursue seriously lacks dedication in maintaining the connection to urban planning's once truly environmentally-sense origins. Paradoxically, the growing interest for the 'ecologizing' the field omits the fact that philosophies of space underlying ecological urbanism re-surging today have a clear commonalities with some preceding ideas (i.e. rural-urban relations, regionalist tendencies, creation of spaces from below, participative procedures, notions of relational and relative space against absolute space and state as territory, etc.). Many of these ideas and practices originated within the heritage of the libertarian world and played a role in the production of knowledge and methods within the urban planning during the last century and a half.

The following body of text is an attempt to present in its obvious partiality the rich world of ideas that through biographical and bibliographical connections flew between several generations, geographies and experiences forming a dialogue between two ideologies: anarchism and urban planning. In that dialogue these ideas were reshaped so that they would define an unfinished project of 'anarchist urbanism'. And the hypothesis is that this is an intentional effort. The array of subjects worked together to interconnect the lived experiences, utopian speculations and critiques of the State and capitalism with intention to fix together a distinct epistemological reading of urban space with specific impact on the doctrines of urban planning. [fig.2.] Furthermore they constructed not just one anarchist perspective on urbanism, but an actor-network that relates to social practices, intellectual collaborations and references between the key actors that reframe urban planning as part of wider social ecology, not only as a professional discipline. The timeline starts in the times of the birth of classical anarchism, the second half of the 19th century.
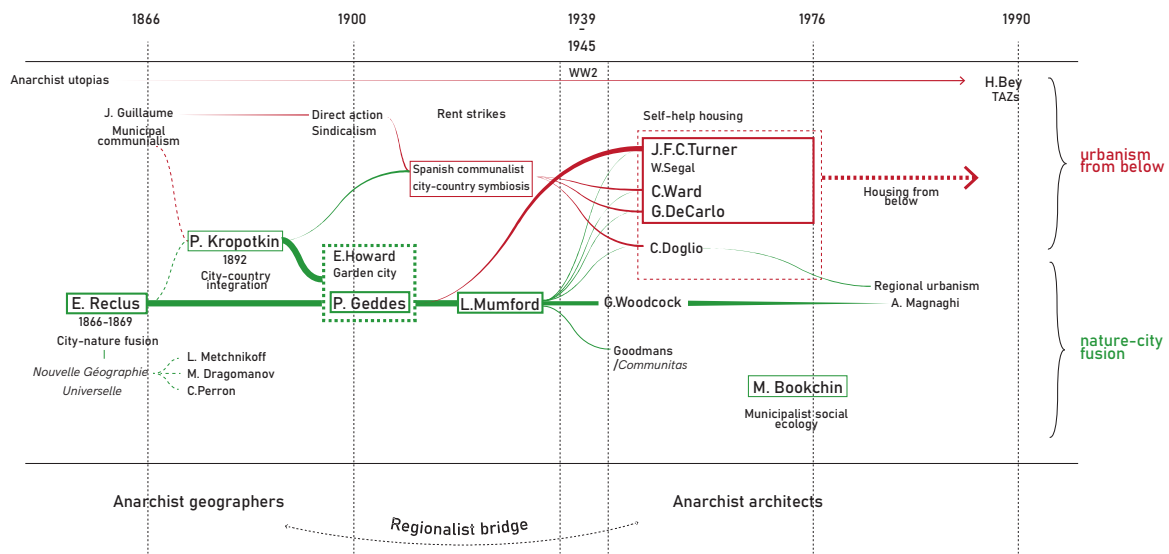
Fig.1: Elaborated thread of anarchist influences on urban planning.
Source: Author. Note: The diagram was previously published in Oyón, Jose Luis and Kuzmanic, Jere. 2022. 'The anarchist strain of planning history: pursuing Peter Hall's Cities of Tomorrow thesis through the Geddes connection, 1866–1976'. In: Welch Guerra, M., Castrillo Romón, M., Pekár and Abarkan, A. (Eds), *European Planning History in 20th century.* Routledge, New York.

Production of ideas: The anarchist geographers, 1866-1899

Elisée Reclus, one of the French most influential geographers and proto-ecologist, during these formative decades of anarchism and geography, writes primarily about a fusion of nature with a city that in the future will expand indefinitely through its countryside, encompassing the regional dimension of urban and rural at the same time (Pelletier, 1999, Homobono, 2013). Since his early writings in the 1860s, he explores the city as a concentration of natural capital. Cities, as he describes, are born and grow based on their natural advantages, and their immediate natural region amplifies their growth.

The future Reclusian city is an unlimited city, 'the indefinite extension of the city in total fusion with the countryside' interconnected through periurban spaces of cultivated nature-fields, orchards, gardens, together with the technical infrastructure that allows the city to have a life as an organism - water infrastructure, transportation, food supply. Therefore he imagines a) railways and roads as a key to achieving the nature-city fusion, b) the suburbs imagined as settlements of low-rise houses integrated with nature, without fences to separate their inhabitants, pivoting around sub-centres with large parks and public services. His ideal(ist) approach to nature-city fusion is grounded in his belief in '*le sentiment de nature*' - human consciousness of belonging to natural world (Oyon, 2018a). In other words, that every person beholds a profound potential for changing the course of urbanization away from unhealthy densification and centralization. For this, Reclus is considered a proto-ecological urbanist whose influence can be traced to whole range of later authors including John F.C. Turner and Murray Bookchin as well as to the core of the dicipline to Howard and Geddes (Ferretti, 2015). However recent works by historians of geography reveal Reclus as a center of a 19th century network of anarchist geographers colaborating in action-networks including transnational connections, such as to russians Mechnikoff and Dragomanov

165

and clarifying his connections to anarchism inspired social reformers such as Elisée's nephew Paul Reclus, Ebenezer Howard (Hall and Ward, 1989) and Patrick Geddes (Ferretti, 2016, 2020).

Since the decade of 1880, Reclus' more famous contemporary anarchist geographer, Pjotr Kropotkin developed an idea of the economic integration of the city and countryside. He imagined it as a territory where the big city and its surroundings with decentralized and industrialized, relatively self-sufficient communities reciprocally feed each other with food, goods and primary resources. The inhabitants of such an integrated spatial system are both workers and farmers, producers and consumers of their agricultural and industrial products (Purchase, 2003). Although the idea is presented in his seminal *Fields, factories and workshops* from 1899, Kropotkin's preceding book *The Conquest of Bread* (1892), as a collection of ideas on how to organize the post-revolutionary society, became the book that inspired the anarchist labour movement in Spain during the first decades of the 20th century (Masjuan, 2000). In these two works, he conceptualizes post-revolutionary reorganization and (self-)management of the city through socialized consumption established to provide basic needs ahead of restarting the production after the revolution successes. The new emancipated society he advocates is set in a new space that revolutionizes the capitalist conception of food supply, housing and municipal public services (Oyon, 2014). The anarchist society based on territorial model of social and regional cooperation was the idea that formed the foundations of the thread of anarchist influences on planning pioneers and is later referenced by Mumford and Howard, founding figures of regional planning through Regional Planning Association of America and Town and Country Planning Association of UK.

The Reclusian call for a city in harmony with nature and his region is explicitly present in the development of Geddes's ideas on the region-city, the Valley Section, and his Outlook Tower in Edinburgh (Ferretti, 2015). Mumford's regionalism and the Regional Planning Association of America projects during the 1920s and 1930s are inspired by the ideas of decentralization from Kropotkin (Meller, 1990). The influence is present as well in Howard's garden-city proposal. Both Geddes and Mumford will later mark out the generation of European architects and urban planners from the postwar period, including a range of those declaring as anarchists, creating an undeniable bridge with the old tradition of 19th-century anarchist geographers, particularly with Kropotkin. Important note is that this bridge was more than conceptual. The primary sources such as letters, documentations of visits and explicit references in correspondence and works between Kropotkin, Reclus, Geddes and then later Geddes and Mumford show a strong network of closely related authors.

The second thread of influences was the rich imaginary of from below territorial actions. In example, the libertarian policies during the Second Republic in Spain that had direct affiliations with the Kropotkin's territorial integration, or the recognition of direct action responses to a growing worldwide urban crisis in form of rent strikes, tenant actions and array of other grassroots tactics (Levy, 2018). A rich world of ideas of spatial imagination of libertarian communism intended to unfold with the social revolution Masjuan Bracons (2000) reduces to an anarcho-communist and anarcho-syndicalist tendencies, with essential coincidences: a) the organization from below of municipalities and communes into federations of municipalities and, especially, b) the imperative of decentralization of the big cities towards a 'stable synthesis between the countryside and the city'. The subsequent potential is confirmed by recognition of 'agro-industrial symbiosis' in land reform by the CNT Congress of the 1936 in Zaragoza. Also on a wider scale, the tactics of direct action emerged from syndicalism and feminism and dispersed throughout the world during the early 20th century (i.e. tenant strikes at the end of World War I: France, Spain, Argentina, Mexico,…) many of which were led and facilitated by transnational anarchist networks (Levy, 2018). In Spain, CNT's rent strikes in the summer of 1931 were followed by interventions on the housing market ahead of the Civil War. Spanish anarchists embodied Kropotkin's ideas on the organization from below in a municipal setting through direct action. Along these struggles the housing as organisational and territorial question entered to the central spot of planning debates in the rest of the century.

Urbanism from below: the anarchist architects of the second post-war period, 1939-1976

On a completely new level, the anarchist reflection on the city reaches European architects and urban planners in the second post-war period (Oyon and Kuzmanić, 2020). In this an important role play periodicals, particularly the Freedom, established by Kropotkin in 1880s, in which architect and planner Colin Ward was the editor for two important decades and John Turner, Giancarlo de Carlo and Carlo Doglio were contributors. The importance of urbanism 'from below' in post-war decades also spread transnationally within the rising awareness of new global urbanisation. Examples, are the American Goodman brothers, Paul and Percival and their work *Communitas* or John Turner's work with Eduardo Neira in Peru (Golda-Pongratz et al. 2018.). It is impossible not to mention Italian circle of anarchist architects that emerged in antifascist resistance in Second World War to be shaped by several key figures involved in rebuilding Italian housing and territory in coming decades.

Overall, ideas on anarchist urbanism started to revolve around the autonomous direct action as a driving principle of the 'anarchist solutions' to problems of everyday life in cities. Paraphrasing Ward, in the face of capitalism, the libertarian movement must not wait for the great revolution that will change everything. The practices of freedom are for today. They are daily actions of existing revolution, that of the here and now. They are *'anarchism in action'* (Ward, 1973). For this kind of engagements Colin Ward was a pivotal figure of that time in redefining the role of 'pragmatic anarchism' within wide range of fields, among which one, very dear to him, was urban planning. As a productive writer and practitioner, he developed his first interest in self-help housing with post-war squatters in 1946 and occupations of abandoned military camps (a practice that included 40 000 families in England and 5000 in Scotland). He afterwards developed a critique of the large-scale management and massive bureaucracy of state-owned/municipal housing estates. His works analyse and politicize the forms of housing production, tenure and distribution and further engage in various case studies such as: tenants associations, cooperatives and the concept of property, the self-construction, tenant self-defense and urban planning 'from below', which for example included appropriation of public services and some radical reflection on urban ecology and green gentrification. He updated Kropotkin's ideas on the integration of production and consumption, especially on housing and community self-management and created a more complex set of proposals inspired by the real experiences of both pre- and post-war Britain implying the existence of *citizen controlled urbanism*. Together with Turner, Walter Segal and De Carlo and inspired by dialogues with British intellectuals and architects such as Peter Hall, David Hardy, Brian Richardson and Pat Crook, he described another important anarchist principle: *The dweller's control* or user's involvement in all stages and aspects of making of the built environment to which he dedicated most of his around fourty books. Colin Ward's work should be considered as pivotal for the thread as his writings bare most focus on connections created along the thread between all here mentioned figures.

During the 1960s and 1970s, another British architect, John F Turner created an engaged and open vision of self-help housing inspired by the works of Patrick Geddes in India (Oyón and Kuzmanić, 2022). Self-help housing neighbourhoods made by users over time were not finished and serialized object, but as a progressive process where the inhabitants both decide and execute their ideas. Since his first work in *Architectural Design* in 1963 about new housing solutions in Latin American countries, specifically Peru, Turner's main concern has been to give visibility to the heterodox process of creating self-built neighbourhoods in at the time called "underdeveloped countries" (Golda-Pongratz, 2018). He describes the value and benefits of autonomy of the self-built housing for its users based on practical experiences. Turner's vision is also a renewed subsequent turn to the Kropotkinian vision since it does not base on the simple reproductive 'satisfaction' of the needs of food, housing and clothing. Instead, it recognizes emancipatory power in socialized consumption and the beyond spatial meaning of housing in its complex socio-economic relation to an individual, unit, neighbourhood and the city: Housing not as an object but "as a verb"-or as direct action.

From the south of Europe in late 1940s, Giancarlo De Carlo, as an Italian architect, in his early writings for journals Volontà and Freedom, made explicit the connection between urban problems of post-war Italy and possible anarchist solutions. Later in life he becomes a known for promoting the participation of users in the construction of housing mediated by architects. Recognizing that all three phases of the architectural project (the definition of the problem, the elaboration of the building solution and the evaluation of the results) require the presence of the users (Franchini, 2020). His most noted works were along these lines are plan for San Giuliano quartier in Rimini and the Matteotti neighbourhood in Terni between 1969-1974. The references to Geddes' method of conservative surgery can most easily be recognized in his most famous project: the plethora of interventions in the historic core of the city of Urbino. De Carlo's works and thinking has to been seen in connections with Carlo Doglio's writings and regional planning initiatives in post-war Italy that trigger an hypothesis on intended collaborations of promoting regional version of anarchism through means of planning (Proli, 2017). Doglio's explicit declaration that 'urbanism is anarchism' echoes through his activities as urban planner and university professor, as a vision of urban planning based on direct action of informed citizens, intended as a tool for the creation of a new society. The two former housemates and lifelong friends form a center of a rich network of Italian anarchist planners and architects and civic militants such as Danilo Dolci, Giovanna Berneri and Cesare Zaccharia, among others. Equally important connection is made between British and Italian group through Doglio's six years of life in London and Ward's and Turner's regular visits to Italian anarchist gatherings over course of three decades facilitated by De Carlo, Amedeo Bertolo and Rossella Di Leo. During the seventies and early eighties transnational collaboration between members of this generation is most intense and could be described as informal attempt to shape 'anarchist urbanism' as a collective vision inspired by heated years of European social movements such as Autonomia Operaia, self-help housing (i.e. SAAL in Portugal), squatting and Tenant movement in UK, among many others.

Anarchist social ecology and new mutualist geographies: 1976-onwards

After the 1980s the interest in anarchist solutions to urban questions started to lose its attraction. Reasons can be related to birth of neo-liberal project and it's new political economy of space as well as radical changes in cultural landscape of leftist movement to which anarchism responded by radicalising and forming a new forms of countercultural alliances and militant tactics. Murray Bookchin's libertarian municipalism and the social ecology emerged in this context. New question of ecological crisis to address and 'global urbanization' urged for the rearrangement of anarchism as political project. As early as the some of the most important environmentalist publications, such as the seminal *Silent Spring* by Rachel Carson, Bookchin publishes *Ecology of Freedom* and translates the urban question into an environmental question (Venturini et al., 2019). The influence of his work extends to the *progetto locale* (Magnaghi, 2001) of Alberto Magnaghi and territorial school of planning in Italy as well as to the principle of *democratic confederalism* that is political backbone of Autonomous administration of North and East Syria and other radical municipalist movements around the end of the century. In this way Bookchin theoretically backed the reteritorialization of anarchism after almost 150 years. The critique of the process of urbanization, environmental degradation and the social disconnection it produces has a central place in the concept of social ecology that proposes radical redirection of urbanized society towards decentralization and municipalism in a sense that is very close to Kropotkinian and Reclusian visions of urban future. Bookchin's ideas in this sense present a full circle of the thread of anarchist influences on the planning, bringing the idea of urbanism from below and dweller's control of environment back to the roots of regionalist and ‚grand-scale' imaginary of Kropotkin and Reclus. However, this vision is still to be translated into an influence in 'literal' sense, as for now, as it always is case with 'anarchist solutions', it just lives in 'active society' (Doglio in Proli, 2021) around the world.

The conclusion:

Anarchism, as a lesser-known stream of planning history, contributes to a concrete and coherent vision of what urban planning does for the human-environment relationship. As briefly elaborated above it is more than just 'being against the State and rules' that comes as the

proposition. The curiosity that two of the founders of classical anarchism, Kropotkin and Reclus, were geographers to some extent explains why anarchism is political concept grounded in territory and spatial imagination. However the rich evolution of ideas that emerged from there, and even more so, the uncountable experiences of direct action, users autonomy and cooperative non-herarchical structure that are so dedicatedly documented by the authors above can not be explained without taking into a consideration a certain collective effort to understand, but not define, urbanism as a political concept deeply rooted in human need to control environment and pursue autonomy.

However, there is a deeper ontological implication: What if urban planning is seen as part of the broader phenomenon of social ecology? Social ecology as a spatial/territorial extrapolation of anarchism seeks to organize human-environment relationships in non-hierarchical constellations (Bookchin, 2005). The historical consideration here presented, as a conclusion, implies not one urban planning discipline as an opposition to 'uncontrolled' urbanization but planning cultures as heterotopian evolution of the human-environment relationship.

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Immanent Monuments or transcendent instruments? Four Roles for Post-war Churches in Sustainable Neighbourhood Transition.

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The research project 'Faith in the Periphery' investigates the future of post-war churches in relation to sustainable neighbourhood transition. The project posits that due to their scale, central location, and through their radiant capacity, they can play a key role in the transformation of the suburban fabric. This paper is based on the dissertation's concluding chapter, which identifies four active roles for post-war churches, namely that of 'outsider', 'facilitator', 'participant', or 'distributor'. These four roles emanate from the theoretical framework constructed during the research, where the traditional significance of the church buildings as a sacred monument has been deconstructed and reconfigured by introducing hybrid categories such as 'transcendent instruments' or 'immanent monuments'. Thus, we demonstrate that through the hybridization of an existing but connoted typology, the post-war church building can prove itself as a meaningful agent in the sustainable transition of the suburban neighbourhood.

Introduction: parallel discourses and the untapped potential for intersection

The presence of suburban allotments in Flanders remains a contentious spatial legacy from the 20th century, accommodating approximately 20% of the region's current population (Pisman et al., 2020). Various authors, including Smets (1986), De Meulder, Schreurs, Cock and Notteboom (1999), De Decker (2011), Bervoets and Heynen (2011) and Dehaene (2015), have extensively described the historical formation and mechanisms of these areas. While some works acknowledge the potential benefits of dispersed conditions (Secchi, Vigano, 2009; Geysen, Van Daele, Scheerlink, 2018), many highlight the challenges and shortcomings related to social, ecological, economic, and cultural concerns. (Alberti, 2005; Nolf, De Meulder, 2017; Boussauw, Vanoutrive, 2017; Vermeiren et al., 2019) To address these challenges, policymakers introduced a spatial policy plan (BRV, 2018), focusing on increasing spatial efficiency, promoting multifunctional use, fostering cohesive cities and villages, advancing energy coherence, cultivating resilient open spaces, and enhancing quality of life.[1] The Flemish Government Architect has initiated several concrete initiatives to implement these principles through research by design. *Klimaatwijken* (Climate Districts) links spatial innovations, energy transition, and qualitative densification.[2] *Leefbuurten* (Neighbourhoods for Living) is a pilot project guiding seven local councils in redesigning future proof public spaces.[3] *Verkavelingswijken in Transformatie* (Allotment Neighbourhoods in Transformation) focuses specifically on transforming low density suburban allotments, employing density, connectivity, circularity, image quality, collectivity, and diversity as analytical and transformation tools.[4] All these studies share a common objective of addressing demographic, climatic, and economic challenges through integrated strategies. Furthermore, all address the neighbourhood unit as a rational scale to achieve collective benefits. Although the connection between parish churches and neighbourhood units is apparent—like neighbourhoods, parishes are organized territorially with each square meter of land assigned to a specific parish— existing research on the future of neighbourhoods lacks any consideration of churches. In summary, the transition envisioned by these studies entails neighbourhoods that are densely built, providing a wide range of housing options for a diverse population while fostering the sharing of services and amenities. Additionally, the inclusion of new small-scale facilities is expected to enhance local autonomy and reducing dependency on cars. Further, by depaving streets and establishing connected green and blue networks, safe routes for biking and walking can be created. This integration also incorporates parks and sustainable drainage systems, promoting biodiversity,

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[1] BRV (*Beleidsplan Ruimte Vlaanderen*). The final report is accessible via https://omgeving.vlaanderen.be/nl/ruimtelijk-beleid-en-planning/ruimtelijk-beleid/beleidsplan-ruimte-vlaanderen.

[2] Exploration phase and case study design are accessible on
https://vlaamsbouwmeester.be/nl/instrumenten/pilootprojecten/verkennend-onderzoek-klimaatwijken.

[3] For the recently published intermediate report see https://www.vlaamsbouwmeester.be/nl/subsite/leefbuurten

[4] The reports of the exploration phase and the analysis are accessible on https://vlaamsbouwmeester.be/nl/subsite/verkavelingswijken
The presentation of the case study research is expected by the end of 2023.

improving air quality, and effectively managing storm water runoff. Through the collective renovation of existing buildings and the implementation of renewable energy systems, the energy demand is minimized, allowing for responsible solutions. All these actions contribute to the development of an autonomous neighbourhood that addresses contemporary societal challenges in spatial, ecological, social, and cultural aspects.

At the same time, the adaptive reuse of churches is a topical challenge. Everywhere in the Western world, adherence to the Christian faith is declining, a phenomenon that manifests itself in the rapidly increasing number of redundant parish churches. In Flanders, of the almost 1800 parish churches, 142 have already been desecrated (data from end 2022) and it is estimated that on the short term, 30% will need to be adapted for reuse. (Visienota, 2022) The historical reasons behind this massive reconversion wave (amongst which the unique state-church relationship in Belgium and the territorial dimension of the Roman Catholic church), as well as the various voices in today's debate have by now been amply explored in the literature (Coomans, 2006; Danckers, Jaspers, Stevens, 2016). Other authors look at future options for parish churches from perspectives as varied as architectural theory (De Ridder, 2021), conservation theory (Coomans, 2014), interior architecture (Callebaut, 2022) and intangible heritage (Vande Keere, Plevoets, 2018). All agree that parish churches play an important role as spatial beacons, cultural markers and social nuclei. At the policy level, the *Projectbureau Herbestemming Parochiekerken* (Agency for the Adaptive Reuse of Parish Churches, founded in 2016 on initiative of the Flemish Government)[5], has given a serious boost to design expertise in the repurposing of churches through no less than 141 feasibility studies conducted over a period of 5 years.[6] One of the provisional conclusions from this experience is that modern churches in the suburban areas are more 'vulnerable' than their 19th C counterparts as the debate about their future use is hampered by the fact that municipalities tend to prioritize more 'historical' and centrally located churches; moreover churches from the 1960s are generally considered too utilitarian in their aspect, and little loved by the general public. By contrast, some of these buildings possess incontestable heritage values, and have often been built on initiative of, and even by the local population.

This research seeks to go beyond the focus on adaptive reuse as an interior job and seeks to approach the issue of church repurposing from the perspective of urban development. More specifically, we ask if, and how the adaptive reuse of post-war churches can support the sustainable transformation of the suburban tissue. Up till now, both fields are not, or only marginally linked in practice, research, and policy. The coupling of both therefore constitutes the originality of the research project 'Faith in the Periphery' (2019-2024). It is our hypothesis that churches, given their multiple significance at the neighbourhood level (social, cultural, spatial), can play a crucial part in the process of neighbourhood transformation. Throughout the research, this hypothesis has been tested through design assignments for master students, as well as through various collaborations with architectural offices. Part of the concluding chapter of the doctoral dissertation, this paper identifies four roles post-war churches could play in the desired neighbourhood transformation at the suburban level, namely that of 'outsider', 'facilitator', 'participant', or 'distributor'. The paper comprises three main sections. First, it introduces a theoretical framework that seeks to challenge the conventional idea of churches as sacred monuments. Secondly, it zooms in on a specific case study with a view to determine the distinctive characteristics, issues and potential of post-war churches. Lastly, it illustrates how the four aforementioned roles could become implemented in the form of conceptual design proposals.

Navigating the Shift from Transcendent Monuments to Immanent Instruments

Throughout history, churches have always symbolized the presence of divinity. Until the mid-20th century, this symbolism relied on the theological belief in the transcendent nature of God's 'wholly otherness', which was physically expressed through monumental structures. (Was, 2017) This inherent sense of transcendent monumentality reflected the image of God, and through the accompanying liturgy, it found expression in various physical elements. Typically, the grand scale,

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[5] The Project Agency was a partnership between the expertise centre for religious art and culture PARCUM (a joint initiative between the dioceses and the Heritage Agency), the Expertise Centre for Flemish Cities and Towns (VVSG), the Flemish Heritage Agency, the Flemish Government Architect and the Flemish Ministry for Public Governance. Today the agency is substituted by a Platform for the Future of Parish Churches. See https://www.vvsg.be/omgeving/platform-toekomst-parochiekerken.

[6] A publication with substantial contributions by Charlotte Ardui and Sven Sterken, focusing on the design results of the Project Agency, is scheduled to be released in the fall of 2023.

dim lighting, intricate decorations, symbolic references, and the carefully organized spatial layout shaped the liturgical practice. Moreover, the physical position of churches within city centres enhanced the visual and symbolic impact. Often placed on elevated sites or prominent locations, these architectural landmarks stood tall, commanding attention and shaping the skyline. These interior, architectural, and urban characteristics possessed the ability to evoke specific emotions in those who inhabited these spaces, while also conveying theological understandings and interpretations. For instance, a long and narrow space intentionally organized with a main entrance at one end and a significant focal point at the other end, can be seen as "representing a spiritual pilgrimage through time and space" (Torgerson, 2007, p. 3).

As traditional churches can be seen as the ultimate prototype of monumental architecture (Bekaert, 1967), it is pertinent here to explore the concept of monumentality in architectural theory with a particular focus on how it is brought in relation with the urban fabric. Rossi (1982; 2009) for instance, associates monuments with the notion of permanence. He believed that significant, long-standing structures, or what he refers to as 'permanences', structure the urban tissue. As a result, he city, with all its permanences, acts as a backdrop for human life. Similarly, Kahn (1944) explores the permanent and static nature of monuments, acknowledging their spiritual and eternal essence. According to him, monuments 'resist' alteration or modification; this had to do with certain enigmatic qualities, a specific materiality, lightning effects, the ensemble value, and the integrity of construction which he recognizes as typical features of monumentality. Koolhaas (1997) acknowledges form as a substantial attribute of monumentality (Hartmann, 2019, p.94-96). His understanding centres around the symbolic gestures and the significance of scale. Lastly, Aureli (2011; 2016) praises the autonomy and 'obstructive qualities' of monuments, acknowledging the capacity of historical churches to trigger activity and urbanity: like monuments, churches not only embody their distinctive position, they also operationalise it.

Much of the above does not easily applies to post-war churches however, for they exhibit a distinctive expression of theology, liturgy, and architecture (Doevendans, 2010). Indeed, as the 20th century progressed, a fundamental theological shift occurred within the various Christian churches, acknowledging the divine presence *within* everyday life rather than as something sacred and therefore exterior from it (Torgerson, 2007). As a result, the liturgy was also fundamentally adapted, with the aim to democratize the practice of faith by fostering the active involvement of the laity during services. This liturgical shift, which required open, flexible and well-lit spaces where the faithful could take place around the altar, resonated strongly with a modern approach to building design, which accordingly, led to a fundamental rethinking of the church building as a type (Morel, Van De Voorde, 2012). The use of new materials and techniques enabled architects for example to break away from limited spans and narrow naves and thus architecturally accommodate the new liturgical practices (Kidder Smith, 1964). Deviating widely from existing church typologies and often without overt religious symbolism, post-war churches were often conceived as multifunctional community infrastructures and often smaller in scale than conventional churches (Sterken, 2013). Moreover, in the urban fabric, churches no longer held the prominent positions they once did: their location within the new or soon-to-be subdivided areas depended on land prices, the benevolence of the local administration, of the charisma of the local parish priest. Yet, the dioceses installed various incentives (mostly financial in nature) to ensure the presence of the Church in the suburban expansion (Sterken, 2013).
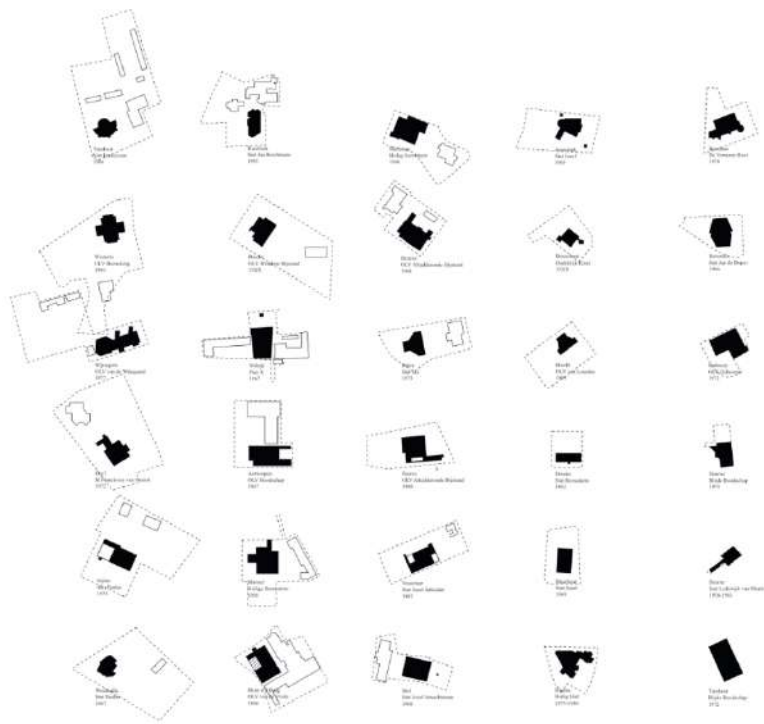
[fig.1] overview of 30 post-war churches in the diocese of Antwerp showing the versatility in plan layout and the relation between the church building, the plot, and auxiliary buildings parish infrastructure. Drawing by the author, 2021.

In opposition to earlier church types which in most cases fall under the category 'transcendent monuments', and with a view to capitalizing on the 'otherness' of the post-war churches (in the theological, liturgical, architectural and urbanistic sense as explained above) as a positive quality, we suggest a conceptual twist: what if we look at them not as 'transcendent monuments' but as 'immanent instruments'? Indeed, most 1960s churches were designed to serve the community in the first place, by offering a place for encounter embedded within their daily routines. Consequently, they don't possess the 'permanence', 'enigmatic qualities', 'large scale', or 'autonomy' associated with monumentality in architectural theory (cf. above) but are rather designed to encourage participation, social encounter, and pragmatic use. Given the fact that this type of churches exists in significant numbers —roughly 25% of the churches in Flanders were built after World War II, and almost 15 % after 1965 [7] —, our call for a conceptual reversal in the appreciation of church buildings is not a mere academic exercise, but an attempt to name, recognize and qualify the essential characteristics and potential of this built heritage. Thus, we tackle two interrelated challenges: first, the lack of vocabulary to discuss and assess the value of modern churches[8]; and second, the received idea that these buildings are mere functional spaces that can be easily repurposed. As we state, such indifferent and pragmatic attitude overlooks their original intention (and current potential) as 'houses for the community'.

Yet, it could be argued today, both the idea of the church as a transcendent monument or an immanent instrument have not only lost their intrinsic significance, but also their conceptual relevance. Indeed, the irreversible trend of secularization has made the concept of a church as a transcendent monument obsolete; on the other hand, the idea of the church as an immanent instrument has also lost its appeal for in many instances, it has been mistaken for simplification and unconcealed pragmatism, resulting in buildings of utmost banality and lacking any formal strength.

In an attempt to overcome this dead-lock opposition, we propose to take the reasoning developed above one step further: what if we stop looking at church buildings through the lens of these established categories, and introduce hybrid categories instead? What, for example, could it mean to think of church building as a 'transcendent instrument', or a an 'immanent monument'? Moving beyond binary oppositions broadens one's perspective and creates a fertile field of tension from which unexpected new insights may arise. Is it possible, for example, to combine the formal capacity of a monument with the need for embeddedness of a community centre? Or can the etheric ambiance traditionally linked with the concept of transcendence be coupled with the performativity of technical infrastructure? The four 'roles' discussed later in this paper originate from such cross-pollinations; on the one hand, they consist of architectural interventions geared at unlocking the building's latent qualities and increase its cultural significance as a monument; on the other hand, they serve as

instruments in sustainable neighbourhood development, thus consolidating their societal relevance and meaning. In both cases, the objective is the same, however, namely to reconnect the church, spatially and socially, with the neighbourhood and its inhabitants.

St. Joseph's Church in Berg, Meerhout: A Case Study of Post-War Church Architecture and Community Dynamics

St Joseph's Church in Berg, Meerhout is one among the 428 churches built in Flanders after 1945.[9] It holds particular significance for two reasons. Firstly, it serves as a prime example of the contemporary challenges. Secondly, its creation, location, and architectural style symbolize the tangible transformation of the (religious) landscape in the aftermath of war. Hence, already in the late 1950s, the seeds of a new church began to sprout in the neighbourhood of Berg. Following the post-war trend of demographic explosion and the spatial policy (or rather, the lack thereof), Berg grew from a small hamlet with a handful of farmhouses, into a neighbourhood consisting of scattered family houses surrounding a school and few services. (Cuypers, 1988). These rapid social and spatial changes posed a major challenge to the organisation of pastoral care. Parish boundaries were redrawn, and churches and associated infrastructure were systematically provided to newly developed peripheral neighbourhoods. (Sterken, Weyns, 2022) Likewise in Meerhout, where the new parish of St. Joseph was officially established in 1964. (Cuypers, 1988) The responsibility of designing the church fell into the hands of the local architect duo Lou Jansen and Lode Schiltz, who were assigned a plot that was selected with the intention not to obstruct the further development of the allotment.[10] (Smeets, 1971) The construction and financing of the church became a collaborative effort within the neighbourhood. A 'building club', a group dedicated inhabitants, organised successful funding initiatives. They received direct financial and organisational support from Domus Dei, the diocesan fundraising organization. In 1969 the church was festively consecrated. (Cuypers, 1988) Today, the St. Joseph's church stands as a testament reflecting the combined effort of the community that helped it built and the vision of church authorities.

[fig.2-3] The St. Joseph's Church in Berg anno 1988, from Cuypers, 1988.

[fig.4] The Joseph's Church in Berg anno 2021, elaborated by author, 2021.

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[9] Boone, Böröcz, Tansen, 2008

[10] Jansen and Schiltz were prominent figures of the Turnhoutse School—a local architectural movement known for its late modernist and functionalist principles. See De Bont, Y. (2012) 'Lou Jansen and Rudi Schiltz' *in Architectuur in de golden sixties. De Turnhoutse School* Strauven. F. (ed) (Tielt; Lannoo) 152 – 155.

Accordingly, the church exemplifies typical characteristics of post-war churches in terms of its location, architecture, and interior. The site where the church building stands is now centrally situated within the new neighbourhood. Typically, it exhibits minimal hierarchical differentiation from neighbouring plots. The church is situated on a spacious plot, where the residual space is full of street clutter and mainly serves as a parking area. Post-war churches often feature a distinct and clear geometric design, with a freestanding structure that is commonly placed in a random arrangement among residential plots. In Berg, this translates into an introvert, straightforward, box-shaped volume, where the structure is visible from the outside through repetitive columns along the side facades. The entrance is marked by a modest bell tower. In terms of plan layout, post-war churches typically prioritize maximal flexibility. They often provide a large open space, devoid of vertical structural elements, and accompanied by a few servant spaces. In the case of St. Joseph's church, this is accomplished with 20-meter-long pre-stressed concrete beams, spanning a generous space capable of accommodating up to 400 worshipers. Servant spaces are situated above a small Baptist chapel adjacent to the main entrance. Also, in terms of interior ambiance the St. Joseph's church is emblematic. The space is devoid of excessive ornamentation, creating a sense of simplicity and tranquillity. In addition, the incorporation of zenital lighting, separating the walls from the ceiling, the careful articulation of the structure, and the use of simple everyday materials, here concrete blocks, all contribute to its distinct atmosphere.

[fig.5] The Joseph's Church in Berg today, elaborated by author, 2021.

Furthermore, the St. Joseph's church serves as a pertinent and illustrative case, encompassing not only its physical attributes but also its utilisation and stakeholder dynamics. As stated earlier, the church was constructed and financed through the active involvement of the community. The intention was to create a church as an open, flexible, non-functionalist and non-capitalist, space for social encounters and public engagement. However, already shortly after its completion, a decline in church attendance became apparent, resulting in a gradual decrease in income for the church fabric. In 2010, the church underwent a renovation to address structural and moisture-related issues, but it also included pragmatic interventions to enhance the church's versatility in use. Notably, a heating system was installed, fire exit doors were added to meet the regulations for public buildings, and the Baptist chapel was repurposed as storage space. Additionally, the concrete altar was substituted with a movable wooden one and original liturgical furniture was removed to enable a multipurpose use.[11] From then on, Mass celebrations were combined with sporadic concerts, exhibitions, or neighbourhood dinners. Due to a further decline in attendance, the church hosted its last service in

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[11] This information was provided by Jos Huysmans, chairman of the church fabric. Conversation with J. Huysmans, church fabric, Meerhout 09/10/2020

2022. The church policy plan of Meerhout outlines the future of the St. Joseph's church as an 'event space' by 2030, as it is deemed the most suitable building among the four churches in Meerhout.[12] However, it is important to note that this destination reflects a pragmatic approach. The church will predominantly remain closed and will serve a regional scale of activities. Moreover, the transformation necessitates the preservation of parking spots and the inclusion of additional (sanitary) facilities.

In conclusion, the case reflects the two challenges discussed in the previous section. Firstly, from an architectural historical perspective, the church's austere character and uncanny qualities are, and have never been, fully acknowledged. This is proven by the limited attention it received by heritage agencies and in literature.[13] Also, the fact that over the years, community members have adorned the space with art and artificial plants demonstrates a lack of appreciation for its modest ambiance. Secondly, there exists a discrepancy between the original purpose and potential of the church building on one hand, and its current and envisioned utilization on the other hand. Designed as a 'house for the community', it aspires significant symbolic value within the local neighbourhood, representing their collective identity. However, there is a missed opportunity to align the evolving needs of the neighbourhood with the proposed new use as 'event space'. While the program may only require minor alterations and ditto investments, its focus on a regional scale fails to take advantage of the church's original meaning and central location within the community. Moreover, this pivotal moment presents an ideal opportunity to reconsider and redesign its physical positioning within the urban setting.

Transforming the post-war Church: exploring four Roles in Neighbourhood Transition

As stated before, this research project seeks a way out of the uncertain future of the post-war church buildings by coupling the question of their (re)use with the challenges of sustainable neighbourhood transition, as pointed out in studies like *Verkavelingswijken in Transitie* and *Klimaatwijken* (cf. section 1). To this effect, we have defined a set of overarching principles, encompassing architectural interventions both within and around the building, as well as concepts for new use, management, and ownership.[14] These principles serve as a flexible framework that can be adapted to suit specific circumstances, with a view to activating the church's spatial and socially structuring capacity. In spatial terms, these principles are:1) activating and restructuring of the outdoor area surrounding the church; this enhances its exceptional status within the neighbourhood and expands the spatial qualities beyond the church's interior; 2) maximum safeguarding of the qualities of the building's open interior space, thus prioritizing facilitation the edges than filling the centre; 3) carefully redesigning the thresholds between inside and outside (both on the level of the building as on that of the church site), with a view to creating in-between conditions. In addition, we also propose three principles for new use, management, and ownership: 1) An a-functionalist approach, namely a solid and flexible framework, rather than a specific defined use, allows multiple uses, and encourages appropriation and adaptability. 2) We aim at safeguarding the non-capitalist capacity of the building. As an exception in a profit orientated society, the new use for the place should not prioritize financial gain but serve the community by providing valuable resources and services. 3) Collective ownership, so that the church building becomes a shared responsibility, enriching its current sense of symbolic ownership. On the basis of both these sets of principles, together with the conceptual hybridization discussed before, we have identified four distinct roles ('outsider', 'participant', 'facilitator', and 'distributor') a church could play within the desired neighbourhood transition. Each role embraces the inherent ambiguity between monument and instrument, serves the local community and promotes sustainable transformation, all the while building on, and enhancing the unique qualities of post-war church buildings as described above. St. Joseph's church in Berg serves as a case study to test and illustrate these roles. The designs are not conceived as architectural projects bur rather aim at expanding the stakeholders' and policymakers' imagination by presenting possibilities, broadening the scope of

adaptive reuse (beyond the single focus on the interior), and introducing a longer-term perspective of sustainability.

[fig.6] The Outsider.
Drawing by author (2023)

The Outsider entails an intensification of the otherworldly nature of the church building. In this scenario the church building serves as a stabilizer, a sanctuary, a vacuum of functionality amidst the rapidly changing and dynamic territory. Positioned at the heart of the new lively neighbourhood, the church serves as a place of remembrance, silence, reflection, and tranquillity - a refuge from the fast-paced and utilitarian aspects of daily life. Through the integration of water and green, the former church building is turned into an oasis in the tradition of a *hortus conclusus*. The site is depaved to maximize its natural surroundings, while indigenous plants and trees are carefully introduced to enhance biodiversity and provide shaded areas. The roof of the church is removed and the transition between inside and outside, both for the plot and the building itself, have been meticulously redesigned by walling the contours. Through a gradual progression from the external environment, through a set of outdoor rooms into the enchanting space within the church walls, visitors step by step leave the realm of everyday life. The entrances are clearly marked and serve as the gateway to this transformative journey. The site is charged with benches, an outside auditorium can host new types of rituals. In terms of amenities, the requirements for the new role are minimal: lockers, storage and sanitary. Consequently, the place demands little maintenance; the management and ownership of the church building involve a single investment by the municipality.

The Facilitator

The Facilitator is reimagined as a dense apparatus, acting as 'a facilitator', and offering a variety of neighbourhood facilities. This role ties in with the desired neighbourhood transformation, fostering a vibrant and self-sustaining community with reduced reliance on external resources and transportation. Given its central location and size, the church building is an ideal site to host a wide range of community-oriented amenities. In terms of community use, the transformed church provides a space for social and cultural interactions among people of different generations. A wide range of amenities are available, such as a doctor's office, a small childcare, a co-working wing, rentable rooms with lockers, and a post office for packages. These amenities are collectively managed and owned by a cooperative. To maximize the plot's utilization, it is densely developed, creating a new spatial order that enhances the site's public character. The church building is turned inside out, with extensions of varying sizes surrounding the former sacred space. Likewise, it remains an open and accessible space that still serves as the main space for encounters and interaction between community members of different generations. As a result, the former church building and its site become a hub for social and cultural activities, establishing a (new) reference point within the neighbourhood.

The Participant

[fig.8] The Participant.
Drawing by author (2023)

The Participant becomes a part of the transformation by embracing new forms of collective living and working, leading to a qualitative densification of the site. This contribution is significant in diversifying the existing homogeneous housing stock, as the former church building is surrounded by new, affordable, and cooperatively managed dwellings. The development incorporates a variety of housing types, including single-person flats for seniors and singles, as well as compact ground-bound houses. An enclosed collective garden serves as a buffer between the church building and the housing units. Additionally, the site includes amenities like a parking pocket for shared cars and bike storage. Within the converted church, separate home office spaces, a communal kitchen, and ample storage space are incorporated, while preserving a significant portion of the former sacred space for various gatherings. During weekends and evenings, these spaces can also be utilized by the wider community for meetings and community activities. The church building is designed as a Janus head, open and welcoming to both the neighbourhood and the housing development. The altered ratio between occupied and open spaces on the site influences the orientation of the building, giving the church a different framing that enhances its connection to the wider neighbourhood.

The Distributor

[fig.9] The Distributor.
Drawing by author (2023)

The Distributor serves as an infrastructure node in suburban networks for essential resources such as water, energy, and locally produced food. The desired transition of the neighbourhood includes various interventions that promote a collective and considerate approach to water management, energy transition, and local food production. With its advantageous size and location, the church site is perfectly positioned to facilitate these flows. The roof is adorned with solar panels and a seasonal energy buffer tank is installed underground on the plot, to which a heat grid is be connected. At the same time, a collective water cistern is dug in to cater to the needs of the school and nearby residences. The management and ownership of these resources involve an energy cooperative and the municipality, demonstrating their commitment to sustainable development. Through this transformation all thresholds dissolve: the former church becomes nothing more than a grand public canopy, covering storage spaces. It serves as a vibrant place for social gatherings, festivities, and functions as a logistical distribution point for local food production, featuring vending machines for vegetable parcels and a tapping point for civic water. In this role, the former church, and its plot transforms into an open space, inviting individuals to freely appropriate, allowing for spontaneity. Infrastructure elements allude on the generosity of the place in sharing surplus water and energy.

Conclusions
We have observed that the vocabulary used to discuss churches built after the second world war is heavily influenced by the image of traditional churches. This lack of genuine and informed appreciation affects the heritage assessment and adaptive reuse potential of these churches. Once no longer in use as structures for religious and community purpose, the only reference to their *raison d'être* disappears alike. By constructing a field of tensions between the traditional concepts of monument, instrument, transcendent, and immanent, we have found a reason to update the former societal relevance of the church and combine it with an ambition to enhance the building's formal qualities within its urban surroundings. This has provided an opportunity to identify roles for the church within a desired sustainable neighbourhood transformation. We have explored four distinct roles for post-war church buildings, in which each takes on a different agency in the impending transition: the outsider, participant, facilitator, and distributor. Not only do these roles anticipate the transformation, but they also have the potential to act as catalysts for development, aligning with the historical capacity of churches to trigger urbanity and interaction.
Starting from this reflection on the servant and radiant qualities of churches, we intentionally avoid using the concepts of 're-purposing' and 're-use' in our discourse. We acknowledge that, while the liturgical goal of these buildings may be less relevant today, there is a future role for post-war churches beyond pragmatism, purpose and urgency. Hence, the prefixes 'supra' and 'super', align more closely with our objective of surpassing mere purpose. It is our aspiration to redefine their role in the supra

and super realms, ensuring their continued relevance in a world where the traditional concept of a church may have evolved. By doing so, we honour their historical significance, while propelling them towards a future where they can thrive as symbols of architectural and societal significance. Thus, even more than fifty years after its publication, the final sentence of Bekaert's *In een ander Huis* from 1967 – where the latter did away with the idea of the sacred as the essence of church architecture, prioritizing its social relevance and architectural quality instead – is still relevant: "Churches will continue to be constructed, churches that are no longer churches, but that instead will be able to occupy the empty place left by current ones." (Bekaert, 1967)

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Qualitative datascaping for historic cities in conflict: A grounded theory analysis for spatial sustainability
Case of Jaffa, Israel

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This research is rooted in the constructivist grounded theory analysis to develop qualitative datascapes for attributes taking the Historic Urban Landscape approach and its evaluation on different urban scales and application for planning frameworks. The case study of the historic city of Jaffa, Israel is explored. The research assesses HUL attributes through semi-structured interviews of stakeholders at the local, district, and national levels of urban planning and heritage management. A heuristic and knowledge-driven approach for exploring the concept of spatial sustainability by focusing on the HUL approach and deployed to address the research question: which HUL attributes are most critical and feature in relation to other attributes and are instrumental for the success or failure in the application of HUL recommendations? or How is the HUL approach relevant and integrated within the design and planning frameworks at various urban scales and what are the gaps and potentials? This study may be beneficial to the local authorities and other stakeholders, concerned with urban heritage and spatial sustainability and advantageous for enhancing conservation and decision-making frameworks.

1.   Introduction

The spatial complexity of historic cities is evident and emergent from the dynamic and diachronous evolution, and influence of myriad social, economic, environmental, and cultural forces. The past decades have seen an evolution in theories addressing the spatial configurations of historic cities, adhering to more process-driven methods of design, and planning and diverging from the conventional category-driven approaches (Veldpaus, Pereira Roders and Colenbrander, 2013). Most contemporary processes of urbanization and development pose a challenge to spatial sustainability in historic environments, especially those having witnessed or witnessing intense levels of ethnic, National, geo-political, and/or religious conflicts (Pullan and Baillie, 2013). In these cases, it is pertinent to question and examine the spatial manifestations of such conflicts as well as to document the divergent values of urban heritage amongst stakeholders and actors. Though the fields of urban design, landscape architecture, and spatial planning are multidisciplinary, they are heavily practice-oriented and rely less on theoretical analysis (Allen and Davey, 2018), and with the scientific categorization of disciplines, institutional and departments, the development agenda takes precedence over the cultural agenda for historic cities (Erkan, 2018).

To build on the multidisciplinary requirement of the field of urban design and spatial planning in historic cities, the research adopts the Constructivist Grounded Theory approach (Hereafter CGT) as a method for qualitative datascaping. This method is explored as a tool to document and assess the differing values for urban heritage elements with reference to UNESCO's Historic Urban Landscape Recommendations (UNESCO, 2011) (HUL hereafter) at various scales and perspectives of actors and stakeholders. The study is conducted for the case study of the historic city of Jaffa, Tel Aviv-Yafo municipality as a case of urban heritage in conflict. The aim is also further to develop the HUL approach as a complementary step for an Inclusive Heritage Discourse (IHD). By presenting a qualitative datascape of urban heritage values, the proposed tool can be used to facilitate spatial sustainability and decision-making processes.

1.1   Background

UNESCO's Recommendations on HUL emphasize framing urban heritage with a landscape approach beyond the protected heritage areas by addressing interrelations of their physical forms, spatial organization, natural features, and settings, and their social, cultural, and economic values. The New Urban Agenda (UN-Habitat, 2017), which is based on the SDG Agenda 2030 (UN, 2015), emphasizes addressing the unique and emerging urban development challenges facing all countries with special attention to countries in situations of conflict (Article 109). Although the agenda outlines the requirement of integrated territorial development which can be addressed

through HUL recommendations, there is a lack of an established method or means to achieve it (Erkan, 2018). Another challenging aspect of the HUL recommendations is the intergovernmental nature of the guidelines demands collaboration amongst various actors and stakeholders. While existing literature focuses on attributes and elements of values beyond the built and protected layer to a landscape level, there is little research documenting and assessing the values and relevance of these attributes to different stakeholders at various urban scales and their potential towards achieving the goals of spatial sustainability.

This area of study presents more challenges in the case of historic cities in conflict as to document, map, interpret, and theorize the value and significance of the HUL attributes and integrate it with concepts of spatial sustainability. The challenge lies in the implementation of IHD which provides the opportunity for heritage to function as a reconciliation factor within policy and planning frameworks and enables constructive dialogues between supranational actors, public institutions, civil society organizations, and heritage professionals (Kisić, 2013). In most practices, the Authoritative Heritage Discourse (hereafter AHD) is adopted in heritage conservation practices for material culture to 'conserved as found' philosophy (Smith, 2012), subverting the non-conformist, alternative and non-traditional approaches to understanding heritage narratives. Talking from the point of view of dimensions of social and cultural sustainability, issues and challenges posed by conflict in historic cities often are treated as technical issues without addressing the underlying nuances and thus generating urban alterities (Lefebvre, 1996; Smith, 1996), resulting from exclusivist attitudes and governance models. Hence, this research will aim to present findings on the lacuna of current practices, attitudes, and perspectives in line with the HUL approach and attributes within spatial sustainability frameworks, that have not been widely discussed in literature or practice.

1.2 Spatial Sustainability for historic cities in Conflict

The concept of spatial sustainability has made its appearance relevant in literature focused on economic, social, and environmental sustainability. The Illustrated New Urban Agenda (UN-Habitat, 2020) made emphasis on this concept by highlighting it as the fourth dimension for transformative commitments where the physical form of a city impacts the urban social, economic, and environmental well-being and is a direct outcome of intentional integrated urban and territorial planning (UNHABITAT, 2018). Cultural heritage conservation policies and spatial planning is imperative steps for addressing challenges arising on account of transformative processes, such as migration and spatial fragmentation, and in many cases which do not prioritize the attributes and values of historic environments (Roders and Bandarin, 2019) and require an inclusive approach. Especially for the case of historic cities in conflict, the spatial ramifications of conflict become more pronounced. The related and recognizable forms of these implications leading to partitioned urban zones (Karlinsky, 2000) can be illustrated from borders, boundaries, walls, buffer zones, frontiers, security areas, infrastructural systems, dead zones, enclaves, warlord domains, religious bastions, gated communities and so on (Pullan and Baillie, 2013). Such cities which give rise to urban partitioned zones (Marcuse and van Kempen, 2000; Kempen, 2007; Kempen and Murie, 2009) with the introduction of 'conflict infrastructures' (Pullan, 2013) have an impact on the spatial configurations of cities and consequently on the life of people.

1.3 Problem statement

One of the key concepts of the HUL recommendations is to acknowledge and address the layers and continuity of historic urban environments which through the passage of time acquire significance at local and at times transcend to national and international levels. The need for addressing the significance of these layers in the planning and preservation strategies become more pronounced, especially in light of rapid urbanization and development (UNESCO, 2016). The importance of the wider setting and landscape to the historic urban environments was highlighted in the 43rd session of the UNESCO World Heritage Committee to promote sustainable development and actively engage with the wider development processes by adopting the HUL approach for properties in and around urban areas so that their planning elements can be integrated directly into the planning and development policies, plans, processes, and instruments; regardless of whether the property is inscribed for its urban values or not (UNESCO, 2019). However, the conceptual framework of landscape for integrating within mainstream planning practices is still to gain prominence when it comes to heritage management (Bandarin and Van Oers, 2015). In

addition to this, the HUL recommendations also pose limitations (Veldpaus and Pereira Roders, 2017). AHD poses a risk to perpetuating power relations between the experts, institutions and inter-governmental frameworks thus diminishing the potential and opportunities for them to be agents of change (Kisić, 2013; Aronsson, 2014) in meeting cultural, social, and economic planning challenges. These challenges at various urban levels are more noticeable in the light of contemporary urbanization and development and require tools and methods in the discourse of urban heritage and spatial sustainability to adopting to methods and tools to identify, recognize and acknowledge the limits of acceptable change in a historic context (Bandarin, F. and Van Oers, 2012). There is a need to clearly identify urban attributes and to establish a methodology to manage change (UNESCO, 2020) and concerning to the multi-sectoral approach and various urban scales.

2   Case study: Jaffa, Israel

The ancient port of Jaffa was a mixed town with Muslim, Christian and Jewish residents (Monterescu and Rabinowitz, 2007). The Tel Aviv city, founded in 1906 as a Jewish suburb, was envisaged to be a modern and developed neighborhood and perpetuated the political divide. Since the annexation of Jaffa to the Tel Aviv municipality in 1950, it was rendered as a dilapidated neighborhood of the modern city. In the late 1990s, Tel Aviv's International Bauhaus style gained appreciation for its modern architecture. In 2004 acquired World Heritage City status with efforts targeted toward preservation and heritage management. Municipal investments during the last twenty years in tourism infrastructures, culture, urban spaces made it a tourist destination. Jaffa is a case where disintegration of physical elements of the historic city is constituted along with dramatic transformations in the social, economic, political and cultural urban systems (Golan, 2020).

The municipality of Tel Aviv-Yafo has devised a 'City Vision Plan' and 'the Strategic Plan for Tel Aviv-Yafo: City Resilience' (Tel Aviv-Yafo Municipality, 2017, 2019) which highlights the growing polarization and alienation trends in the city, specially between the North and the South. The polarization is driven primarily by socio-economic disparities, converging with neo-liberalism, globalization, and the historical disparities between the communities. Jaffa encapsulates the spatial conflict dynamics of the nation state and is an exception to the segregated spaces in Israel where ethnic segregation is prevalent (Monterescu 2017).
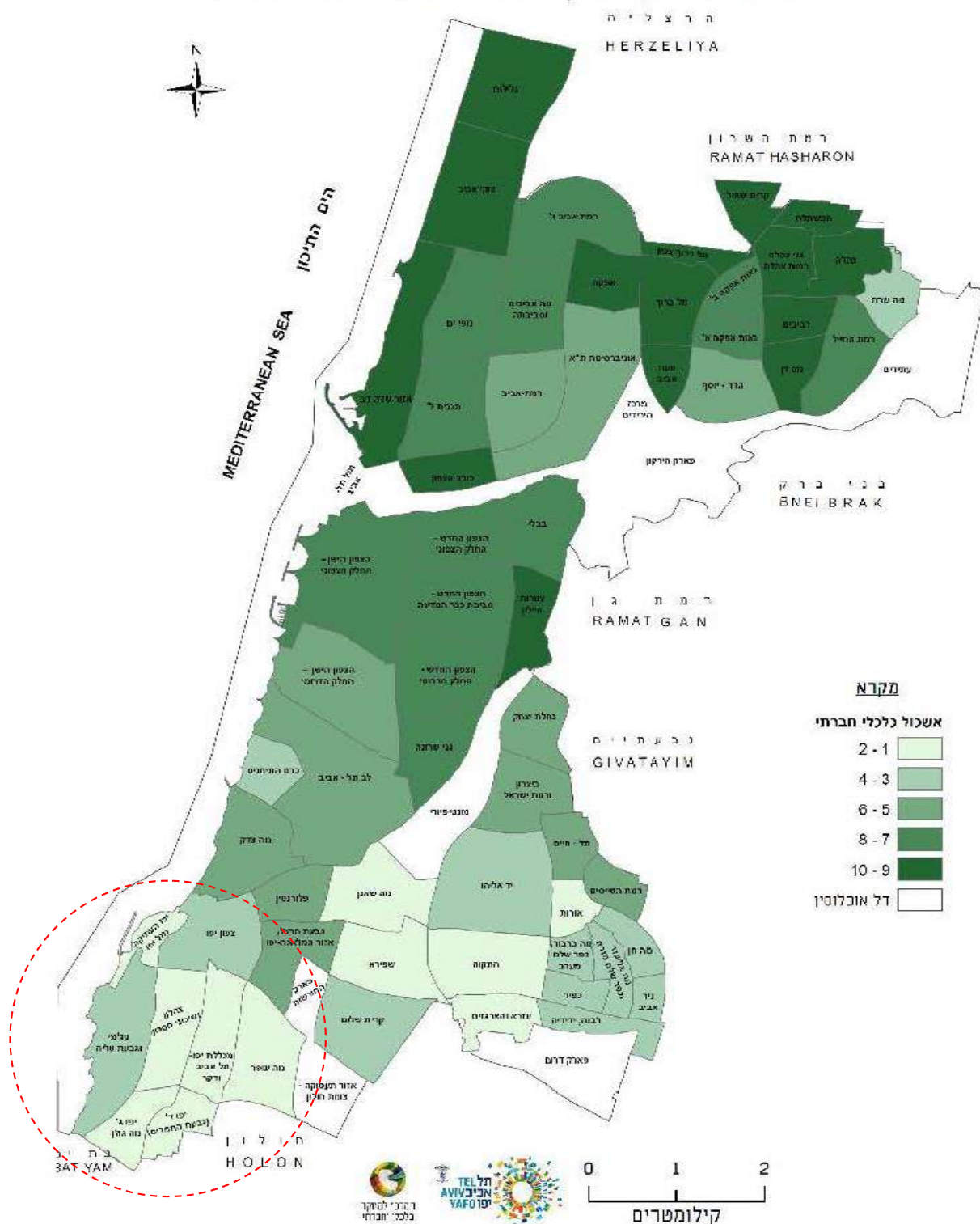
[fig. 1] The social-economic level of the Tel Aviv-Jaffa population and the city's neighborhoods, the area of Jaffa highlighted in red dotted circle, with the lowest socio-economic levels of the city.(Calculated by data from 2017) The population's socio-economic index is a concluding index that underlies its calculations included characteristics Economic, demographic, education and education characteristics, standard of living, employment and retirement; Source: Tel Aviv Municipality

Amongst the priority areas of the Strategic plan for the city, Jaffa is identified as site for intervention for social and economic projects, stressing on the needs of creating a space for shared

existence as well as a plan and development for preserving the unique features of Jaffa's social and physical fabric (Tel Aviv-Yafo Municipality, 2019). A tourism and marketing plan aims at the global experiences that bring forward the characters of the city through promotion of sites of religious, heritage and multicultural nature and developing public space and transportation infrastructure to and from and within Jaffa (Tel Aviv Municipality, 2019).

Although the master plans acknowledge and address the challenges that Jaffa as a historic cultural districts face, in the light of economic, social, and cultural pressures, the interventions require a deeper level of documentation, research and policy and master plan frameworks to support it. The following section will highlight some of the on-going/ proposed projects in the historic city aimed at cultural, economic, and urban development.

2.1 *Case of Shuq Ha Pishpashim / Greek market renewal project*

The Greek Market compound presents a case of historical layering and development over a period and a complex case of economic pressures and conflicting interests of regional and local governance. The architectural history of the compound dates to early 20th Century CE, constructed by the Greek Orthodox Church, a land which previously was agricultural land in historic Jaffa, which was eliminated due to extensive construction during the British Mandate period. Archaeological evidences and excavations reveal that the market dates primarily to the Crusader, Mamluk–Early Ottoman and Late Ottoman periods whereas pottery shards from the Hellenistic, Byzantine and Early Islamic periods are also excavated (Arbel, 2016).

The market compound falls under the City Development plan no. 2572 Kikar HaShaaon[1] along with the Clock tower and the flea market. The plan applies to North-West Jaffa and addresses redevelopment proposals in three touristic zones: the port, the Old City, and the markets area and received 12 million Euros of funding (Shalita, 2012). The 7500 sq.m area of the Greek market compound contains 13 designated buildings for preservation at various levels. The policy also aimed at controlling the permits for business such as restaurants to not exceed 25% of the total commercial area. The redevelopment and infrastructural upgrade of this area brought in investments and new business in the form of café's restaurants, merchandize and city services (schools, social services etc.) improved. However, this process soon brought in gentrification, and brought new residents to impact the low-income residents and veteran business owners, dramatically altering the historic socio-spatial configurations of the area (Shalita, 2012; Ramon, 2021). A Policy for Flea Market Discussion of Policy approval (2572/2)[2] was granted additional 40,000 sq.m. building permits for additional floors (Refer Figure 3). In 2018, the Greek market was purchased for NIS 243 million (approximately 60 million euros) by a group of private inventors. The District Committee for Planning and Construction sanctioned proposal for this compound which includes preservation and renovation of the historical buildings and transform the complex into a combination of hotels and residences with a commercial facade by adding building rights and floors to the existing building.

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[1] Tel Aviv Town Plans; Specific Plan number 2752 'The Clock Circle Area of Jaffa' (1995, March 3). Local Planning Tel Aviv-Jaffa. https://apps.land.gov.il/IturTabotData/takanonim/telmer/5004906.pdf

[2] https://www.tel-aviv.gov.il/Business/BusinessLicense/DocLib/%D7%9E%D7%93%D7%99%D7%A0%D7%99%D7%95%D7%AA%20%D7%A2%D7%99%D7%A8%D7%95%D7%A0%D7%99%D7%AA%20%D7%A9%D7%95%D7%A7%20%D7%A4%D7%A9%D7%A4%D7%A9%D7%99%D7%9D%20%D7%95%D7%A9%D7%95%D7%A7%20%D7%A2%D7%9E%D7%99%D7%A2%D7%93.pdf

[fig. 2] The view of Shuq Ha Pishpashim/ Greek Market, from the square with the clock tower.

[fig. 1] Proposed external design and layout of the Greek Market/ Shuq Ha Pishpashim, designed by Ilan Pivko architects; Source: Ilan Pivko Architects

However, the proposal was opposed by the Tel Aviv Municipality as the plan did not justify the increase in construction volumes in the area. They recorded the objections to the addition of built-up volume through permission of additional floors and rights as incentives for the preservation of the buildings and the new proposal does not justify the breaching of the exiting City Development Plan for the additional transfer rights and incentives (Tzur, 2020). Many other objections submitted on the plan highlight the need to preserve the current spatial configurations of the historic area, protect the veteran merchants, mitigate densification, address vehicular traffic and parking issues and stresses that the quality of life of the residents will be severely impacted. In 2013, the new businesses and the restaurants that opened in the market composed more than 28% of the total businesses in the market, and the traditional businesses consisted of only 26%. New housing and gated communities, and redevelopment projects which often gentrify cities also introduce the spatial divisions within the urban environments, most time physical divisions of high walls, fences characterizing drastic separation of the private and the public as well as at a socio-spatial level

giving rise to a spatially fragmented urban fabric (Rotbard, 2006) which is unconducive for achieving the tenets of spatial sustainability.

3.   Research concepts, methods, and process

3.1   *Constructivists grounded theory analysis and assessment*

The adoption of the CGT approach facilitates the documentation of various stakeholders and values of HUL attributes at different urban scales. The aim is to and how the urban heritage attributes and values are being/ have been undermined and often neglected in the course of action. In case or cities and historic values and significance, actors and stakeholders have divergent views and the degree of importance varies as per the mandates and dispositions of experts, organizations, or institutions. By application of CGT methods, which is a most commonly used qualitative methods in social sciences (Charmaz, 2011), is taken to allows the compilation of perceptions and views of stakeholders operating at different urban scales without diminishing the value at an individual level (Allen and Davey, 2018). The method is the discovery of theory from data and has been extensively used across disciplines for qualitative research. However, across urban studies, the application of CGT is limited, a method where subjective narratives and perceptions hold ground to construct and collate the relations through developing theoretical insights (Allen and Davey, 2018). The selection of this method is justified for furthering the IHD where diverse notions of heritage, narratives, mandates and visions, interpretations and uses of heritages by diverse actors is recognized (Halme et al., 2017).

3.2   *Data collection and coding*

Since the objective of the research is to further the IHD, use of purposive sampling of participants, based on the research objectives was adopted and participants were identified. The interview questions were formulated following the first research phase, were a set of all concepts emerging from the key research questions' related literature review and datascaping carried out on the case study was shared with the respondent. Narrative data was collected via semi-structured in-depth interviews, where the participants were able to assess the method of generating information through datascaping and its applicability, limitations, or challenges from an individual perspective. Since, the study develops further on the HUL recommendations, based on the tools of the guidelines, participants of this study were selected among public sector/provincial authorities, private sector/entrepreneurs, residents, and tourists (Refer Table 1).

Participant No.	Stakeholder group	Urban scale	Institution/ Affiliations
1	Public sector organization	National	Israeli Planning Administration
2		Regional/ District	Tel Aviv District committee
3			Israel Antiquities Authority
4		City	Strategic Planning Department (Yaffo section), TLV Municipality
5			Historic Preservation Department, TLV Municipality
6			VP Tourism, Tel Aviv Global
7	Consultant professionals and experts	All levels	Urban Planner
8			Urban designer
9			Geographer
10,11			Conservation architect
12			Anthropologist
13			Project architect, Jaffa port redevelopment and strategic plan
14			Ecologist, Landscape Architect, Society for Protection of Nature, Israel
15			Architect and planner, Jaffa Islamic WAQF
16			Israeli Council for Preservation
17, 18, 19, 20, 21, 22	Local community	Local area	Local community living in Jaffa (Diverse ethnic background group)
23			Tour Guide

Table 1: List of interview participants and their designations

The complete responses of the interviews were transcribed by the researcher and analyzed through a process of open coding with Atlas.ti. Primarily, the coding was carried out to document the perception of each stakeholder towards the significance, relevance, applicability of HUL Attributes (Article 9) (UNESCO, 2011) in process of design, planning and decision making. Based on the responses and coding, the following radar diagrams present a qualitative datascape of the perceptions and values of HUL attributes for stakeholders at different levels.
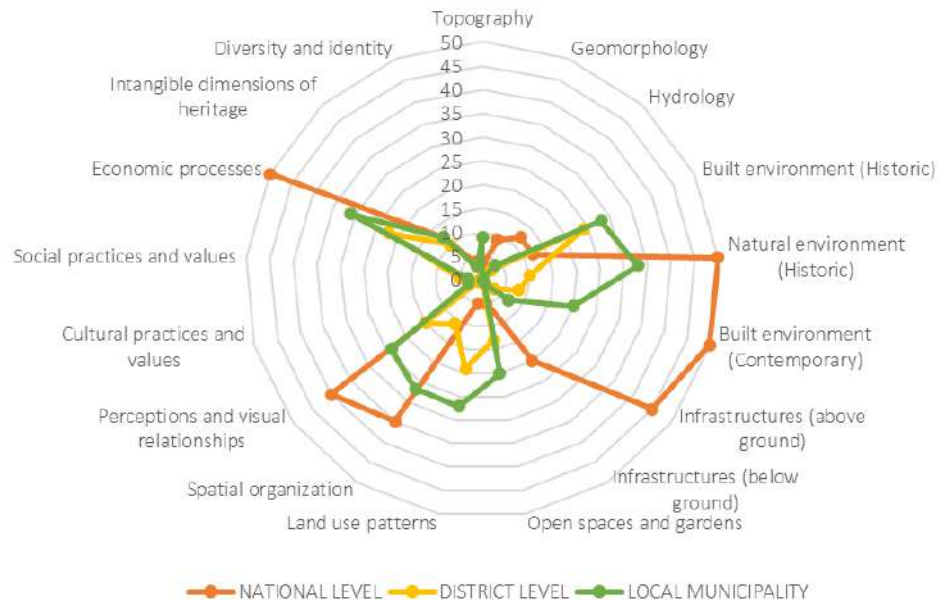
[fig. 2] Radar diagram of outcomes for coding for Public Sector Organizations at National, District and Local Level

The Various departments under Strategic Planning, Tel Aviv-Yafo Municipality speaking from the perspective of conservation and management of heritage comments:

"The historic fabric will evolve eventually and is for the good, though there is a policy in place for this but the new development needs more refining/ designing/ planning guidelines."

"The area around historic Jaffa, there is an ecosytem of small industries, which are dependant on each other. For example: Metal workers and artists. It is becoming harder and harder for them to survive because there are more new housing projects that they doesn't go well with theses kind of users. So this is a trend we are observing and we're trying to intervene because we believe it's important those users should exist in a city and not outside of the city. It's very important for certain activity, creativity that we think that should exist."

The Israeli Planning Administration at the level of Tel Aviv-Yafo district laid more importance preserving the urban historic fabric:

"Preservation policies should not only focus on preservation of the architecrureal styles of the historic districts, but aim at preserving the quality and the structure of the urban fabric. If only stylistic presevation is carried out, it does not do justice to the setting and the urban environment."

On the other hand, the District Planning Commission conforms to the ideology of the HUL approach which stresses on management and planning of cities, beyond the confines of boundaries and borders:

"Administrative borders create physical borders, and that is reflected in the local-level municipal plans which leads to fragmentation"
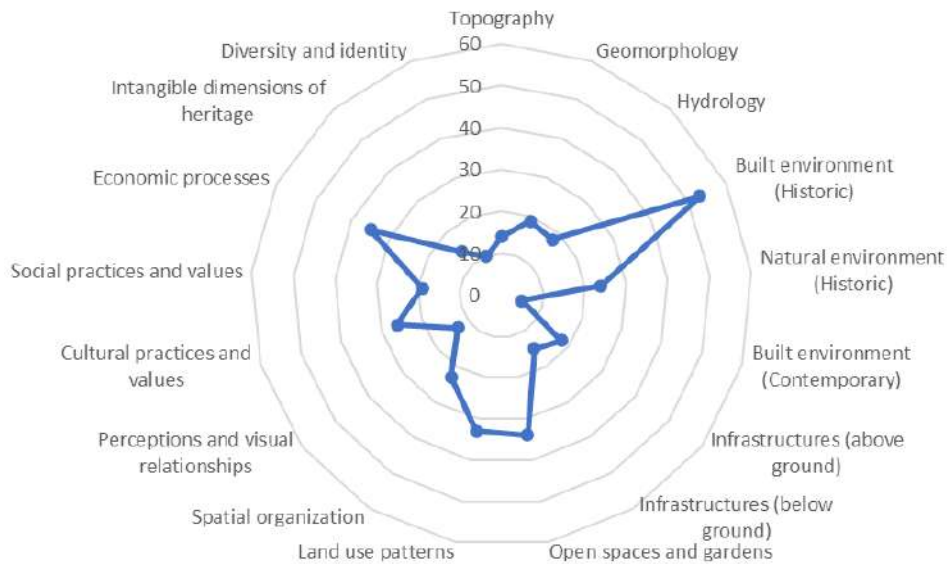
[fig. 3] Radar diagram of outcomes for coding for Public Sector Organizations at Consultant professionals and experts

However, professionals who are individual, independent and in-house consultants to various departments at the Municipality, District and Planning Commission emphasize on the need of regualtory provisions to manage challenges which heritage conservation and planning are projected to:

> *"We don't have a conservation plan at all at the district level. Heritage that is protected in Tel Aviv, may not be protected in another city."*
>
> *"One of the main challenges of policy is to mitigate and prevent gentrification and its impacts, along with finding tools to include the local identity and social values, specially at an economic level, to support local commerece"*
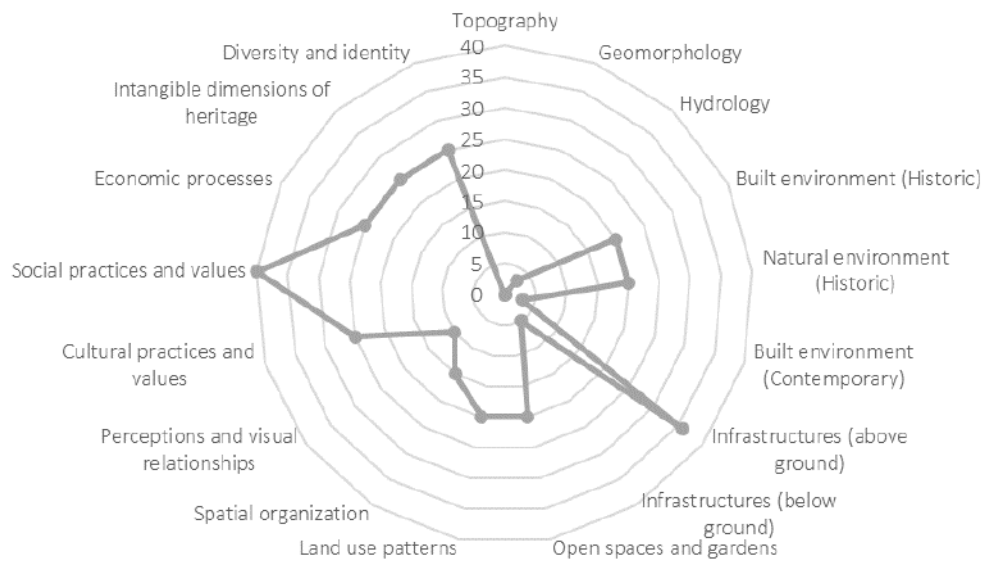
[fig. 4] Radar diagram of outcomes for coding for Local community.

The local residents put more emphasis on the social infrastrucure such as provision of improved education systems:

> *"I am concerned with the education and future of my child; the municipality should aim at provision of more schools and education system improvement in Jaffa"*
>
> *"My father lived in Ajami and studied in the school next to the French hospital and visited it often, now after it became SOHO hotel, no one can think of going near that building."*

Through these multitude of interviews and interactions with actors, practitioners and preofessionals, it was observed that collaboration, communication and interdisciplinary methods were highlighted as the need to address the complex issues to plan and design the historic city of Jaffa.

4. Discussion and conclusion

However, assessing the various stakeholders at different urban levels by applying the HUL approach reveals the potential to present information and insights about stakeholder perceptions and which maybe overlapping, matching as well as conflicting, values, needs and ethics (Veldpaus and Pereira Roders, 2017). The aim of conducting this exploration is to analyze a case study and assessing it with emergent values of HUL attributes through CGT. It is observed that the importance of the HUL attributes/ elements, which are crucial to contributing to the spatial configurations of a historic city, differ at different urban scales. In case of the Shuq Ha Pishpashim/ Greek Market, it is evident that changes in urban land use patterns and density by redevelopment and densification are going to have direct impacts on the historic spatial configurations of the area. This research also presented a qualitative datascape to document the incongruity in how the spatial apparatuses and frameworks through 'conflict infrastructures' that can intensify urban partitioned zones. Whereas, due to this intervention, besides impacting the visual and the material integrity of the place, the economic and social dynamics will be impacted drastically. While the Tel Aviv-Yafo Strategic Plan aims to create a space for shared existence as well as a plan and development for preserving the unique features of Jaffa's social and physical fabric, the divergent perspectives, and non-overlapping frameworks within various stakeholders at different levels prevent the realization of the objectives. It needs to be further analyzed as to the absence or lack of detailed and informed frameworks are the underlying cause or the overruling of certain dynamics such as economic viability over historic preservation norms are the factors that have an impact on decisions and planning frameworks.

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Urbanisation as land consumption, commodification and parceling out: Hybridities in spatial occupation in Bukavu

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Introduction

This article focuses on Bukavu, a medium-sized border town in eastern DR Congo, in the Great Lakes region, which is rich in mineral resources and plagued by armed conflict. The city is faced with major geomorphological constraints, in particular steep slopes and watercourses (lake and rivers) that cross the city, considerably reducing the capacity of the urban perimeter. In addition, the town is facing increased demographic pressure, largely due to the rural exodus caused by armed conflicts in the surrounding mining areas, and is currently undergoing a major transformation of its natural landscape. Against this backdrop, land is proving to be a highly coveted resource, and the pressure it is under is making it impossible to apply urban development plans and standards on the ground. As the urbanisation of Congolese cities is governed by the normative urbanism of comprehensive planning, which dates back to colonial times (Amani, Genard 2022), land management is regulated by law no. 73-021 of 20 July 1973 on the general property regime, the land and property regime and the system of securities, as amended and supplemented by law no. 80-008 of 18 July 1980. This instrumentarium, which is linked to Western-centric management, draws a clear line between the public and private sectors by defining the relationship between the public authority, which is supposed to translate society's needs into space via the plan and is represented by its clerks (civil servants), and the users, made up of the private sector and residents, for whom the administration draws up and monitors the application of the plan (town planning, subdivision) and the rules in the name of a collective interest, while protecting and promoting private investment. Against this backdrop of a priori clear governance, the urbanisation process reveals fairly complex alternative arrangements, the specific features of which can only be understood by describing them in detail. By tackling the major issues at stake in the land question, an analysis of the land production system provides an insight into the urban changes underway in Bukavu and the social context of the urban fabric. The aim of this paper is therefore to discuss the (de)regulation of land in the urbanisation process. The contribution of this article is to understand the logic of land tenure in relation to new urban forms in the process of urbanisation in Bukavu. In particular, it will focus on the blurring of public and private, administration and administered, leading to a hybrid form of governance in which collective and particular interests constantly interpenetrate. It is not possible to understand the dynamics of urban development in the DRC, and in Bukavu in particular, without understanding this hybridity: recognising the abundance of literature on land tenure in Bukavu, this work provides a critical analysis of the urbanisation process and the game of dupe in the instrumentation of public action linked to land tenure.

Urban sprawl : between institutional and functional logic.

Urbanisation is rightly seen as a process of human appropriation and transformation of nature. This section looks at urbanisation as a phenomenon of land (over)consumption and appropriation in Bukavu. It will show how the public authorities have failed to protect land that is not suitable for urbanisation (easements and non aedificandi sites), made up of land that, because of its steep slopes, soil conditions (marshy areas) or geographical location (along watercourses), could have escaped urbanisation, but has ended up being appropriated by humans through the phenomenon of land grabbing, land rent and the generalised urbanisation of nature. A review of the literature (Muchukiwa 2016, Nyenyezi, Ansoms 2016, Nyenyezi, Ansoms 2014, Balegamire 2021, Nyenyezi, Mushagalusa 2021, Mugisho, Ndele 2019, Cléophace, Leonard 2021) and interviews reveal that Bukavu's urbanisation process is strongly dominated by the increase in demand for building land due to demographic pressure. After the 2nd World War, Bukavu became attractive and an important centre, given its position as the metropolis of the former Greater Kivu (North Kivu, South

Kivu and Maniema). It became an administrative and commercial city and, at the same time, the economic hub of the entire region. The colony began to take an interest in the living environment of the "natives". So it was that in 1940, in addition to the commune of Ibanda (the town occupied by the whites), Kadutu, "the first black town", was officially detached from the customary district and became an integral part of the town of Bukavu. The town's topographical situation did not allow for continuous development. With its steep slopes, the town was built in a discontinuous fashion depending on the availability of land deemed suitable for urban development (slopes of less than 12%). With the influx of the working classes, Kadutu was already saturated by 1954 and the search for a new housing estate became imperative. It was against this backdrop that the extra-customary centre of Bagira was chosen, despite its remote location. A housing estate was created on the crest of a hill that had once been reserved for a coffee plantation [fig.1].
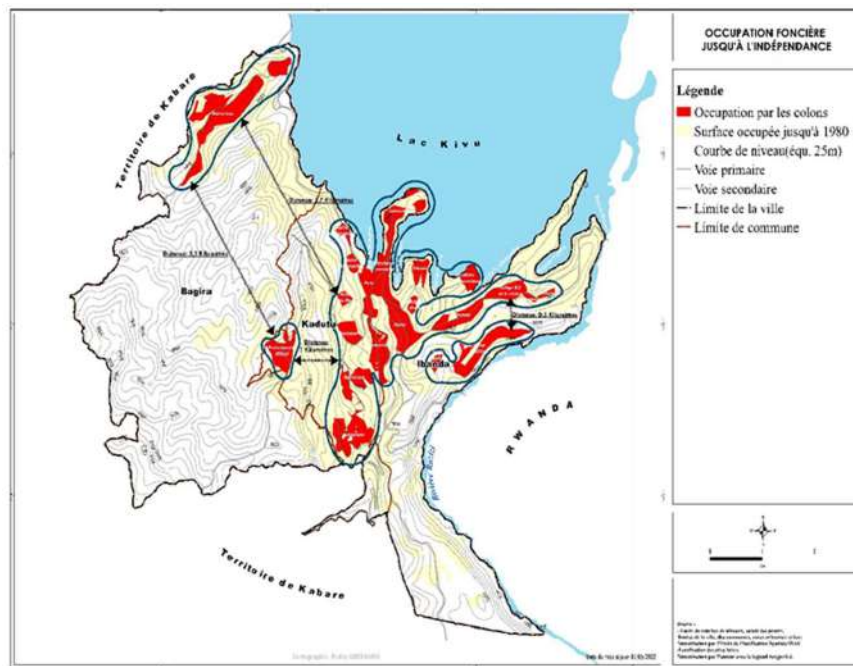
[fig.1] Land use in Bukavu up to 1960. Source : Elaborated by the author

Following independence, the government kept the town within the boundaries of the three communes left by the Belgians. Urban growth then took place within the urban perimeter rather than extending into the surrounding rural areas. This led to an increase in built density. Demographic analysis of Bukavu shows that growth remained relatively constant during the 1960s-1970s and the early 1980s. Faced with the need for building land, from the 1970s onwards, the public authorities gradually agreed to subdivide large tracts of land in the city. This subdivision movement gradually continued, with limited respect for town planning rules, until there was no longer enough land to develop in Bukavu if these minimum rules were to be respected (Nyenyezi, Aymar 2014). The 'geomorphological constraint/land use' dimension thus sounded the death knell for the government, which decided in 1988 to subdivide 'Muhungu', a hilly area that would have required extensive servicing work before it could be made available to the population, but whose housing construction would also require appropriate techniques and resources [fig.2]. Following this subdivision and in response to demand, other areas were occupied without being officially subdivided. These included NYAKALIBA, IRAMBO, KARHALE, RUZIZI, etc., which had previously been considered undevelopable. Some of these plots of land were offered illegally, either by land registry officials, or by successive town mayors, or by neighbourhood chiefs and many other political and administrative authorities. From 1994 onwards, urbanisation increased exponentially as a result of the demographic pressure inherent in the political instability in the Great Lakes region, with the arrival of thousands of Rwandan refugees fleeing the genocide and accentuated by a series of wars - Alliance des Forces Démocratiques pour la Libération du Congo (AFDL) and Rassemblement Congolais pour la Démocratie (RCD) - between 1996 and 2000, of which Bukavu was the scene.

[fig. 2] View of the transformation of the urban landscape. Source : By the author on 9/12/2020

This phenomenon led to a pronounced deterioration in the vegetation cover as a result of the spectacular demand for land, with major consequences for the organisation of urban space. By 1997, the city was saturated. From a geomorphological point of view, it had reached its carrying capacity. Faced with this situation, rather than seeing political or administrative action aimed at expanding the city beyond its 1958 boundaries (inherited from the colony) or a private or "popular" urban sprawl initiative, as can be seen in several Congolese cities such as Kinshasa, urbanisation continued within the urban perimeter through housing estates "outside the legal framework". Land was used as a means of reward for those who came to power following the wars between 1996 and 2003. The race for land took on unbelievable proportions, with demand for building land far outstripping supply. This period was marked by land grabs and the systematic plundering of land and property by those in power. A topographical analysis of the sites subdivided between 1996 and 2000 shows that the contours in these areas are more than 13% sloping [fig. 3]. Protected areas had once again been offered and registered by the administration, which was then lax in applying town planning standards. The IBANDA commune was then experiencing subdivisions and fragmentation. These divisions even affected the MUKUKWE sports ground. In this movement of limited access to land, most of the public areas and spaces were gradually sold off, as well as the ten meters of shoreline on the plots of land by the lake, which were previously considered to be "easements" on which it was forbidden to build or live. Over time, the state's supply of land was not enough to contain the strong demand. This triggered a new practice of parceling out land by private individuals. This corroborates the observation of aerial photographs between 1986 and 2018, which show that urbanised areas have developed rapidly to the detriment of wooded areas and fields. This increase in urbanised areas can be seen most clearly in the period from 2006 to 2018, with the occupation of sites unsuitable for construction [fig. 4]. A link has been established between the progressive loss of vegetation cover and the resulting vulnerabilities of the urban fabric (Cleophas, Leonard 2021; Muhaya, Chuma 2022), such as landslides, subsidence and erosion. In other words, the consequences of urban development where there should be none (Tzaninis, Mandler 2021).
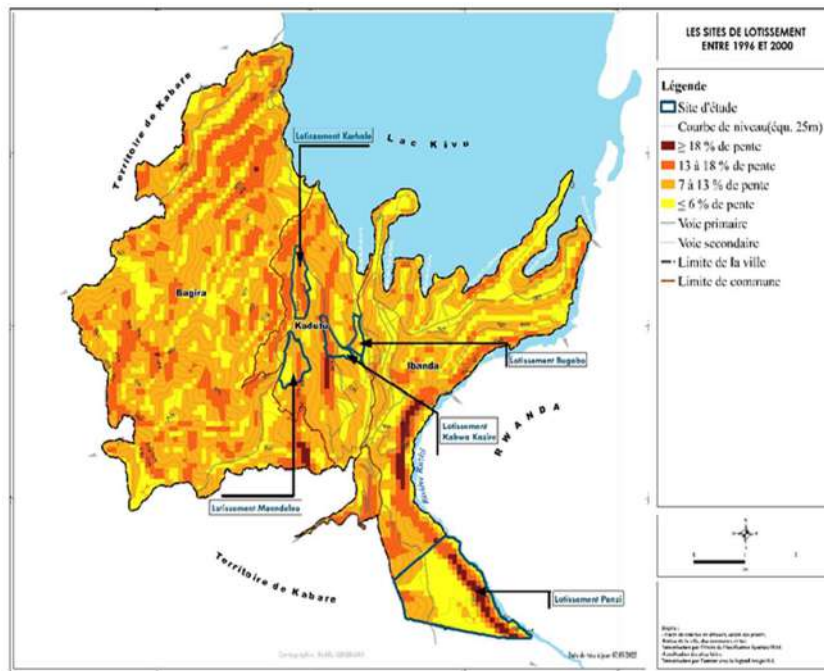
[fig. 3] Topographical situation of sites developed between 1996 and 2000. Source : Elaborated by the author
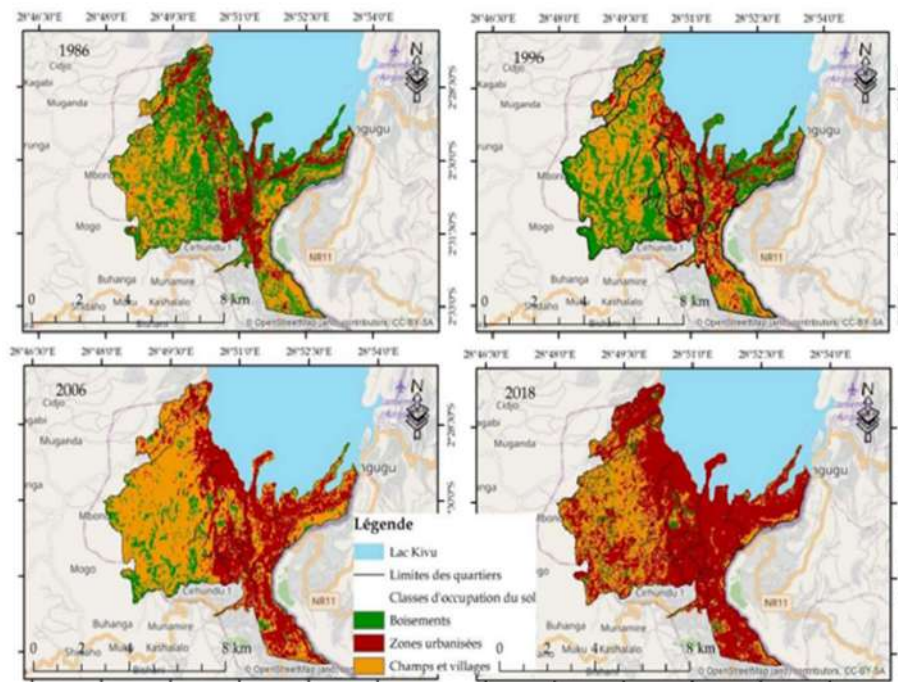
[fig. 4] Land use map from 1986 to 2018. Source : From Cléophace, Leonard 2021

To sum up, during the colonial period, on the basis of a segregationist approach that took account of the site's orohydrography, the commune of IBANDA was separated from the communes of KADUTU and BAGIRA by large uninhabited areas. Following independence, the tendency was to develop the spaces between the three towns and then those within the old towns themselves. Attempting to comply with town planning and environmental standards, the town gradually reached the point where it could no longer offer building plots without breaking the rules. In view of the demand for building land, which was accentuated by the demographic explosion, those in power found no other solution than to subdivide land in the State's

public domain by decommissioning or outright appropriation. As this was not enough, subdivisions were built on sites unsuitable for urban development, or inappropriate sites were occupied. This story questions the notion of land ownership. If it refers to what is "relative to a piece of land, to its exploitation, to its taxation", then controlling urbanisation seems to require the State and the community to keep land that cannot be appropriated by humans. While it is true that 'informal' land production plays a large part in urbanisation, the consequences of the gradual privatisation of non aedificandi sites mean that the urban environment should always include non-urbanisable land that cannot be appropriated by humans and therefore does not intrinsically constitute land. In other words, land that remains protected and common property but not exploitable. And it is this coexistence of urbanised and non-urbanised land that gives Bukavu its urban hybridity. Since this coexistence of urbanised and non-urbanised land, public domain and private domain of the State depends on the mode of governance, the following point will question contemporary land management in Bukavu.

The hybridity of public and private issues

The previous point highlighted the fact that the common denominator of urbanisation is demographic growth and geomorphological constraints. Added to these two factors is the accumulation of capital in the same space. Land use is thus marked by horizontal densification, which highlights the tension between socio-economic and socio-spatial dynamics. Based on Latour's notion of hybridity (society-nature), this section looks at urbanisation as a dialectic between the public and the private, the common good and the individual good, the general interest and the particular interest in land use. If urbanisation represents the process of continuous socio-ecological transformation of space, the role of the administration, at least in its formal sense, is to ensure that it is controlled and that standards are applied. However, day-to-day land management brings to the fore other norms that we call 'practical norms'. These practical standards act as intermediary mechanisms, creating conditions that enable stakeholders to express both their freedoms and their constraints. They offer the possibility of negotiating and translating the constraints set and defined on the basis of an action mechanism with limited resources, by taking account of alternative resources in their relationship. Here, on the basis of a variety of resources, the relationship will be between the official and the subject, or between the official and the commissioner, whose role will be defined.

Acquiring building land: corruption as a land management resource

One of the characteristics of Bukavu's urbanisation is the frantic race for land. This attraction is linked to the fact that land is wealth and, what's more, savings. Given the uncertainty of the system, investing in a building plot is a way of protecting oneself against future hazards (unemployment, political instability, etc.) as well as meeting projected needs (children's education, health, marriage, inheritance, etc.). The cultural dimension is also mentioned, as land is synonymous with social recognition. Also, land is seen not only as a place to live, but much more as an economic asset to be valued in a market with little public regulation. All these factors combine to increase demand to such an extent that the information received by the land registry and property titles department shows that the town is saturated. All 39km² of the 43km² available to the town have already been allocated. There is therefore no land reserve, as all the plots are in the hands of the concessionaires. In the State's private domain, the land is in the hands of private individuals who manage it as they see fit, often in violation of authorised boundaries. The administration is supposed to control transactions and changes in order to guarantee the general welfare. However, the process of regularising and formalising land runs counter to the usual procedure. Rather than starting with a request for land and an acknowledgement of receipt, the plot is first acquired by purchase or transfer, even if it is not legally registered. You then go to the land registry office to regularise the situation. The holder of the land, armed with a deed of sale or transfer and a plot occupancy sheet, comes to have the land measured and demarcated officially, at his own expense. At the same time, the purchaser looks for the lease contract, which attests to the existence of the land and the measurements taken by the land affairs department. From there, a file is opened to finalise the land application and the necessary works. This involves regularising a de facto situation, but at a price. This process, commonly referred to as "monitoring the rental contract file", officially costs US$17 in administrative fees. But there is a kind of social contract that means you have to pay more, as a land registry official in Bukavu told me: "because of the precarious resources allocated to

our services in terms of operating costs and officials' salaries, special arrangements have already been made between those subject to the law and land registry officials, who are like rules in their own right. Here at the Bukavu II land registry, as elsewhere, you will never get a rental contract at that price. You have to pay a lot more to keep the machine running. At the Bukavu II cadastre and land affairs division, it is established that in addition to the $17 paid to the bank as proof of payment, there are related costs, broken down as follows: CDC (Head of Cadastral Division): $20, CTI (Head of Real Estate Titles): $20, Surveyor: $20, Opening the file: $10, Typing and office stamp: $5, CB (Head of Office) Technical: $5, B2 (Office 2, Agent of the National Intelligence Agency): $5, Social Security Fund: $10, Accounting clearance: $5, Tax: $5. The minimum cost of obtaining a rental agreement is therefore $122, starting at $17 or $22, depending on whether or not tax is included. On the face of it, the formalities involved in recognising ownership rights are inexpensive. However, corruption thrives on the fact that there are different markets depending on the land services agent to whom the application is submitted, seeking to gain a significant financial advantage. Given the administrative slowness characteristic of these services, those subject to them are encouraged to pay more to speed up the process, thus motivating the agents with money to obtain their land rights. This creates competition between Ministry of Land Affairs agents to attract registrants. The actual amount of the bill and the time taken to process the file therefore depend on the agent's behaviour. In turn, applicants have developed a strategy to reduce costs and speed up the process. Nowadays, many dealers build directly without first obtaining a lease contract, concentrating solely on obtaining a certificate of registration after construction. Normally, the procedure requires you to have a lease agreement in order to obtain planning permission, and then, after a building survey and the drafting of a development report, you finally obtain the registration certificate. Once again, a fee of $50 is recognised as proof of payment of the cost of monitoring the certificate file at the public treasury. However, there are other related costs, which are broken down as follows: CDC (Chef de Division de Cadastre): $20, CTI (Conservateur des Titres Immobiliers): $20, Géomètre: $20, Bureau domaine foncier: $10, Bureau documentation: $5, Bureau technique: $5, Bureau taxation: $5, Bureau dactylographie: $5, Bureau enregistrement: $5, Caisse sociale: $10, Apurement Comptable: $5, Bureau enregistrement certificat: $40. In a weak institutional environment, negotiation and transaction are mechanisms for adapting and mitigating risks. This is what is known as the "coop" (Bilakila 2004), characterised by informal haggling, cheating, negotiation and inventive survival solutions to conduct business. According to Bilakila, 'coop' illustrates the perseverance of the Congolese in the face of adversity. Any attempt to obtain a service from land agents involves costs. These costs are far in excess of what is officially requested, without any supporting documents. From one point of view, this could be considered as "corruption". However, the surplus collected has already been "accepted" by the taxpayers and "formalised" by the land affairs departments without causing any problems. Taxpayers are aware that they have not strictly followed the procedures prescribed by law and that there is a price to pay for this. It should be noted that the specific breakdown of related costs is not known to the public. I had to be motivated to obtain it and find out more. According to this breakdown, the spoils are shared in a hierarchical and inclusive manner. Furthermore, with the solidarity that generally characterises African countries and public services in the face of the absence of state social security and health insurance, it appears that $10 from each application for a rental contract or registration certificate is reserved for the social fund to help agents in need in the event of illness, bereavement, marriage, birth, natural disaster, etc.

The fragmentation of land parcels: the norm of accomplished fact

« Tusogeleyane tu eneye mu ville : Finding space to accommodate everyone in the city »

The combination of the population explosion and demographic constraints has made land scarce in the region. In addition, insecurity in the region has meant that Bukavu has become a haven for people fleeing their villages because of the relative tranquility. These factors have had an impact on Bukavu's land market, leading to saturation on both the supply and demand sides. With no empty plots of land available in the urban area, a new form of land acquisition has emerged, known as parcel fragmentation, which reflects the over-exploitation of land. In response to the untimely parcelling out of land, which is disfiguring Bukavu's urban landscape, the authorities have not remained insensitive. Around 2010, the provincial minister responsible brought together the land registry and land affairs departments to discuss the problem.

Subsequently, the provincial governor signed a decree setting the minimum size of a plot at 3 ares, or 300 m² (15 m x 20 m). This measure only succeeded in putting an end to the granting of registration certificates for plots smaller than 300 m², but did nothing to curb the practice of subdividing plots below the size stipulated by the decree. "After two months, there was nothing in the treasury account. When the government authorities noticed this, they called to find out why the money was no longer coming in. We told them it was because they had banned the delivery of papers for plots smaller than 3 ares, so no one was coming to register their plots any more," says the head of the Bukavu I land registry division. In the meantime, property transactions continued in the town, with earthworks being carried out for new buildings, and houses being erected under the helpless gaze of the services of the ministries of land affairs and town planning. "It's a win-win situation. Why refuse to acknowledge a division that has already taken place? They come to regularise, and then we get a job and the State finds itself. The designer gets something, I get something, my colleagues get something. And the taxpayer gets his title deeds", she continues. The initial measure imposing a minimum plot size of 300m² was then revised to 100m² by the provincial government, allowing even smaller plots to be registered. This revision paved the way for the land registry services to register and issue plot titles even for concession holders with smaller plot sizes, sometimes as small as 70m² or 60m². However, because of the abuses observed, the practice of parcelling out plots was eventually suspended. This shows that the authorities have not been able to regulate land parcelling effectively, and where attempts have been made, they have resulted in lost revenue for the government. Land departments are waiting for new regulations, while concessionaires and agents are profiting from the situation. What's more, the state benefits from the taxes collected on these transactions. A land registry official explained that they are obliged to issue cadastral numbers after the sale of plots between residents. The process is therefore privatised, with everyone making a profit.

The land market in Bukavu: the expression of a city of capital accumulation

[fig. 5] Panoramic view of an island. Source : By the author on 15/12/2020

Cities in the South have often been presented as centres of urbanisation where the informal sector plays a dominant role in public policy. Mike Davis (2006) has described these cities as chaotic slums where poverty thrives. However, the land market in Bukavu seems to contradict this assertion. From the perspective of Saskia Sassen and David Harvey, Bukavu is also a place of production and accumulation of wealth, like New

York or Paris. This is what we propose to show in this last point, where the land market transforms the civil servant-subject binomial into a civil servant-commissioner binomial. The latter plays a much more important role than that of a simple intermediary between buyers and sellers. The commissionaire, who can be likened to a property broker, acts in reality as a land developer, dividing up plots of land as he sees fit and putting them up for sale before they are regularised by the land affairs and land registry departments. This dynamic creates a balance of power between those who aspire to access land and those who control access, crystallising power relations and social relationships. Furthermore, it should be emphasised that the regulation of the land market does not depend solely on demographic growth or problems of land accessibility, but also and above all on property speculation. If we can characterise this speculation, two factors stand out. Firstly, the question of location rent, where the location of a plot of land has a direct influence on its price because of its locational advantage. But locational advantage does not explain everything. There is also another key factor, that of capital flows, the historical characteristic of which, as Harvey mentions, is that urbanisation reflects capital accumulation. The ability of landowners to take advantage of their situation enables them to maintain the competition necessary for the continued accumulation of capital. This presupposes a prior commodification of land, where location rent highlights the link between land price and building density (Ruegg 2008). The surveys revealed that this phenomenon is at the root of the rise in the price of plots of land in Bukavu. For example, a plot of land bought in 2003 for $900 was resold five years later for $9,000, an increase of 1,000%. Between 2007 and 2012, plots were sold for between $8,000 and $20,000, and from 2015 onwards, prices have continued to rise, with a sample of plots surveyed fetching $30,000 for the smallest plot and $150,000 for the largest plot with a dilapidated building in 2020. This land speculation results in significant profits for commission agents, as shown by the example of a plot in NGUBA bought for $290,000, which generated a profit of $319. 000 for the commission agent after being divided into several lots sold at various prices as follows: lot 1: $69,000, lots 2 and 3: $100,000 each, lots 4 and 5: $30,000 each, lot 6: $42,000, lot 7: $40,000, lot 8: $30,000, lot 9: $30,000, lot 10: $60,000, lot 11: $29,000, lot 12: $29,000 [fig.6].
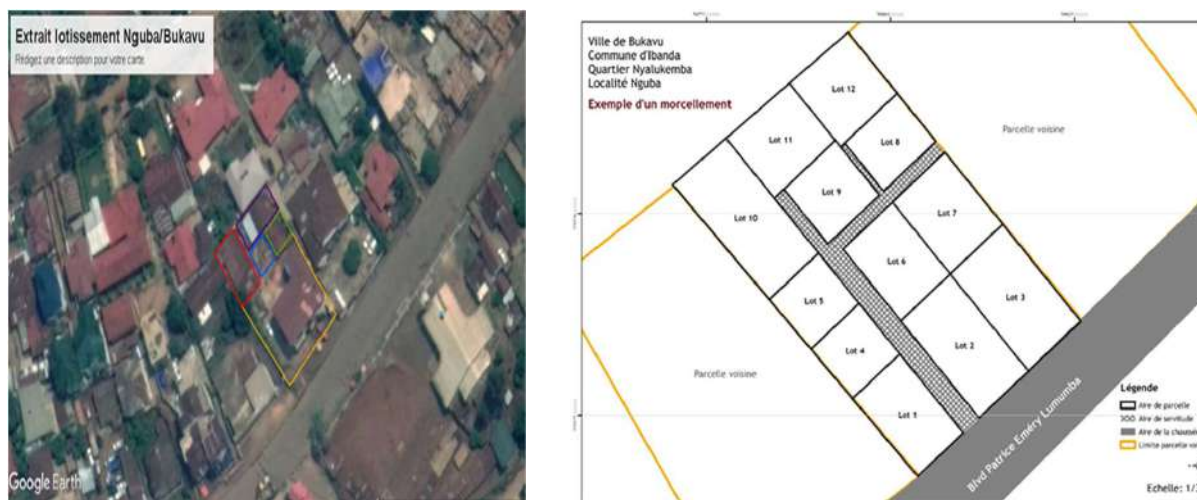
[fig.6] Parcelling of land on Avenue Patrice Emery Lumumba in Nguba. Source : Elaborated by the author

The high prices of plots of land in Bukavu exceed those observed in Kinshasa, which has until now been considered the city with the most expensive land in DR Congo, given its status as the capital, with the ratio ranging from simple to double. In examining the factors contributing to the high prices of plots of land in Bukavu, demographic pressure and the scarcity of building land are explanatory factors, but are not sufficient to justify the considerable sums spent to acquire a plot of land in this city. Field surveys accompanied by in-depth analysis will highlight the impact of artisanal mining on this situation in two ways. On the one hand, several studies reveal a close correlation between insecurity in the mining areas surrounding Bukavu and the massive movement of rural populations towards the city, which increases the

demand for building land. On the other hand, mining activity attracts many players, particularly miners, who invest in real estate or use the acquisition of plots as a means of laundering their capital at a later date.

Conclusion

Starting from praxis, this article shows how the city and its socio-political and environmental context have strong implications for the way in which the natural landscape is urbanised. Looking at the urban sprawl of Bukavu, the paper raises the issue of land parcelling as a strategy for providing building land in the face of the shortage of available space in urban areas. This approach is controversial, with some seeing it as disfiguring the natural landscape and a source of land disputes. Others see it as a necessary response to the demand for housing in a context marked by insecurity and demographic pressure. In other words, there are urban and environmental processes that negatively affect certain social groups while benefiting others (Heynen, Kaika 2006). Land management is a major challenge in this context, with complex issues relating to the allocation and appropriation of land. It brings to light new resources and new logics of urban production. Although these arrangements do not formally resemble official ones, they are not informal. It is a social contract in which the clear boundary between public and private becomes blurred, with state agents using their position to participate in the land market on an individual basis. However, this is not without consequences. Those subject to land services see their freedoms increased but also their constraints reduced. Ultimately, this land market is characterised by speculation, fuelled mainly by capital from artisanal mining, but not exclusively.

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II.b

Foodscapes : from farmlands to agro-parks

Agricultural islands in Paris metropolis. An investigation into possible interactions and complementarities between urban and food landscapes

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Abstract
The intra-urban agricultural enclaves of the Paris metropolis are part of "agro-sylvo-urban" landscapes and form a constellation of islands. How do this archipelago and the metropolis interact? What role can these enclaves play in the future of the metropolis in a context of socio-ecological transition? By investigating nine enclaves, we have been able to identify recurring problems linked to the metropolitan situation, and to analyse the projectual dynamics at work in these areas, involving a range of players, in particular landscape designers. It appears that agricultural activity generates co-benefits for the enclaves and the metropolis, which can be amplified by the spatial project. What's more, their respective vulnerabilities mean that the complementarities between agricultural enclaves and woodland-urban areas need to be strengthened, and new planning strategies need to be devised that include landscape designers.

The archipelago of agricultural enclaves in the Paris metropolis

Urban agriculture (UA) takes many spatial forms (interstice, indoor farm, rooftop vegetable garden, peri-urban agriculture, etc.) with a variety of socio-economic models (inhabitant gardening, micro-farms, professional farms, etc.). This raises questions about their role, place and modalities in the urban fabric (Aubry, 2014; Morgan, 2014; Caro *et al.*, 2016; Bognon and Cormier, 2018; Consales and Bories, 2018) Among UAs, the intra-urban agricultural enclaves of the Paris metropolis constitute a singular spatial figure. The notion of enclave (from the Latin *clavus*, nail, lock) refers to a territory enclosed by another, echoing that of island, isolated. The agricultural enclave, a rarely used concept, has been defined as follows: "The agricultural enclave is the contemporary observation of agricultural forms of various scales now physically, and very often involuntarily, caught up in the urban fabric […]. Beyond these areas, agricultural enclavement is a global observation of the isolation of agriculture in urban societies, both physical and cultural, which needs to be overcome" (Janin, 2017). In this article, it is understood as a productive agricultural area isolated by predominantly urban areas, and disconnected from the agricultural continuities of the Paris region, such as the Brie plateau or the French plain. It is also characterised by its spatial, functional and regulatory constraints, as well as its size[1]. Some enclaves in the Paris region have been the subject of research in geography and agronomy, notably as part of the Agrige research programme[2] on agri-urban programmes in the Green Belt ((Bonin, 2021), showing the extent to which they face numerous challenges and issues; but they have not been studied as an insular spatial typology. Faced with this observation, this doctoral research mobilised cartographic tools [fig.1] to reveal and characterise these Ile-de-France agricultural enclaves (Thierry, 2023).

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[1] The surface areas of the enclaves were determined on the basis of cartographic analyses and interviews with farmers. Ranging from 1 ha to 2,500 ha, they are larger than the majority of UAs in dense urban areas. For example, for a farm to be profitable, a minimum of 1 ha is needed for organic market gardening (short distribution channels), 8 ha in a single holding for integrated arboriculture (short distribution channels), and 10 ha for organic livestock farming (short distribution channels). Furthermore, of the sites studied, the largest enclave identified is on the Saclay plateau (approx. 2,500 ha).
[2] AGRIGE : Archipels agriurbains, Résistances et Gouvernances, du programme Pour et Sur le Développement Régional (PSDR 4)
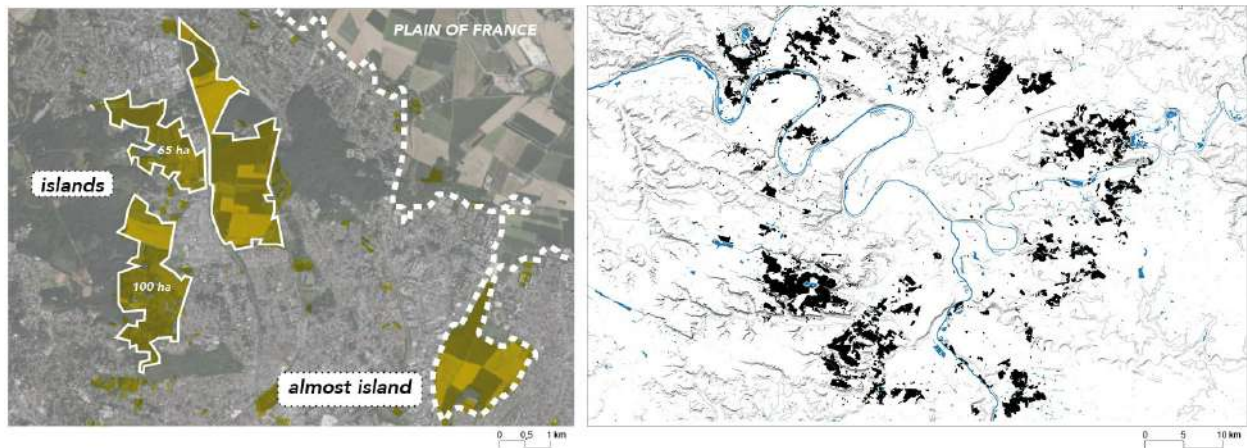
[fig.1]. Recognition of enclaves as a spatial form. Source : elaborated by the author (2021), from IGN and MOS 2021.

Agri-sylvo-urban landscapes

The agricultural soils of Paris's former food belt have been heavily urbanised since the 19th century. Urban sprawl has accelerated since the 1950s, as part of the process of Parisian metropolisation, disconnecting the city from local food systems (Steel, 2013), complicating the relationship between urbanised areas and peripheral agriculture (Brand and Bonnefoy, 2011)and enclosing peri-urban farmland, which then becomes intra-urban [fig.2]. These enclaves are the result of a chaotic development process – isolated by urban sprawl, infrastructure construction, existing woodland and forests – but also of policies and projects aimed at maintaining agriculture. Their situation characterises an ill-consideration of role for agriculture in metropolitan planning. Most of them are located in the Green Belt, a project launched in 1983 to structure a network of agricultural, natural and forest areas between the dense city and rural areas. The project has been criticised for allowing urban sprawl onto agricultural land, and was almost abandoned in 2013. A comparison of the respective use of agricultural soils and forest soils between 1982 and 2021 [fig.3] shows that agriculture has shrunk considerably, while forests have remained stable or even expanded, benefiting from a separate regional policy (Flegeau, 2018).
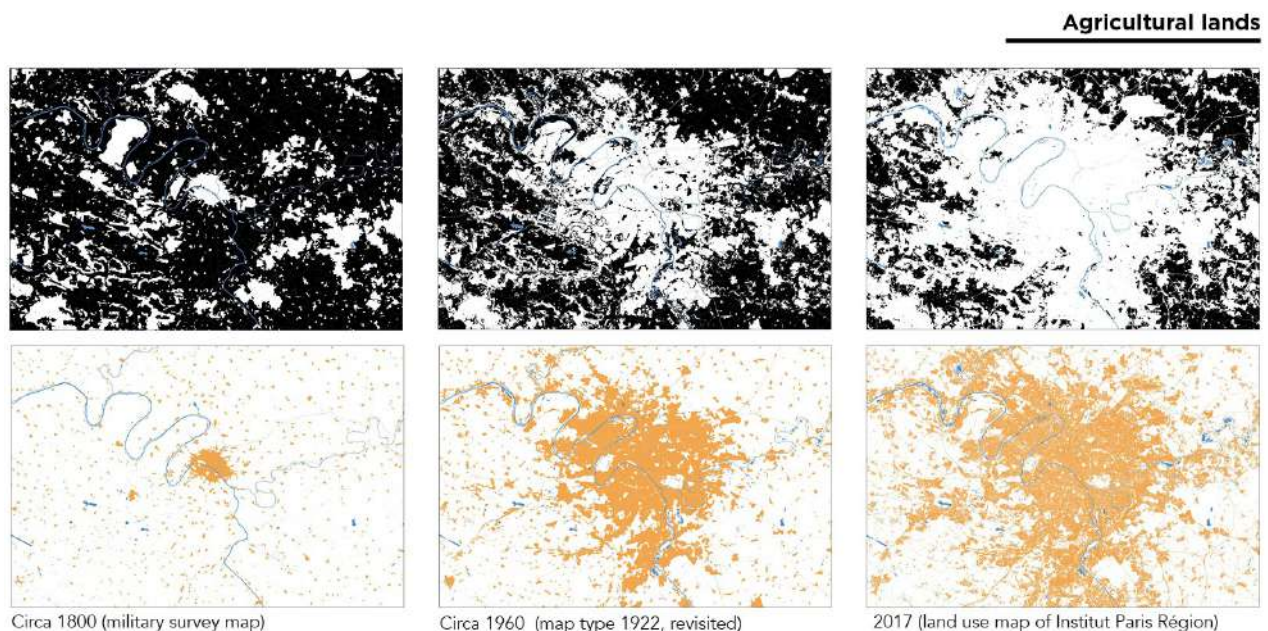
[fig.2]. A metropolis disconnected from agricultural areas, pushed to the fringes and swallowed up by urban development. Source : elaborated by the author (2021), from IPR.

Forest areas lost between 1982 and 2021   Agricultural lands lost between 1982 and 2021
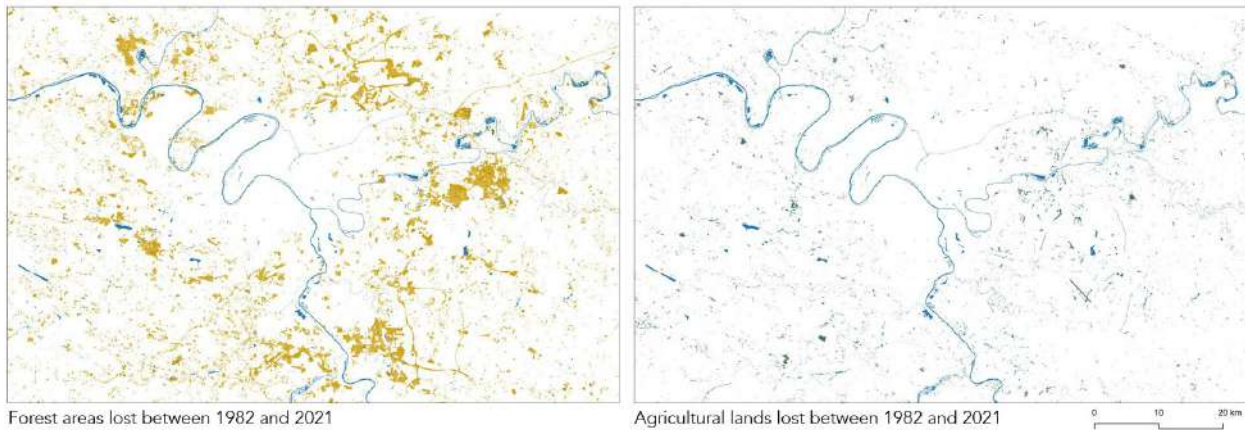
[fig.3]. Contrasting trajectories for agriculture and forestry in the Green Belt between 1982 and 2021. Source : elaborated by the author (2023), from Evolumos 2021.

Today, this Green Belt is one of Île-de-France's main development objectives. In 2019, it was made up of 38% urbanised areas, 37% agricultural areas and 23% forested areas. Mapping shows that these three types of juxtaposed or even interpenetrating landscape structure are highly fragmented. As a result, the Green Belt appears to be an eminently a 'agri-sylvo-urban' landscape [fig.4].
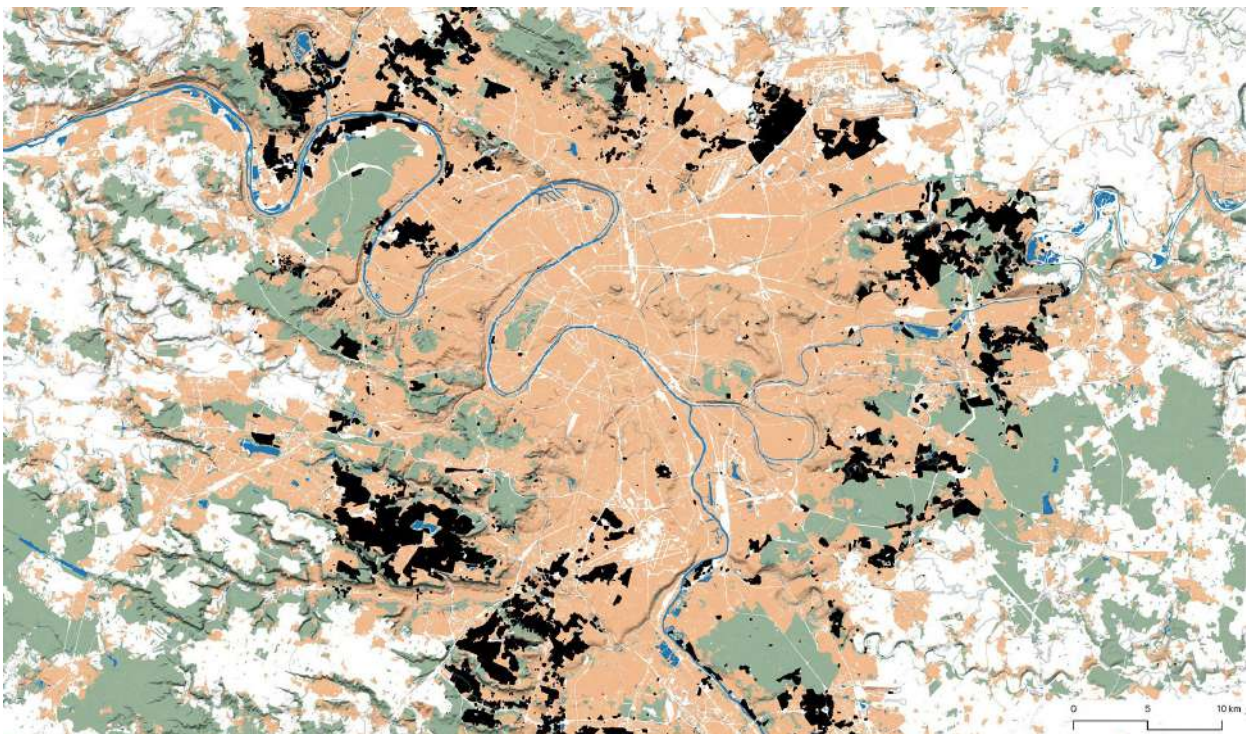
[fig.4]. Enclaves, components of agro-sylvo-urban landscapes. Source : elaborated by the author (2023), from Mos 2021, IGN.

An inverted archipelago

These enclaves form a constellation of landscapes around Paris (ring), between the dense urban area and rural spaces. As part of the process of describing the territory, through a combination of immersive walks and cartographic production, the PhD research refers to the actual enclaves as 'islands' and those in the pipeline as 'almost islands'. This terminology echoes the figure of the archipelago, where water surrounds islands, dividing and connecting them. This essential spatial concept of the twentieth century (McGrath, 2021) is a fertile figure in urban planning [fig.5]. Ungers and Koolhaas used it in 1977 to describe Berlin (Ungers *et al.*, 2013). Since 1967, it has also guided the planning of Rennes, which is trying to establish a consensus between city and country through the organisation of an 'Archipelago City' (Chapuis, 2008).
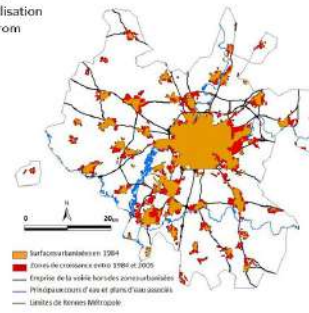
[fig.5]. The archipelago figures of Berlin (Source : Berlin as Archipelago, 1977) and Rennes (Source : Audiar)

If we reinterpret this concept, the constellation of agricultural enclaves in the Paris region would form an 'agricultural archipelago', rather than a Green Belt. An inverted archipelago thus emerges, made up of agricultural spaces separated by the sylvo-urban spaces of the Parisian metropolis. Using such a concept to read and understand the Paris metropolis means revealing the presence of these unique agricultural landscapes at different scales and questioning their role. The agricultural archipelago of enclaves is in fact a sylvo-agricultural archipelago, since the agricultural islands are frequently bordered by woods and forests, constituting complementary landscape structures with regard to the dynamics of the living, both plant and animal. So these notions of islands, almost-islands and archipelagos are tools for designing metropolitan areas on the basis of agricultural areas, and offering an alternative to their urbanisation.

Enclave internalities and externalities

The inverted archipelago is characterised by the coexistence of two spatial logics [fig.6]. On the one hand, the enclaves are defined by an interiority with a specific function: one or several farms structured by a network of paths and landscape features contributing to a agronomic project (greenhouses, sheds, groves, hedges, ponds, streams, etc.). On the other hand, they are defined by externalities, by logics that go beyond those of the enclave, linked to the spaces that surround them. In this way, agricultural landscapes are capable of simultaneously providing various ecosystem services and amenities for urban dwellers (positive externalities); but they are also subject to severe constraints (infrastructure, conflicts of use, etc.), and are reciprocally vectors of nuisance (negative externalities). How do these two spatial structures interact? How does the multifunctionality of enclaves, which is specific to Uas (Wegmuller and Duchemin, 2010), create links with the surrounding woodland and urban areas, and vice versa?

Taken as a whole, the enclaves form an archipelago of 'food islands' that are the focus of socio-cultural and biodiversity dynamics, and which are linked to regional networks : footpaths, agricultural and forest ecosystems, local food production (processing, short-distance sales), etc. They constitute significant landscape structures (around 18,000 ha identified in the research), which play a key role in local food systems and are part of the biodiversity networks of the *Schéma Régional de Cohérence Ecologique* (SRCE). They represent a major challenge for urban-agricultural relations, as their positive and negative externalities are spread over much larger areas than other UA.
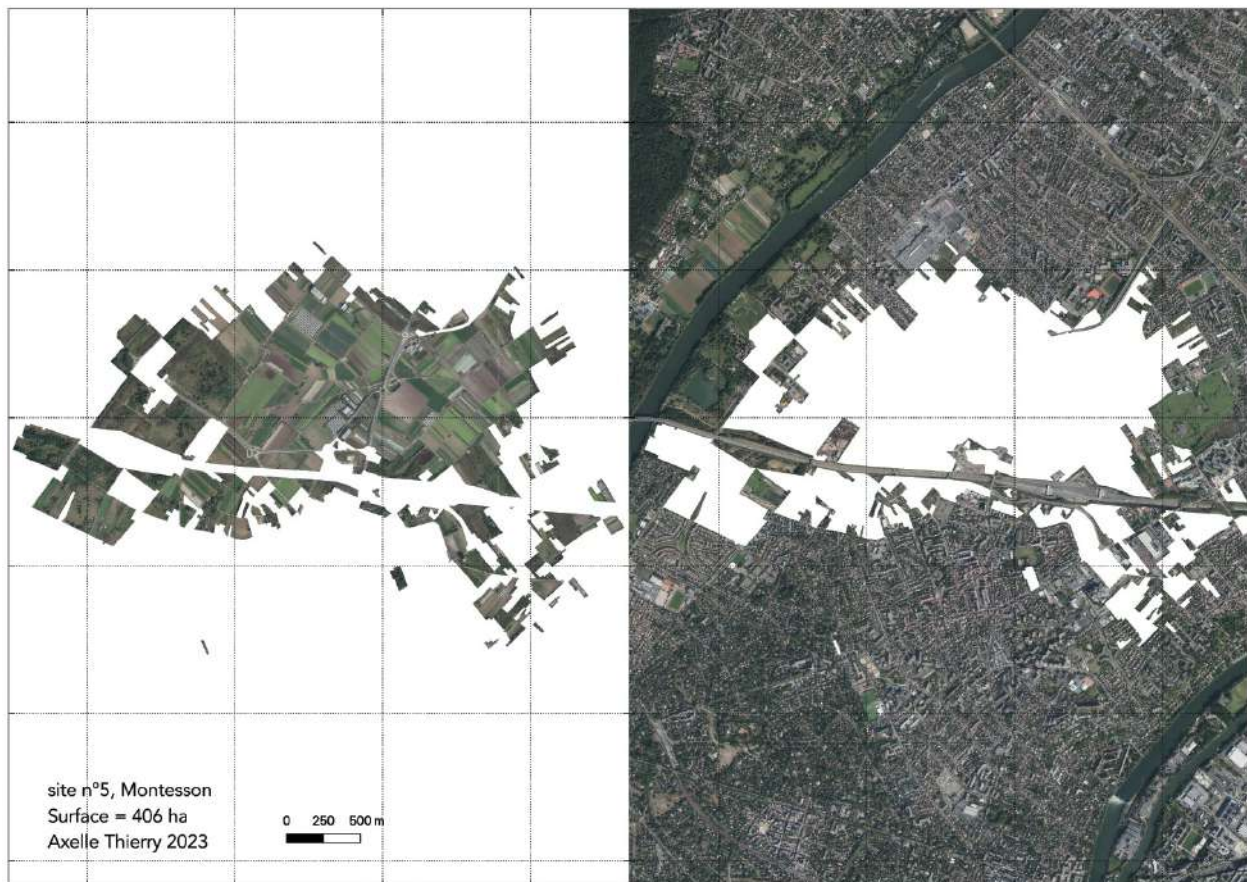
[fig.6]. The internalities and externalities of enclaves. The example of the Montesson plain. Source : elaborated by the author (2023), from Mos 2021, IGN.

What role can agricultural enclaves play in the Paris metropolis? In what way could they help to rethink the urban-agricultural-forestry links, or even guide the future of the metropolis in a context of socio-ecological transition? We hypothesise that the spatial project within the enclaves can develop co-benefits and complementarities with the metropolis.

Based on this premise, this article presents the results of observations made in enclaves. It identifies problems, issues and project dynamics. It opens a discussion on the added value of designers in supporting agricultural projects, particularly from the perspective of co-benefits and complementarities between urban areas, agriculture and forest. This article is based on a chapter currently being written, linked to an ongoing PhD research project (PhD by landscape design). This research focuses on the future role of agricultural enclaves and aims to respond to two issues: to clarify how agricultural project – via landscape project – can constitute a tool for urban design, and to specify the potential contributions of landscape architects in renewing reflection and action on the future of relations between the metropolis and agriculture.

Investigation of nine enclaves in the archipelago

Material and method

Nine enclaves [fig.7] were analysed between 2021 and 2023 as part of a partnership with the Agence des Espaces Verts de la Région Ile-de-France (AEV), a key player in the spatial embodiment of the Green Belt (Flegeau, 2018). The AEV has a land tool, the *Périmètre Régional d'Intervention Foncière* (PRIF), which enables it to acquire non-urbanised land (natural, agricultural and forest areas) to create the Green Belt, in particular with the aim of opening them up to the public. These sites have been selected on the basis of a number of criteria. They vary in terms of scale, objectives and location, and are all covered by a PRIF.

The survey was based on multidisciplinary methods – investigation of the terrain by walking (regular and attentive observations), observation of meetings by accompanying the AEV's

Agricultural Mission in its actions, interviews with farmers, developers, local authorities, etc., diachronic and multi-thematic mapping production – to identify a diversity of situations, characteristics and problems – and to analyse the projectual dynamics at work in the enclaves.
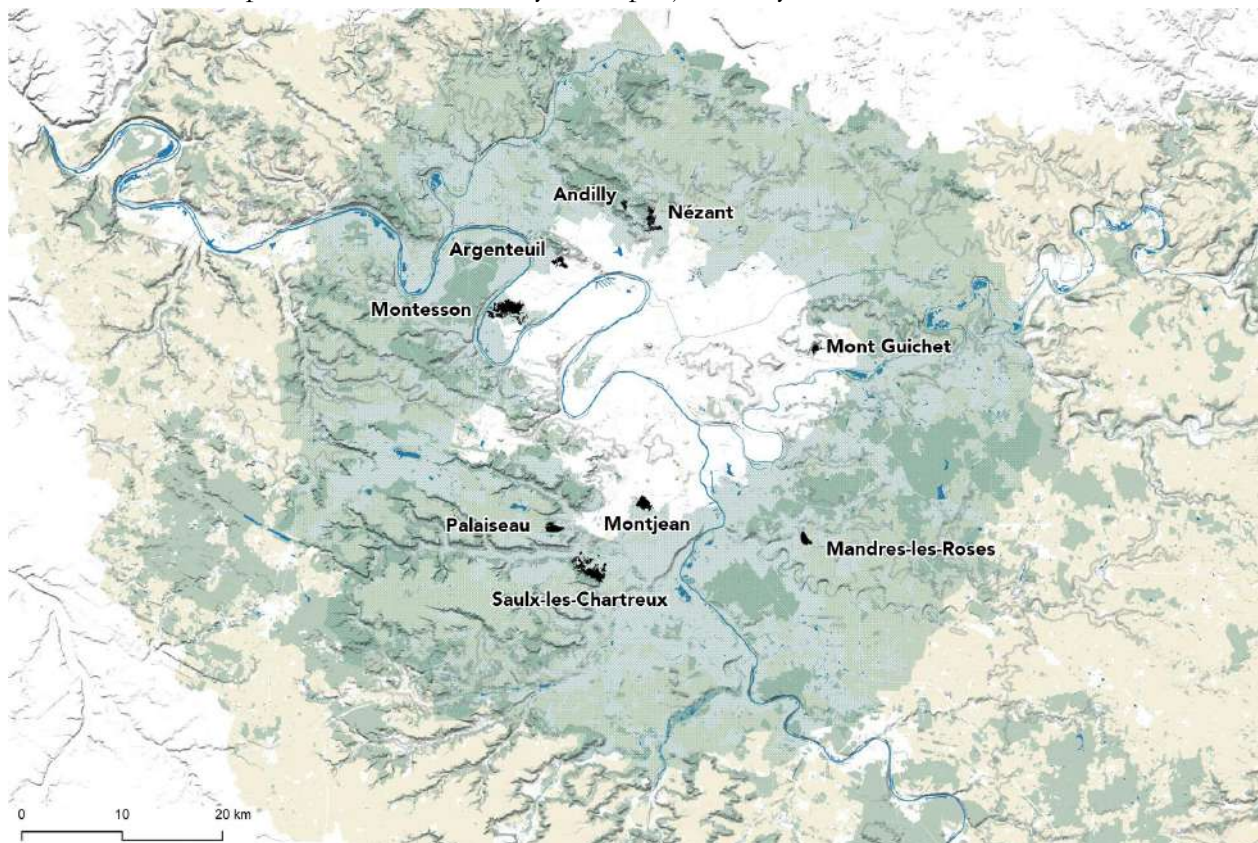
[fig.7]. The nine fields of PhD research in the Green Belt. Source : elaborated by the author (2023), from Mos 2021.

Site characteristics and issues

The enclaves observed are not anonymous islands, almost all of them have a name linked to their geographical characteristics: 'plain of', 'mountain of' etc. [fig.8]. They are farmed by professional farmers with relatively traditional farm business models. However, the nine sites present very different situations:

- the Andilly Plateau is characterised by renaturation issues. Here, farming is a management method for repairing the site and bringing it to life, with experiments in eco-pasturing and agro-forestry;
- the Argenteuil Plaine, historically a market-gardening area, is now partly occupied by sedentary Travellers, and illegal dumping has polluted the soil. As a result, the agricultural function of the site has been undermined. A complete overhaul of the site is currently under study, with a view to reconnecting it with the city and introducing mixed farming in the few areas that are not polluted;
- The Nézant Hillside et Mont de Veine are a rare arboreal vestige of the former Parisian food belt. The future of the site, which is in a state of partial abandonment, is threatened by the imminent retirement of farmers. The lack of action by local authorities is leading to a status quo.
- the Mandres-les-Roses Plateau is defined by the cohabitation of an intense activity of horticultural greenhouses and cereal fields. The site studied is the subject of a project for an organic market-gardening centre (with short-circuit baskets, permaculture, recycling of organic waste, etc.).
- The Montesson Plain is an emblematic site due to its size (400ha, twelve market gardeners) and its proximity to the La Défense business district. It is subject to many conflicts of use (theft, damage, illegal dumping, etc.), which are partially dealt with by a recently-developed soft mobility network.
- The Mont Guichet, a former vineyard that became a cereal-growing site, is now used for mixed farming (vines, market gardening, fodder). This site symbolises the return of vines to the Ile-de-France region, authorised in 2016, and is based on the principles of short circuits and wine-forestry.
- The Montjean Plain is home to an agri-neighbourhood currently under construction. It represents a compromise between construction (200 dwellings) and partial preservation of agriculture. The

site, which grows cereals, is the focus of a vast project to diversify agriculture and make the transition to agro-ecology through the landscape project.

- The Marnières site in Palaiseau is at the tip of the Saclay *Opération d'Intérêt National*, a vast development project in south-western Paris (education and research cluster, metro line 18). An agricultural project aims to replace the cereal-growing activity to meet the challenges of food relocation (farmer employed by the municipality) and ecological compensation.

- The Saulx-les-Chartreux Plateau is a very active agricultural site (more rural than the other eight), where multiple informal transfers of land have created a situation that is very complex for the public authorities to manage.

[fig.8]. The nine sites and their landscape units. Source : elaborated by the author, 2021.

Cultivating enclosed land : meaningful and complex links between food-producing areas and inhabited areas

It is paradoxical that agricultural enclaves are still frequently perceived by local authorities and developers as 'empty spaces', potential land reserves, because they are 'full spaces' that are lived in, managed and multifunctional. Compared with other types of UA, enclaves have a range of advantages: this soil-grown agriculture, on relatively large plots of land, favours short-distance sales and products with high added value, which ensures economic balance in a context of strong societal demand for food traceability. As food production is globally diversified (market gardening, arboriculture, viticulture, livestock, etc.), the enclaves present a variety of landscape qualities that are appreciated by local residents. This landscape diversity also helps to reinforce the green and blue networks. Lastly, some farms have forged important social links by organising farm sales, educational activities and so on.

However, farming in enclaves also has its drawbacks: this type of agriculture receives less support than urban agriculture in dense areas (see the 'Parisculteurs' programme in inner-city Paris, for example) and rarely receives Common Agricultural Policy aid because of the small areas and types of production. Farming is subject to numerous regulatory constraints (urban, environmental, heritage, health, etc.). Farming is hampered by the fact that it is landlocked (difficult for machinery to get around, few agricultural buildings permitted by urban regulations, etc.), by the difficulties of recruiting and housing labour in an urban environment, and by the problems of social acceptability, noise and odour pollution, conflicts of use and so on. Finally, access to land is even more complex than elsewhere.

TOPICS	Issue	Andilly	Argenteuil	Coteaux de Nézant	Mandres-les-Roses	Montesson	Mont Guichet	Montjean	Palaiseau	Saulx-les-Chartreux
constraints and obstacles to agricultural farming	DIFFICULTIES ACCESSING IRRIGATION				X		X			
	DIFFICULTIES ACCESSING AGRICULTURAL LAND			X						X
	SOIL POLLUTION	X	X							
	MAJOR CONFLICTS OF USE		X	X						
	DIFFICULTIES IN RECRUITING FARM STAFF			X			X			
	INADEQUATE LOCAL PLANNING			X	X					
	ECOLOGICAL COMPENSATION	X					X	X		
threats to farming	PROGRESSIVE SPRAWL ON FERTILE LAND			X		X				
	DISAPPEARANCE OF SPECIALISED AGRICULTURAL SECTORS	X	X	X		X				
	DISAPPEARANCE OF FARMERS	X		X						
conflicts	TENSIONS AND RESISTANCE TO MAINTAIN AGRICULTURE IN URBAN AREAS						X		X	X
dynamics local & positive externalities	HERITAGE OF THE SITE		X	X	X					
	SOCIO-CULTURAL LINKS			X	X	X	X	X	X	
	SHORT CIRCUITS			X	X	X	X	X	X	X
	REINFORCEMENT OF SHRUB AND TREE COVER	X		X			X	X	X	
	TRANSITION TO AGRO-ECOLOGY OR AGRI-ORGANIC	X		X			X	X	X	

INTERACTIONS METROPOLIS-AGRICULTURE

[fig.9]. Examples of issues identified. Source : elaborated by the author, 2023.

Project-based dynamics in enclaves

By analysing the trajectory of nine sites over the last ten years, seven of them have been the subject of spatial projects[1]. How is agriculture conceived and created in these enclaves? Is it part of institutionalised planning contexts?

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[1] Saulx-les-Chartreux et les coteaux de Nézant n'ont fait l'objet d'aucun projet.

The role of designers in the project dynamics of the nine enclaves

Local authorities and developers rarely have expertise in agriculture, so they have recourse to specific engineering (agronomy, legal expertise, hydraulics, etc.). In addition, designers have been involved in most of the enclaves occasionaly. Their involvement varied in terms of scale (entire enclave, farm, etc.), mission (advice and assistance to the project owner, design, site supervision, etc.), framework (project management office, association, consultancy firm, local authority, institution), themes and outcome (studies, construction site, etc.). Four configurations emerge from the analysis of the sites:

Case 1. Classic urban and landscape project management service where the challenge is to propose a diagnosis, development scenarios and a massterplan for the site, integrating an agricultural programme. In this case, farming is already established, but is considered unsatisfactory. It is both a component of the site and a programme. Four large sites are involved : Argenteuil, Montesson, Montjean and Mont Guichet. The designers involved – Agence TER (landscape and urban planning) in Argenteuil (2014-2016), Agence Folléa-Gauthier (landscape and urban planning) in Montesson (2011), Agence Laq (architecture and urban planning) in Montjean (2014-2023), Agence Roberta (landscape) in Mont Guichet (2012) – were commissioned by the local authorities or the AEV to rethink the agricultural revitalisation of the sites and their interfaces with urban areas. In Argenteuil, a network of paths is restructuring the plain, bypassing a sedentary camp that blocks access to the plain. In Montesson, thick borders of housing create a smaller agricultural area in the heart of the plain, which takes on the appearance of a vast public space. At Montjean, the project is also based on a compromise between the construction of a new residential area on the northern flank and the preservation of agricultural land to the south. At Mont Guichet, promenades link the agricultural terrace and the wooded hillside. These masterplans therefore covered the total area of the enclaves, but none of them were implemented within the agricultural areas. The designers, three of whom were landscape and urban planners, had no specific expertise in agriculture, but some of them were supported by a dedicated engineering team. In addition, the clients had also called on dedicated engineering services.

Case 2. Service provided by the AEV on its owned land. This type of assignment is carried out by the Landscape department of AEV, which designs the projects, and the Development department of AEV, which monitors the work. It also involves the Agriculture department of AEV, which is responsible for agronomy, and the regional delegates, who are responsible for regulatory urban planning and regional strategy. In addition, projects are developed in close collaboration with local authorities. In this case, the farming activity is already established, but it will evolve. The developments are designed as a prelude to the installation and development of plots of land by new farmers, who are leased by the AEV. Five sites are involved: Montjean, Mandres, Palaiseau, Andilly and Palaiseau (in progress). The issues differ on each of the sites, but the project proposals are all spatially constrained by the AEV's and the local authorities' control of the land. They have two objectives : to open up the sites to the public (creation of paths, viewpoints, signposting, etc.) and to ensure agronomic efficiency (drilling, fencing, etc.). These projects benefit from engineering tailored to agricultural issues : legal, hydraulic and pedological expertise, etc.

Case 3. Service provided by an association or company employing designers and sometimes landscape architects. These structures are mobilised to provide advice and technical support for the development of the site. The configurations vary : the Agrof'île association (support for agroecological projects) was hired by AEV at Andilly to design an agroforestry project with a view to renaturation; it was also asked by a winegrower at Mont Guichet to design a climate change-resistant wine-forestry system, as part of an experimental partnership. The agro-ecological transition of the sites is at the heart of the approach, and the projects are designed as give-and-take experiments, beneficial both for the site operators and for the association, which collects the data. The association brings together not only landscape architects, but also farmers, agronomists and scientists, so its skills are both project-based and technical. In Palaiseau-les Manières, the local authority called on the services of Cultures et compagnies, a start-up specialising in urban agriculture, to make up for its lack of agricultural expertise in developing the urban agriculture project it had initiated. The collaboration proved financially costly, but delivered a turnkey project. This start-up brought together a wide range of skills – agronomy, sociology, project management, small-scale market gardening, educational activities, etc. – but no professional designer. These three

cases therefore illustrate projects without a designer's signature, focused on farms and production, with no overall view of the site.

Case 4. Voluntary service provided by the farmer himself, a former designer. In Mandres-les-Roses, two of the four farmers are former landscape architects who have converted to permaculture. From the outset, they began to spatialise their farm project, proposing to structure the landscape, which until then had been very open, with hedges that created functional cells with several components : permaculture production, experimental orchard, natural areas for agro-pastoralism, farm sheds. Here again, the approach remains limited to the farm, without being part of a wider landscape approach.

Project configuration	Andilly	Argenteuil	Mandres	Montesson	Mont Guichet	Montjean	Nézant	Palaiseau	Saulx
masterplan by designers (mostly landscape architects)		X		X	X	X			
development project by AEV (direct management)	X		X		X	X		X	
development project by external players who are not designers	X				X			X	
development project by farmers, formerly landscape architects			X						

[tab.1] Types of spatial project by site. Source : elaborated by the author, 2023.

Enclave-metropolis co-benefits

Initiating a dialogue between agricultural, forestry and urban areas through spatial planning
The analysis of the project approaches observed in the enclaves reveals a different objectives. The first concerns all the sites (except Nézant and Saulx) and aims to design a framework of public spaces to open up the site to residents, create spaces where people can meet and share at the edges, and develop spaces for multi-purpose use (sales, events, enjoyment, etc.). In this way, the aim is to improve access to the site by creating social, physical, visual and functional links between urban, agricultural and forestry areas, and between local residents and local producers. The second objective aims to integrate an architectural programme into agricultural area, with distinct cases in point: agricultural building projects to ensure production conditions (sheds, greenhouses, etc. in Mandres, Mont Guichet and Palaiseau) ; 'agri-neighbourhood' projects in Montesson and Montjean, which reflect a compromise between urban sprawl and agricultural preservation. The third objective is to bring about an agro-ecological transition on farms, by making production and the associated ecosystem more complex. Andilly, for example, is undergoing renaturation and experimentation with agroforestry, Argenteuil a project to return to mixed farming, Mandres a transition from an 'open field' landscape to a permaculture farm, Mont Guichet an experimental wine-forestry project, Montjean the creation of an 'agro'valley' with non-irrigated crops, and so on. However, some of these projects have more to do with rhetoric than with a finely-tuned agro-ecological transition project.

The projects of designers, particularly landscape architects, have in common that they involve agronomic and landscape complexity. They are based on the specific features of the landscape project : management processes that take place over a long period of time (in an ecological circularity) and that mobilise the 'living' as main resource. This leads to management practices that are attentive to the sites and to the economy of means (gravity-fed irrigation, minimal development,

etc.) in order to take account of tight agricultural budgets. But they are not systematically take place on a variety of spatial scales, going beyond that of the enclave. In so doing, they have an impact which could be strengthened on the links between city, agriculture and forest (a network of shared paths, new uses, views, increased biodiversity, etc.).

Federating designers at the heart of multi-stakeholder projects and around a spatial framework?
Given the variety of agricultural issues in enclaves, there is clearly a need for designers, who are themselves supported by agricultural experts, to take agronomic needs into account in a detailed way. The study of project-based approaches has shown that the agricultural project must be the driving force behind the landscape project, and not the other way round. Designing agriculture involves thinking from a cyclical point of view (life, seasons, crop rotations, etc.). Several types of fruitful collaboration are emerging, bringing together agricultural and agronomic skills on the one hand and landscape skills on the other : between the AEV's Landscape and Agriculture departments ; between an association such as Agrof'île (with expertise in agriculture and landscape) and institutional players such as the AEV or farmers ; or between a consultancy such as Cultures et compagnies and local authorities. The designers' projects provide a unifying spatial framework for the various stakeholders.
However, the transition from a guide plan (masterplan) produced by a designer to a more operational phase is complex to implement without full control of the land. What's more, the timescales for urban planning projects – of the order of ten years or so – do not sit well with the rhythms of farmers. There is therefore a risk of producing projects that are disconnected from agricultural realities, particularly if they are drawn up on derelict sites, without any contact with farmers. Indeed, the presence of farmers on the site at an early stage is a pivotal issue : if they are present, the project must be designed with them in mind ; if they are not, then this gives greater freedom, but it also means prefiguring a credible agricultural landscape.

Towards co-benefits and complementarities?
Observing the enclaves, it appears that agricultural activity generates co-benefits for the enclave and the spaces of the metropolis. Moreover, these co-benefits are amplified by the designers' projects, which enrich the agricultural project through the spatial project [tab.2]. This notion of 'co-benefit', borrowed from that of 'climatic co-benefits', refers to a reciprocity of advantages (win-win).
From a spatial point of view, thinking in terms of co-benefits makes it possible to go beyond the objectives of multifunctionality of agriculture and ecosystem services to undertake more ambitious and systemic projects that address metropolitan issues such as waste management, water and soil protection, creation of renewable energy, etc., while enriching agricultural production with organic matter, crops that consume little water and are resilient, and income supplements (agrivoltaics, etc.). However, few of the sites studied have succeeded in creating strong complementarities between agro-sylvo-urban landscapes. How can this be improved?

Improving the agricultural projects	Co-benefits for the agricultural enclave	Co-benefits for the metropolis
Creating paths	Crop surveillance	Living environment Connectivity, Soft mobility
Mixed farming, landscape grid	Crop auxiliaries	Biodiversity
Sales outlet at the edge of the farm	Direct valorisation Simplification of the chain	Traceability of products consumed
Increased use of trees in production (arboriculture, agro-forestry, wine-forestry, etc.)	Diversification Soil maintenance	Reduction of heat islands Carbon storage Landscape quality
Renaturation	Specific agricultural uses (methanisation, eco-pasture, etc.)	Space open to the public
Educational workshops, events	Enhancement of the farm	Link with the land
Use of organic urban waste	Integration as organic matter to enrich the soil	Waste recycling
Recovery of rainwater from buildings	Irrigation	Less water to infiltrate or treat

	Reduced impact on water resources	

[tab.2] Examples of reciprocal co-benefits observed between enclaves and the metropolis. Source : elaborated by the author, 2023.

Essential complementarities between enclaves and their territories

Inventing intervention strategies

The notions of agricultural enclaves, islands, archipelagos and agro-sylvo-urban landscapes all contribute to a different view of the role of agriculture. The archipelago of enclaves represents a major challenge for the future of the Paris metropolitan area. It has the capacity to host local agriculture that respects environment, is rich in ecosystem services and provides co-benefits for agricultural, forestry and urban areas. However, this is not enough. How can we design projects that are not limited to the perimeter of agricultural enclaves, but are simultaneously defined on other territorial scales, in relation to urban and forest areas?

A number of lessons can be learned from studying these nine sites. To ensure the long-term survival of these enclaves and meet the challenges of the metropolis, it is necessary to put in place public policies that are favourable to agriculture (encouraging the installation of farmers, facilitating access to land, providing financial support for projects). Landscape planning tools (SRCE, *Orientations d'aménagement et de programmation, Atlas et Plans de paysage,* etc.) could play a federating role in bringing together the strategies, regulations and tools that coexist in the metropolis.

Furthermore, relating to professional practice of designers, design strategies should systematically incorporate an agro-sylvo-urban landscape viewpoint, and therefore be part of larger territories in order to address issues in a cross-cutting and re-territorialised way, and to engage greater reciprocal dependencies. Thinking in terms of the essential complementarities between metropolitan bodies can help to identify their vulnerabilities and formulate intervention strategies. What spatial forms might these complementarities take? What kind of urbanism could recreate some links of interdependence between rural and urban areas, within which enclaves could act as relay points?

This means inventing new design methods. Furthermore, introducing food and agricultural thinking into urban planning and design is an effective focus for renewing territorial practices ((Steel, 2013; Boulianne and Despres, 2016; Janin, 2017; Marot, 2019), moving from a logic of 'agriculture in the city' to an approach that guides urban planning, particularly an agroecological urbanism (Tornaghi and Dehaene, 2021).

Links with PhD research

The study of these nine sites is a fundamental stage in the PhD research process. By highlighting design drivers with a view to mutual benefits and complementarities between urban, agricultural and forestry areas, this observation phase provides the conceptual and operational basis for moving on to 'action' by initiating a design approach on one of the nine sites, the 'Coteaux de Nézant'. This site was selected because of its highly uncertain future and the absence of designers involved. This new phase of research by design will enable scenarios for the development of an agricultural enclave to be spatialised, as part of an in-situ incubator with local stakeholders. It will foreshadow avenues for renewing practices towards processes of sustainability and resilience in urban, agricultural and forestry systems.

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Agro-social parks: an analysis of planning and design projects for Italian periurban areas

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In planning, the notion of an 'agricultural park' has been used as a mechanism that attempts to acknowledge and protect agricultural production near urbanized areas while providing a wide range of services and becoming essential public spaces for the nearby cities. The first parks focused primarily on containing urban expansion. In contrast, more recent parks address other aspects, such as territorial cohesion, food sovereignty, and supply chains.

This paper analyzes three cases in Italy that were part of nine presented during a doctoral seminar. It aims to understand the role of 'design' within the planning process of these types of parks and how it interacts with their management and governance dimensions, as well as its potential for provoking new practices, innovative forms of production, and for becoming a planning and design mechanism for periurban areas.

Tracing agricultural parks

The term' agricultural park' and similar ones have been part of the European planner's lexicon since the 1980s. Various scholars trace its origins to the specific planning process that emerged to address aggressive urban expansion that neglected natural areas and, more specifically, the agricultural activities and production occurring contentiously with urban dynamics (Yacaman, Zazo 2015; Fanfani 2019). This planning mechanism acted, on the one hand, as a tool for farmland preservation and urban containment (Zasada 2011) and, on the other hand, in transforming these large-open spaces into green public infrastructure for the nearby cities and their inhabitants (Ferraresi, Rossi 1993).

Since the beginning, these parks were conceived as multifunctional spaces able to produce a variety of environmental, cultural, and social services that could restructure economic dynamics that benefit local farmers (Ferraresi, Rossi 1993). Although the first agricultural parks of the 1990s were conceived as a "territorial defense" mechanism, the more recent parks address emerging issues such as territorial cohesion and sustainability, food sovereignty, local development, and food supply chains (Yacaman, Zazo 2015).

The notion of an agricultural park has been used in France, Germany, Italy, The Netherlands, and Spain (Ferraresi, Rossi 1993; Magnaghi 2000; Donadieu, Mininni 2006; Van Blerck, Harsema 2014; Yacaman, Zazo 2015; Timpe 2017; Fanfani 2019; Timpe 2020a; Zazo, Paul 2022). In each context, these 'type' of park has been conceived or traced to different roots and planning traditions.

In Germany, as Timpe (2020b) argues, the park has served as an "experimental field" to design, test and innovate the human's relation to nature, even smaller scale testing activities that were later transferred to more significant landscapes. He cites the example of the 18th-century English parks that explored new agricultural techniques that later spread throughout Europe through new land use systems. Timpe explores the idea of "productive parks" as the re-emergence of pre-industrial forms and visions in which production and nature can reclaim the link lost to a fossil-dependent capital and human labor model that transformed the notion of 'park' into an "urban facility" for a labor-intensive lifestyle. Timpe also acknowledges the role of the international building exhibition IBA EmscherPark in experimenting with the aesthetics and form of the massive contrasting elements of a post-industrial era next to "wilder" forms of landscape and vegetation. Timpe (2017) envisions and studies emerging "co-created" forms of parks in which 'production' becomes the narrative of testing fields that play a crucial role in polycentric city regions, such as the *Landschaftspark Duisburg-Nord* in the Ruhr Metropolis or the *Landswirtschaftspark Belvedere* and *Waldlabor* in Cologne (Timpe 2020a).

In France, the rise of landscape design and practice has played an important role in acknowledging the potential of periurban agriculture that contrasts infrastructural elements in periurban areas. In the 1980s, Claire and Michael Corajoud's winning proposal for the *Parc Départemental du Sausset* in the Seine-Saint-Denis Department introduced an innovative form in which landscape design and

programming transformed these 200 hectares of the agricultural landscape into a public space. The park is structured through six "*concept espaces*" which are defined as forests, gardens and horticultural landscapes, sloped *bocage*, urban park, wetlands, and water bodies (Courajoud, Courajoud 1992). Pierre Donadieu has also contributed to theorizing periurban agricultural landscapes and practices through his "*campagne urbaine*" definition. The Italian translation of his book, co-authored with Mariavaleria Mininni (2006), attempts to conceptualize the notion of the "countryside park" as one of three "forms" that can structure and materialize this concept. The examples cited are the *Parc des Lilas* in Vitry-sur-Siene, *Parc de la Lironde* in Montpellier, and the *Lottissements agricoles* in Perigny sur Yerres. Another form is the landscape plans such as Rennes' *Code vert* or Anger's *Schéma de District*. The third form is the landscape charters such as the Natural Regional Parks in Vexin Français and Haute Vallée de Chevreusse.

The Italian and Spanish traditions share a common start. Yet, developing these agricultural parks – *parchi agricoli* and *parques agrarios* – took slightly different pathways in its planning and design, management, and implementation processes *(Zazo, Yacaman 2015)*. The first planning experience acknowledged in both traditions is the one of the *Parco Agricolo Sud* in Milan that evolved from it is initial discussions in the 1970s and matured through the 1980s to eventually be formally established in 1990, employing a regional law for green belts (Ferraresi, Rossi 1993). This experience served as a model to simultaneously develop in the mid-1990s *Parco Agricolo dei Ciaculli* in Palermo and *Parque Agrario de El Baix Llobregat* in Barcelona (Zazo, Paul 2022). These projects were funded and implemented through a Life EU program. In both contexts, these processes emerged through a collective effort of planners, agronomists, and agricultural trade unions. They matured into a planning and technical resource that set the basis for future parks, primarily in Spain (Sabate 2015). A 16-case comparison conducted by Zazo and Paul (2022) of implemented and not implemented parks in Spain highlighted the lack of consistency regarding planning, management, and governance. In this study, the design aspect of the parks is not explicitly considered. However, other professionals that were involved in the planning and design of the Baix Llobregat case have more specifically attempted to understand the "elements" and "structure" of an agricultural park and how it relates to a larger planning context and its role within the management and governance of the park. Mainly to understand how to build the synergies between agricultural production, consumption, and public use (Sabate 2015). The agronomist and first director of the Baix Llobregat Park, Josep Montasell (2001), attempted to differentiate and compare large-scale parks systematically [Tab.1]. This attempt reveals planners' desire to conceptualize agricultural parks based on attributes and the urge to distinguish them from other types of parks.

In this model, the cultural and social dimensions seem to be numerically diminished and separated from one of the agricultural park's main hypotheses: the social and cultural dimensions embedded within the agricultural activities in its landscape. This model also appears to weigh productive and economic dimensions excessively. An aspect that has been criticized for favoring productivity and larger producers and neglecting informal and socially oriented agricultural practices within and near it (Pirro, Anguelovski 2017).

Values	Functions	Type of parks							
		Agricultural Park	Natural Park	Rural Park	Urban Park	Periurban Park	National Park	Natural landscape of national interest	Natural Reserve
Productive	Economic	60	20	20	0	0	0	10	0
Ecological	Environmental	30	60	40	20	40	80	70	100
Cultural	Social	10	20	40	80	60	20	20	0

Table 1: Typologies of parks. A weight is assigned according to the value and function of each type of park. Source: Elaborated by the author based on Table published by Montasell (2001).

Methodology

Although various scholars and practitioners have compared agricultural parks, it has primarily led to theorizing them in terms of planning, management, and governance models (Zazo, Yacaman 2015). However, the role of the 'design' of the park and, within it, its form, structure, and the mechanisms used to shape them have been less explored.

Through these experiences, this study aims to understand how 'design' positions itself within the planning process of these types of parks and how it interacts with its management and governance dimensions. As well as the potential for provoking new practices, innovative forms of production, and establishing new relationships between the built and unbuilt environments that challenge a 'performance' perspective commonly used when conceiving 'public spaces.'

This paper presents the results of a seminar conducted on April 4, 2022, entitled *Parchi agrosociali: esperienze e indizi per la cura e la cultura dei paesaggi periurbani* as part of this doctoral research project. The seminar invited nine scholars and practitioners to present study cases in Italy in which the 'agro-social park' figure has been implemented or is currently undergoing planning and design processes. The cases were identified during a literature review phase and initial discussion with scholars. These cases are located in periurban areas and are drawn from various geographical locations and contexts [Fig. 1].

In this paper, three of these cases are analyzed and compared to identify similar and different traits that lead to understanding the role of 'design' within this planning mechanism. The analysis is conducted with the material presented by each scholar and enriched with further consultation of scientific and non-scientific sources, visits, and interviews. The chosen case studies represent projects at different design, implementation, and agricultural production stages. This could lead to a progressive understanding of this type of tool and how it can respond to current issues and challenges.

Exploring the morphology of an agricultural park

The process described by Ferraresi and Rossi (1993) for Parco Agricolo Sud in Milan reveals its planners' theoretical framework and design intentions and the struggle and journey to conceive this unprecedented 'hybrid' park typology.

As carefully narrated by these authors, they recurred to other similar planning processes, policies, and projects that shared similar intentions of challenging and bridging nature and agriculture with the dynamics and needs of the urban contexts. Some of the projects analyzed were the *Giardini di Arezzo* and *Parco di Ferrara* in Italy, 'green policies' at the city and metropolitan level for Turin and Bologna, planning of large open areas in London, specifically the Green Belt, and the relationship established in Erlangen between the elements of the urban public space with the natural and agricultural features, as well as the role of civil society. Furthermore, Ferraresi and Rossi were highly concerned about identifying the elements and structure that could exemplify an agricultural park, the technical skills and knowledge needed to plan and design it, and how they should interact with its implementation, management, and governance. Moreover, they proposed a series of planning tools that looked beyond the park and recognized other elements such as the urban-rural fringe, the surrounding rural settlements, the quality of the agriculture produced, and its relationship with the environment.

Ferraresi and Rossi considered morphology, together with functional and legal, as the three dimensions of the park. They addressed the complexity of this typology through a zoning type of strategy that aimed at defining its "morphology" through elements and a structure that would result in smaller domains to enable more dynamic forms of design and intervention. They described an agricultural park as the intertwining – *intreccio* – between two systems that co-exist with each other: the agricultural "platform" and the network of public spaces in the shape of a "linear" public park. In which the outcome produces a series of conditions and benefits that could be perceived as a "production of services.". Ferraresi and Rossi also emphasized the need for categorizing the types of agricultural production [Tab.2] to recognize the role of natural elements, identify the heritage-built tissue, and various other systems that enable agricultural activities such as hydric resources, roads, and vegetation, which also play a crucial role in becoming elements of the public park.

Figure 1: Case studies presented during the seminar. Source: Author

Classification of types of environmental services and their essential characteristics	
Definition	Description
1. Productive green areas	Regular pursuit of agricultural activities
2. Productive green areas with landscapes, hedges, canals	Regular pursuit of agricultural activities with the obligation of preserving and planting of trees
3. Productive green areas with operational constraints	Conduct agricultural activities with obligations to maintain buildings, size of fields, meadows, canal networks, roads; Restrictions on buildings used for supporting farming activities
4. Productive green areas with imposed crop production	Conduct agricultural activities with crops or livestock prescribed by the park
5. Educational agriculture with visitors	Conduct agricultural activities with restrictions on technologies, obligations of maintaining paths for schools and other visitors in general
6. Museum-type of agriculture	Restricted activity in terms of technologies, crops, and infrastructure; Restrictions as mentioned above
7. Organic productive green areas	Exercise of agricultural activity with restrictions on the use of certain chemical products (quantity/type)
8. Ecological agriculture	Semi-extensive farming; protection of fauna, flora, biological technologies, etc.
9. Natural oasis	Comprehensive respect for flora-fauna, natural shelters, visitors birdwatching, naturist trails, etc.
10. Public Park	Maintenance, surveillance, etc. of green areas equipped as an urban park.

Table 2: Classification of types of environmental services and their essential characteristics. Source: Translated and elaborated by the author based on Table published by Ferraresi and Rossi (1993).

Emerging tendencies in planning and design

Agricultural parks have primarily recurred to restrictive land use types through zoning and fitting into existing park laws. At the same time, agricultural parks have heavily relied on private farms diversifying their economic activities through a 'multifunctionality' approach. Scholars such as Magnaghi (2000) challenge agricultural parks to seek multifunctionality by employing more complex cultural and environmental functions to avoid reducing it to a mere diversification of activities. Current planning perspectives seek to strengthen the relationship of urban-rural planning and food production in cities through the idea of "productive urban landscapes" capable of becoming instruments that address issues such as territorial fragility, social cohesion, food security, environmental and economic benefits, among others (Brisotto, Lemes de Oliveira 2022).

Expo 2015, organized in Milano, became a key milestone in which various local governments committed to an international Food Policy Pact to address nutrition through planning and policies. Instruments such as 'food policy programs' and 'food atlases' have emerged in cities worldwide. For instance, In Italy these policy documents have been drafted in Milan, Rome, Turin, Trento, Livorno, and Matera. In Rome, it was driven by a bottom-up process (Mazzochi, Marino 2020). However, these ambitious agendas often lack a spatial and operational component.

Additionally, publications such as *Capital Agricole: chantiers pour une ville cultivée* curated by Augustin Rosentiehl (2019), have attempted to spatially locate and describe raising practices occurring within and outside the city and new forms in which the urban and non-urban intertwine. This publication reveals a complex system and scales of production. Most of these initiatives are bottom-up practices, often led by former urbanites and professionals. An initial analysis conducted during this doctoral project described various practices and "forms of consumption" emerging in the Milanese periurban fringe. Often they recur to collaborative processes for finding financial support and the resources for implementing them, such as crowdfunding and participating in start-up calls, mechanisms primarily employed within urban contexts (Di Campli et al. 2023).

Parco Agricolo dei Ciaculli, Palermo

Parco Agricolo dei Ciaculli is located within the impressive valley of the Conca d'Oro. Although it is now known for the production of fine citrus and other fruits, primarily the mandarine known as *tardive*; in the past, this area possessed a wide variety of trees such as olive, medlars, peaches, mandarins, lemons, oranges, pomegranates, among others. In 1994, when the idea of transforming this area into an agricultural park, the mandarine production was struggling against urban expansion. However, as described by Giuseppe Barbera[1], the story of this "Mediterranean garden" is far more complex and reflects the rich multicultural heritage of Sicily shaped by Arabian, Norman, and Mediterranean cultures. The notion of the 'garden' borrows from the Arabian tradition of creating aesthetical productive landscapes for pleasure and contemplation (Barbera, 2021).

When the project was executed, this area had several social problems mainly due to the mafia's control of the hydric and land resources, which created an atmosphere of untrustworthiness among citizens, especially farmers. This aspect was a critical aspect addressed by the project (Istituto de Ricerche Ambiente Italia 1997).

This park emerged as a top-down initiative led by the Municipality but quickly engaged the academia and the agrarian unions to shape it jointly. The project was shaped by design and regulating guidelines that were materialized by specific interventions of subprojects. This was a Life EU initiative executed simultaneously in Barcelona and Grenoble, and it included an exchange between these cities.

As described in the project's design guidelines, the intention of creating a park aimed at going beyond the perspective of seeing agriculture as an environmental service that produced social benefits. Instead, it placed agriculture at the center of the project. It sought innovation in its techniques and forms of production through private and public incentives and by working directly with the involved stakeholders. In this way, the park acknowledges agriculture as an "active

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[1] Professor emeritus at Università di Palermo. He was part of the scientific and technical team for this project. He specializes in Mediterranean landscapes, particularly in its trees and gardens.

process" that shapes the landscape according to its modes of production and the conservation of its activities that integrate the people who are actively engaged with this land (Istituto de Ricerche Ambiente Italia 1997). Therefore, the notion of a 'park' avoided reducing this area to a leisure platform but as a place that possesses an important environmental quality and is self-sustained through the activities there exists.

The project identified the essential elements in agricultural activities and their natural features and challenged them to transform them into spaces suitable for public use. For instance, the elements created to sustain agriculture and maintained by its continuous use, such as roads, hydric system, terraces, and the traditional wall – *muri a secco* – are among others. Also, the project acknowledges four types of environmental areas with specific actions and interventions. These are the mountainous area of Grifone to preserve the Mediterranean shrub ecosystem and the mountain passes. Some agricultural terraces were abandoned, so the project targeted the conservation of its farming activities and the reactivation of the underused areas through agroforestry practices. The third area belongs to the agricultural production happening in the lower lands, and the fourth is the residual spaces of abandoned agricultural activities in which environmental actions were needed and transformed for public use and as places to locate the park's services.

The design emphasized the system of paths and roads used for agricultural activities, especially the ones connecting to the agricultural terraces. The intervention activated these spaces for public use by designing itineraries and physically intervening in five thousand lineal meters of roads, repairing and constructing new dry walls, and planting over 6000 trees. The project also proposed an agricultural museum that narrates the rich agricultural complexity and diversity that existed in the Conca d'Oro by planting tree species that previously lived in the area. The initial study surveyed all the agricultural parcels and provided valuable information on agricultural activities. These actions led to investment in research for elaborating guidelines for the *tardivo* mandarine producers and later for genetic studies and creating a producers' consortia and a product label.

As explained by Barbera, the association became an essential element that brought together the farmers, but unfortunately, the project lacked a management body. The relationship between the Municipality and the town of Ciaculli suffered a rupture, and this affected the park's ambitions of transforming the Conca d'Oro into a place for innovation, as it was for various centuries.

Type of park:	Local Plan
Status:	Executed
Inception year	1994
Constitution year:	-
Involved municipalities:	1
Main metropolitan area:	Palermo
Orientation:	Landscape management, land-use planning, and farming management
Style of governance	Top-down
Management entity:	There is no management entity. Since 1999, the farmer's consortia Il Tardivo di Ciaculli has promoted the production and protection of the agricultural area.
Promoters:	Comune di Palermo Programma Life – EU project (1994-1996) Consorzio Il Tardivo di Ciaculli (from 1999) Istituto di Ricerche Ambiente Italia
Size:	800 ha. – approximate size since the area is not limited
Type of agricultural production:	Fruit grove

Table 3: Key data for Parco Agricolo dei Ciaculli
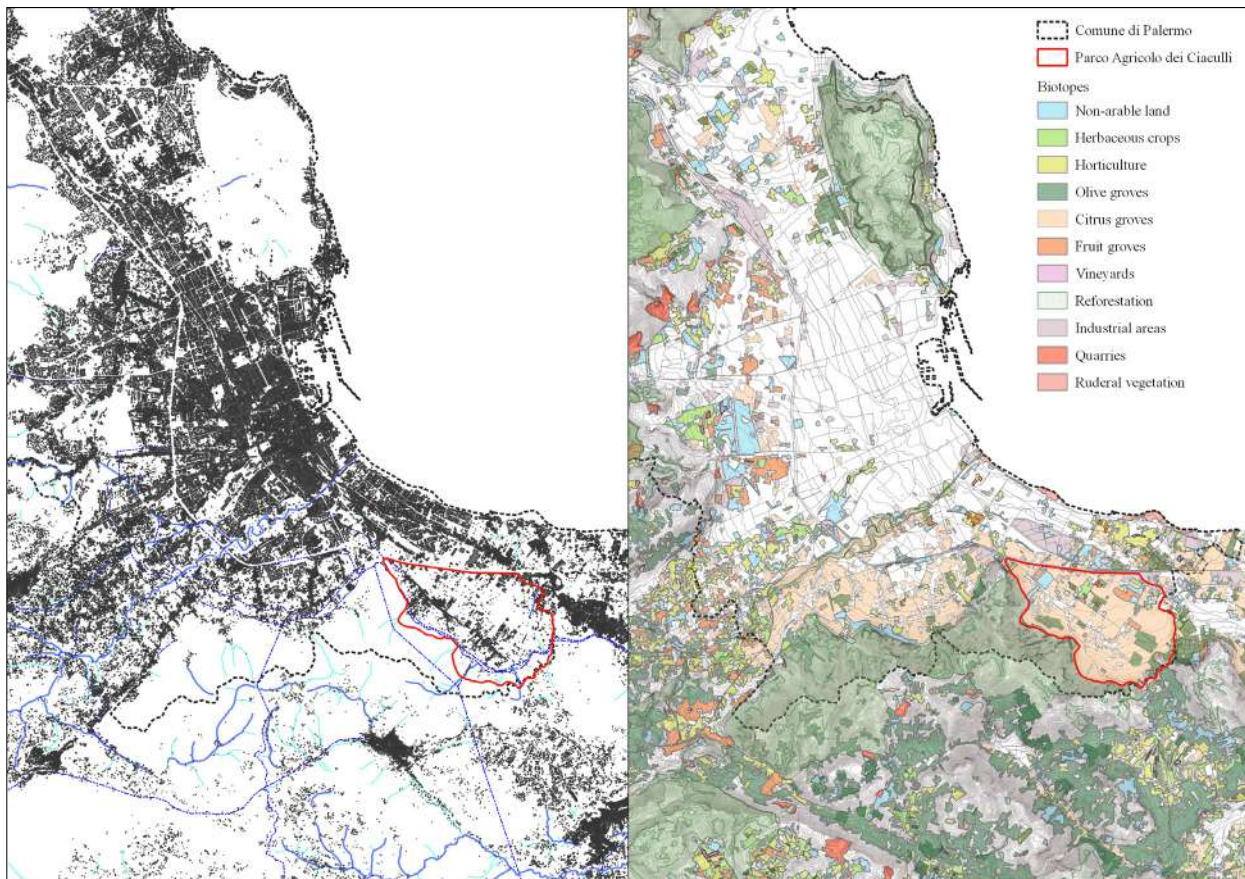
Figure 2: Analysis of the structural elements in Palermo and its relationship with Parco Agricolo dei Ciaculli. Source: Elaborated by the author with information from Sistema Informatico Territoriale of Regione Sicilia.

Parco GruBrìa, Monza and Brianza

GruBrìa Park was conceived by combining two existing supralocal parks – *Parchi Locali di Interesse Sovracomunale* – in the Monza-Brianza province. Ten municipalities promoted it, and it is located within one of Europe's most urbanized and industrialized areas. This decision has allowed a more cohesive yet complex structure that grants the management entity to apply for EU and national resources. The park aims to protect these municipalities' remaining green and agricultural areas while also attempting to give them continuity through various elements, mostly cycle paths and the Villoresi Canal. The park aims to strengthen agroforestry practices and preserve the hydric system that crosses it and is part of a more extensive system that starts in the Alps and reaches the lakes and the Ticino, Po, and Adda rivers.

This park has a clear legal framework, intention, and guidelines. However, the park's design project has adopted an 'incremental' and 'low-cost' approach that, through design, resolves specific needs and creates new public amenities by reutilizing the existing elements. The project has primarily two components, smaller local urban parks, and scattered agricultural mosaics that connect them. Some of these urban parks were designed decades before. For instance, *Parco Lago Nord* in Paderno Dugnano dates back to 1985 and was designed by the architect Maurice Munir Cerasi. The proposal transformed a former quarry into a proper park with various landscape and recreational features [Fig.2].

Other urban parks, such as *Parco Agricolo di Meredo*, correspond to these later 'low-cost' interventions, as defined by Arturo Lanzani[2], that aim at integrating some of the existing agricultural activities. The design elements of these areas consist primarily of tactical interventions, such as transforming the existing agricultural roads into public infrastructure for recreational activities, planting new tree rows and patches of woodlands, allocating resting areas, and attempting to connect this park to its surrounding context.

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[2] Arturo Lanzani is a full professor at Politecnico di Milano and also GruBrìa's president.

As stated by Lanzani during the seminar, the park's design project is a *"canovaccio"* – dishcloth – that adapts to the funds and calls identified and which an immediate response is needed to obtain them. In recent years, some of the projects have been financed by Fondazione Cariplo, a Milanese non-profit organization that funds various social projects in this Metropolitan area.

Lanzani stated that the park's limited financial and human resources are among the challenges. Although this park is advantageous in having the political support of 10 municipalities, their financial commitment is low, and the management entity relies on external funding sources and volunteers. Therefore, primarily on the agency and will of local associations, public employees, public administrations, and citizens. Lanzani considers that this limits the park's capacity to carry forward a more robust project.

The project primarily focuses on developing a sound governance and management structure while its design and implementation adapt to specific situations. Some of the current challenges are giving spatial unity and coherence to the park, ensuring that these areas are not abandoned near the park's boundaries, and being transformed into small services or storage warehouses to later become urbanized. Another struggle is better integrating the farmers and challenging them to be actively engaged and innovate their farming activities. As a user, the agricultural activities that connect the 'urban parks' are not as evident as these small urban parks, each with its own local identity and features.

Type of park:	Supra-local park – *PLIS Parco Locale di Interesse Sopracommunale*
Status:	Passed plan
Inception year	1999 – Parco Grugnotorto
	2001 – Parco Brianza Centrale
Constitution year:	2019 – Union of both parks
Involved municipalities:	10
Main metropolitan area:	Monza and Brianza, Milano
Orientation:	Nature conservation and recreation
Style of governance	Top-down
Management entity:	Consortia Parco Grugnotorto Villoresi e Brianza Centrale
Promoters:	Municipalities of Bovisio Masciago, Cinisello, Balsamo, Cusano, Milanino, Desio, Lissone, Muggiò, Nova Milanese, Paderno Dugnano, Seregno e Varedo
Size:	2.062 ha.
Type of agricultural production:	Cereals and livestock

Table 4: Key data for Parco GruBrìa

Figure 3: On the left, Parco Lago Nord – designed in 1985. On the right, Parco Agricolo Meredo – part of the new generation of 'low-cost' interventions. Source: Author

Terre di Città, Milan

Terre di Città is in the northeast of Milan, within the city's administrative limits and the 47,000 ha of protected farmland that constitutes Parco Agricolo Sud Milano. Unlike its southern territories, its northern part is composed of a series of large metropolitan parks that emerged after the world wars as experimental domains propelled by "independent civic agency" and "innovative policies" (Caravaggi et al., 2021). Among them, *Boscoincittà* exemplifies these aspects and the Municipality's willingness to support these civil-led initiatives. This specific park started in the 1970s and evolved

spatially through a design process that guided its implementation through an "open design" strategy that led to its incremental growth. Socially, it evolved into a recognized institution capable of leading significant transformations through volunteers and a daily commitment to the park's activities (Toeschi, 1985).

The *Centro di Forestazione Urbana - CFU* of the association Italia Nostra is the managing entity behind *Boscoincittà* and the leading promoter envisioning Terre di Città. Although CFU manages a series of community orchards within its 110 hectares of woodlands, lakes, and canals, this new annex would mean integrating the adjacent 100 hectares of underused agricultural fields at-risk of being re-developed into housing units [Fig.4].

As explained by Carlo Masera,[3] the aim is to create an "ecosystem" of agriculture that can trigger social and environmental improvement in the area. The project is framed within the rich and complex system of the immediate, metropolitan, and regional 'green infrastructure.' It inserts agricultural production within a larger and more complex set of landscapes in the area, which are fully accessible to the public. This area was previously owned by the Ligresti business group, a prominent real estate developer, and due to bankruptcy, these fields were passed to Comune di Milano and two financial institutions.

The project is led by a private consortium that created a "non-profit context" of enthusiasts, farmers, professionals, and actors in this area, as described by Masera, to define the implementation strategy to shape it. In 2018-2019 Fondazione Cariplo financed this initiative to conduct a feasibility study.

For now, the design project is defined by a system of guidelines that structure the development of these open areas. As explained by Masera, the design intention avoids defining a precise idea of the landscape. For him, through its activities, techniques, and management, agriculture has historically produced the landscape. Therefore, the guidelines attempt to spatially integrate these areas with the rest of the park and the city through itineraries and physical connections, reorganize various scales of agricultural production, and increase the ecological biodiversity through vegetation and transitional areas. The existing farmhouse, *Cascina Melghera*, is intended to become a key architectural and agricultural heritage element that integrates productive and social practices. Nowadays, the farmhouse is not part of the farming activities in the surrounding rice fields. The agricultural production targets diversifying the current rice production through a biological type of farming that includes open fields and fruit and vegetable production, which are intended to be commercialized directly on-site through a membership scheme and short-circuit networks. As explained by Masera, these initial design ideas led to a more accurate feasibility study.

Although Terre di Città lies within the boundaries of Parco Agricolo Sud Milano, as argued by various authors (Di Campli et al. 20223), the vastness of this area and its lack of spatial strategies and definitions has provoked multiple initiatives. Although it has guided its transformation intentionally, it has given a certain kind of land-use 'stability' in which many social, environmental, and agricultural practices are emerging. Terre di Cittá is one of them, but it is evident that for these 'bottom-up' initiatives to occur and successfully move forward, they need a technical, social, and political capacity for coordinating these complex processes. This includes, as seen in this specific case, the importance of inserting this project within larger planning processes and recognizing the various spatial, environmental, social, and political assets.

Type of park:	Local plan to be executed within the limits of the Regional Park Parco Agricolo Sud Milano
Status:	Proposal
Inception year	2018
Constitution year:	-
Involved municipalities:	1
Main metropolitan area:	Milan
Orientation:	Farming management and farmland preservation
Style of governance	Bottom-up – private consortium
Management entity:	Fondazione Terre di Città – non-profit foundation
Promoters:	Centro per la Forestazione Urbana - Italia Nostra Fondazione Cariplo

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[3] Architect in charge of designing the project. He has also been involved at *Boscoincittà* since its initial years.

	A committee of founding members Additional supporting members (persons and institutions) such as Associazione Italiana di Agricoltura Biologica, Acli Terra, Associazione Casa dell'Agricoltura.
Size:	100 ha.
Type of agricultural production:	Currently intensive production of rice. It is expected to convert into biological production of rice and include fruit and vegetable production

Table 5: Key data for Terre di Città

Figure 4: New residential units built across from the area chosen for the Terre di Città project. Source: Author

Discussion

Although these parks roughly share similar objectives, this analysis demonstrates that 'agricultural parks' are far from homogenous. Not only due to a lack of a common etymological understanding and consensus in its model, as argued by various authors (Zazo, Paul 2022), but also due to the complexity and contested nature of periurban areas, the specificity of each agricultural production and its social and cultural structure, and the management, legal and financial challenges faced by each project.

Some initial projects considered its morphology and programming elements key components (Ferraresi, Rossi 1993; Sabate 2015). However, this design dimension has been relegated to political, legal, social, and financial perspectives. In the Palermo case, the park's design became a vital tool for establishing a link between stakeholders, prioritizing interventions, and defining additional elements within the park that can acknowledge the area's rich agricultural heritage. Both design and legal guidelines were used to shape the park jointly. In the case of Parco GruBrìa, the legal and political dimensions of the park have been heavily prioritized to bring together ten municipalities and find the mechanisms to preserve the remaining non-urbanized areas. In this process, the design dimension of the park has progressively emerged to respond to the limited financial opportunities being identified by the management entity. Although there is no overall design, the general strategies established formally by the park guide the design decisions.

Lastly, the case of Terre di Città reveals the capacity of external private stakeholders that, with a design-oriented and collaborative approach, are attempting to lead a project that challenges agricultural and environmental practices and enables new models for food production and consumption. However, this project exposes the challenges of pursuing public actors and financial

institutions to support it. In this case, the park's 'size' played an essential role in calibrating its feasibility and designing a self-sustaining project.

The 'size' is among the most diverging aspects of 'agricultural parks.' For instance, Parco Agricolo Sud Milano has an area of 47.000 hectares, while other projects presented during the seminar range from 100 to 7.000 hectares. It is an aspect that has not been addressed but should undoubtedly be considered in its design with the other economic, management, and planning dimensions.

New perspectives and planning tendencies are increasingly looking at periurban territories, their agricultural production, and natural elements as critical 'green infrastructure,' as places to challenge food production and consumption, and as an essential element for a transition towards more 'sustainable' territories that respond to the current crises (Brisotto, Lemes de Oliveira 2022).

The 'agricultural park' is a figure that already exists within planning and design processes. Although it is not entirely defined, it could serve as a base from which to construct new hypotheses for productive periurban areas. Therefore, revisiting this 'hybrid' and 'had-oc' mechanism with a design-oriented approach could catalyze the complexity and richness of periurban territories by acknowledging the emerging practices and other instruments in these areas.

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Exploring the Potential of Agroecological Urbanism through Participatory Action Research: Two Case Studies in the Breede Valley, South Africa.

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The high levels of inequality experienced by city dwellers in South African cities are starkly reflected in the urban food systems and environments. One in every four South Africans is considered food insecure. Framed within the growing field of research focused on food planning in African cities and '*reconciling agriculture and the environment*', this paper explores the potential of agroecological urbanism to transform inequities in the current urban food system. Agroecological urbanism presents a strong transdisciplinary methodology and process for re-designing urban food systems. The study area is focused on a secondary city, Worcester, and a smaller town, Touwsrivier, in the Breede Valley as two case studies for addressing urban food insecurity through participatory action research at a local level. The research forms part of a proposed PhD dissertation that is exploring how the (re-)integration of agroecological urbanism can empower and feed underserved areas, generate new forms of co-produced urbanity and reconstruct ecological resilience for the Western Cape, South Africa.

The Urban Food Question in Secondary Cities and Towns

South Africa has a positive food balance and yet nearly a quarter of the 60 million people living in the country report that they have limited access to food and experience seasons of extreme hunger (FAO and European Union, 2022; Stats SA, 2022). Since 65% of South Africa's population lives in urban areas and two-thirds of households that experience hunger live in cities, food security is a critical and predominantly urban issue (Haysom, Battersby and Park-Ross, 2020). The persistent food insecurity experienced by many urban dwellers highlights the paradox of the South African food system. Recent food systems outcomes show high levels of hunger, malnutrition and diet-related diseases (Van der Berg, Patel and Bridgeman, 2022). The prevalence of urban food and nutrition insecurity is coupled with rapid urbanisation, increasing environmental degradation and climate change shocks, extreme territorial imbalances and a slow transformation towards inclusiveness (FAO and European Union, 2022). Global shocks like the COVID pandemic, the ongoing Russia-Ukraine war and the devastating droughts and conflict in Africa have deepened the global food crisis and resulted in staggering food price hikes. The rising cost of energy and food diminishes people's resilience to increasingly more pervasive socio-economic and environmental challenges. These crises disproportionately burden the poorest and most vulnerable communities, exposing the entrenched inequities and inadequacies in the globalized food system.

As in the rest of Sub-Saharan Africa, most of the projected future urban and population growth in South Africa is projected to happen in intermediary cities (Joubert, Battersby and Watson, 2018; Haysom, 2022). Secondary towns are important regional economic hubs and can play a key role in accommodating the needs of a growing urban population, but these towns are currently still under-researched (May *et al.*, 2022). Intermediary cities and towns, therefore, offer strategic sites for exploring alternative strategies to address the inadequacies in the current South African food system (Kesselman, 2023; Riley and Crush, 2023).

This essay presents the Breede Valley in the Western Cape, South Africa, as a compelling study area to address local food and urban challenges in line with the United Nations' Sustainable Development Goals (SDGs)[1]. The research is focused on a secondary city, Worcester, and a rural town, Touwsrivier, in the Breede Valley, as case studies to explore the potential of agroecological urbanism through participatory action research.

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[1] This essay will focus particularly on the urban food question as it relates to SDG 2: 'Zero Hunger', SDG 3: 'Good Health and Well-being', SDG 10: 'Reducing Inequalities', SDG 11: 'Sustainable Cities and Communities', and SDG 12: 'Responsible Consumption and Production' (THE 17 GOALS | Sustainable Development, n.d.).

Fig1. Western Cape Location Map. Elaborated by author from WikiMediaCommons.

Context: The Breede Valley

Worcester and Touwsrivier are located in a broad valley in the middle reaches of the Breede River in the Western Cape province, approximately 120km and 180km northeast of Cape Town respectively. Worcester, Touwsrivier, Rawsonville and De Doorns fall within the Breede Valley Municipality (BVM). The Breede Valley today is an important agricultural region predominantly focused on export-oriented production (CoE-FS, SA Food Lab and WCEDP, 2022).

Worcester is a well-positioned commercial farming, logistics and food processing hub that supplies the Cape Metro and other inland markets. It is an archetypal South African secondary city embedded in a commercial agricultural economy that reflects the same spatial and socio-economic inequality as in the metropoles. The urban structure of the town is the result of colonial and Apartheid spatial planning policies and is comparable to most intermediary and small towns in South Africa. It has a central business core and suburban edge, with peripheral low-income and township areas that force the most resource-poor inhabitants to travel the furthest to access the urban core for economic opportunities, retail, and other urban services. Many people in these areas rely on the informal market for housing, employment, retail and food (Joubert, Battersby and Watson, 2018).
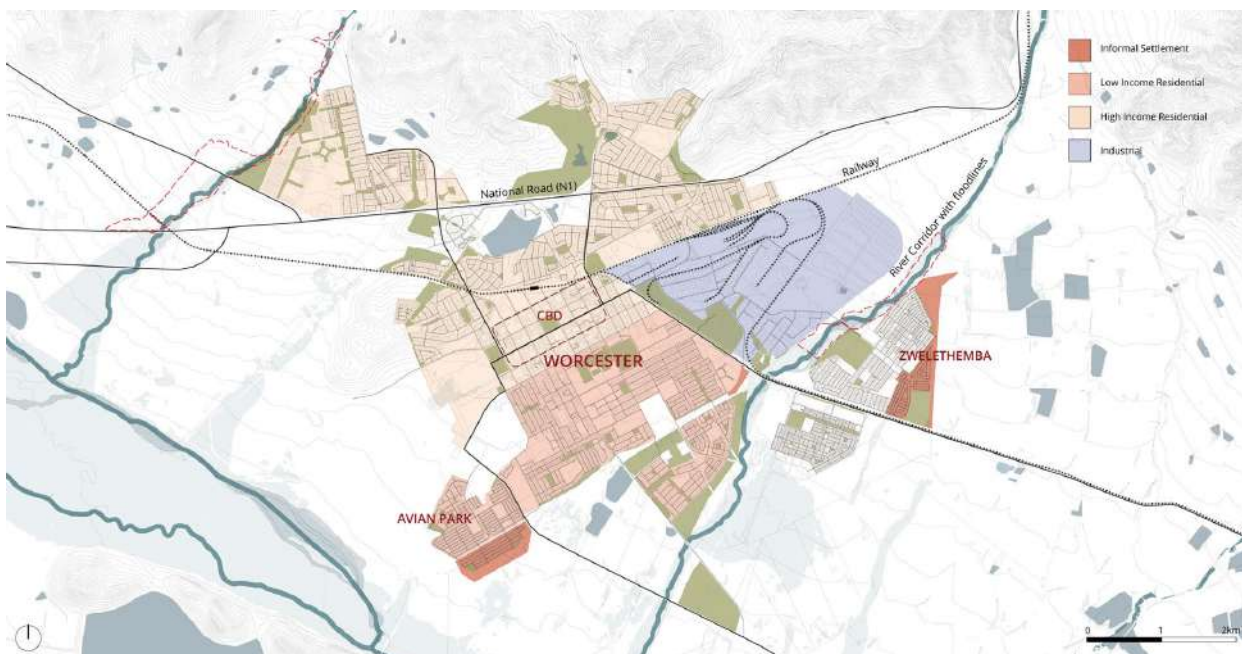
Fig2. Urban and Socio-Economic Structure of Worcester. Elaborated by author from BVM GIS database.

Fig2&3. Informal Food Traders in Zwelethemba in Worcester.

Touwsrivier is a small town at the gateway between the Mediterranean-like agroclimatic zone of the Boland and the harsher semi-arid Karoo region. Originally a railway town, the decline of rail in the early 1990s resulted in economic decline, which accelerated by the early 2000s. Transnet, the national railway company, still owns a lot of land and assets around the town, but most of these properties have fallen into disrepair. The current unemployment rate is estimated at 80%. Touwsrivier as a case study represents a challenge that many small South African towns face, which is how a community sustains itself once a large state-owned entity or industry withdraws or fails. Most people in Touwsrivier live on social grants and rely on local soup kitchens and feeding schemes at the schools (CoE-FS, SA Food Lab and WCEDP, 2023).
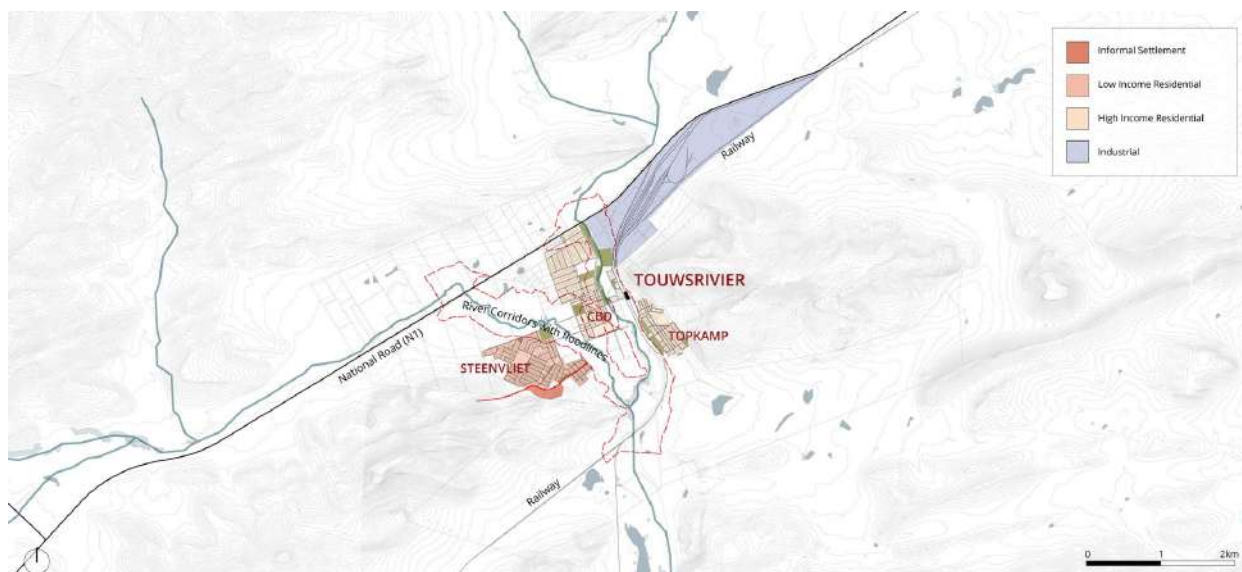
Fig4. Urban and Socio-Economic Structure of Touwsrivier. Elaborated by author from BVM GIS database.

The socio-economic and food insecurity challenges are mounting in both towns. Worcester (Zwelethemba), De Doorns, and Bonnievale are the main 'entry points' for seasonal workers seeking employment on farms in the Western Cape, with most people coming from the Eastern Cape or outside South Africa. Farmers in the region rely on seasonal workers to meet their labour requirements during harvesting season, but increasingly these labourers are settling in Worcester and surrounding towns once the season is over. The Breede Valley Municipality is experiencing increased pressure on local authority systems, employment opportunities, land resources, infrastructure and social services of a growing population. Food insecurity in the area has worsened since COVID, particularly amongst migrant seasonal workers. Unpublished data from the Western Cape Government indicate that Zwelemthemba and Avian Park, two of the lowest income communities in Worcester report that 37% of the households are food insecure (May, 2023).

Fig5. Graffiti in Touwsriver – 'We are hungry, BVM make a plan'. Photo by author.

The Breede Valley is also faced with climate change-related shocks, water insecurity and ongoing disruptions in the national supply of electricity. Agricultural industries in the valley are impacted differently by climate change depending on the different agroclimatic regions. The Breede Valley has both Mediterranean and semi-desert climatic zones and is located in the Breede River Catchment area. The decreased flow and salination of the river threaten the area's ecological and economic well-being. Important wetland areas in the valley like the Papenkuils wetlands are endangered by unsustainable agrarian and urban practices (May, 2023). Touwsrivier is exposed to the more arid climate of the Karoo but is simultaneously vulnerable to flash flooding. About a third of the town is settled in a flood plain (CoE-FS, SA Food Lab and WCEDP, 2023).

Fig 6&7. Recent flooding in Touwsrivier (Donkiesrivier left) and Worcester (Zwelethemba right) – April and May 2023 respectively. Photo by author.

The Foundations of the Food System in the Breede Valley

In the words of Carolyn Steel in her seminal book, Hungry City, *'In order to understand cities properly, we need to look at them through food'* (Steel, 2008, p. 10).

Income poverty and food insecurity not only threatens the health and wellbeing of the growing population in Worcester and Touwsrivier but it also severely hampers the development potential of these communities, perpetuating existing poverty cycles and socio-spatial inequalities (Haysom, Crush and Caesar, 2017). In order to address these challenges, it is necessary to review the foundations and structure of the current food systems and how this is impacted by other urban processes (Haysom, 2022).

A crucial departure point is to note that South African cities and its food system have been constructed by deliberate colonial, political and neoliberal strategies that favoured specific socio-economic groups, commercial industries and formal economies (Haysom, Battersby and Park-Ross, 2020). Permanent human settlement and agriculture was only introduced to the Breede Valley in the 1800's when colonial settlers forcefully appropriated land and natural resources from the indigenous tribes that roamed the land before their arrival (May, 2023).

The precolonial inhabitation of Breede Valley was based on a system of *'nomadic pastoralism and a decentralised system of natural resource governance'*. San and Khoikhoi tribes inhabited the Breede Valley in the 17th century. The tribes raised livestock, drinking their animals' milk and eating wild fruits, berries and indigenous tubers. Heavily reliant on water and grazing, tribal boundaries were fluid and herders often migrated together along the rivers. Their traditions of collectivism and earth stewardship were disrupted by the private ownership imposed by slave-owning settlers. The region was hard to cultivated and the first settler farmers relied heavily on the indigenous knowledge and practices introduced to them by the Khoi traders, and later indigenous labourers (May, 2023).

The second big wave of land dispossession came with the seizing of black farms and the relocation of non-white businesses from central business districts during the British rule and Apartheid eras. Policies like the 1913 Native Land Act dispossessed indigenous and non-white communities of land and resources, forcing many to seek livelihoods as labourers in cities, mines or on farms. The economic ring-fencing of key infrastructural assets, combined with the early adoption of the supermarket economies, resulted in farming opportunities having been predominantly reserved for capital-intensive farming by white farmers (Haysom, Crush and Caesar, 2017). Therefor most of the prime land and financial resources in the current food system are still owned by the descendants of the colonialists and the former ruling party minority (May, 2023).

The South African food system was foremostly designed to be an urban food system aimed at feeding a pacified but not necessarily well-nourished urban workforce. A filling high energy diet aligned well with the modernist industrialisation of South African agriculture and the urban food system (Haysom, 2022).

The modernist spatial planning policies implemented during Apartheid resulted in segregated cities with a disparate distribution of land, infrastructure, and socio-economic opportunities. Large infrastructure, industrial zones and natural corridors buffered the central business district and affluent neighbourhoods from non-white communities on the periphery. This layout is evident in both Worcester and Touwsrivier, with the rivers, railway and a large industrial zone (in Worcester) acting as spatial barriers. Spatial segregation has resulted in the unequal distribution of and access to safe and culturally appropriate food options at a city scale. For the urban poor, this means expensive food journeys, time poverty and a lack of cooking resources that result in the consumption of 'fast', processed or nutrition-poor foods (Haysom, Battersby and Park-Ross, 2020).

Fig8. Long Food Journey from Avian Park to Worcester CBD. Photo by author.

Land tenure and water security are inextricably linked to the urban food question. The urban poor are in an ongoing struggle for land, employment, and food. Many settles in informal neighbourhoods like Mandela Park in Zwelethemba which is built in an area exposed to a high risk of flooding and with limited access to services. These issues prompt the need for transformative action at the intersection of food, urban and natural ecosystems (Haysom, Crush and Caesar, 2017). The principles of agroecology present a powerful and robust solution to challenge the systemic inequality in the current urban food system (Deh-Tor, 2021; Haysom, 2022; Marot, 2022; Specht et al., 2022).

Agroecological Urbanism and Participatory Action Research for Reimagined Food Futures

The main objective of the proposed doctoral dissertation is to develop agroecological urbanism strategies through participatory action research (PAR). Various participatory action research and design-research methods will be tested to facilitate local dialogues and reimagine foodscapes in the two case studies outlined above. The research is embedded in ongoing critical research in the Breede Valley.

The DSI-NRF Centre of Excellence in Food Security (CoE-FS) at the University of the Western Cape (UWC) in partnership with the French Agricultural Research Centre for International Development (CIRAD) and the Vrije Universiteit Amsterdam is currently conducting a multi-year place-based project concerning food system governance and transformation in the Breede Valley (South Africa), Nakuru county (Kenya) and Constantine (Algeria). The project is titled 'Urban Food Resilience Under Climate Challenges (URBANFOSC)'. One of the methodologies used is learning journeys. *'The learning journeys bring together representatives of local, district and provincial government, academics and grassroots organisations working within the food system, including Early Childhood Development Centres, advocacy groups and practitioners'* (CIRAD, CoE-FS and VUA, 2020). Critical insights gained during the learning journeys in Worcester and Touwsrivier inform the design of this doctoral thesis and proposed participatory action research methodology.

Fig9&10. Learning Journey in Zwelethemba, Worcester. Investigating Indigenous Food Sources. Photo by author.

The proposed doctoral research is framed within the emerging global agenda to reintegrate agroecology and urbanism. Agroecology, defined at the end of the 1990s as *'the ecology of the entire food system', 'includes all aspects and participants in the food system'* and is aimed at *'re-establishing the close relationships between the people who grow the food and the people who eat it, while reducing the negative impacts of the intermediary system between the two. Agroecology can become a way of building relationship-based market systems that are equitable, just, and accessible for all'* (Gliessman, 2006, 2014).

Agroecological urbanism focuses on sustainable agroecosystems and regenerative processes, but also on the social inclusion of marginalised voices like that of indigenous people, women and the youth (Wezel *et al.*, 2020). It explores the reinvention of just social arrangements through the transformation of food systems and provides a holistic socio-ecological and political framework embedded in a growing body of research focused on *'reconciling agriculture and the environment'* and finding solutions *'beyond industrial agriculture'* (Marot, 2019).

'Lidzhegu and Kabanda (2022) detail that indigenous knowledge is the knowledge that helps society make decisions about activities, such as agriculture and education, that are acceptable to their lifeways. Indigenous knowledge, along with Western and European-based knowledge, helps create development solutions that are culturally acceptable to the society being helped.' (Diko, 2023, p. 269)

The participatory action research methodology aims to establish a more inclusive community-driven inquiry. The expanded 13 Principles of Agroecology specifically includes participation as a critical approach to food sovereignty and the co-creation of just food systems (HLPE-FSN, 2019).

This proposal draws particularly on the work of Brittany Kesselman in her exploration of participatory action research in the South African context *'as both a normative commitment and an approach to inquiry, is a means by which research can contribute to food justice. Going beyond both 'public sociology' and 'critically engaged sociology' in its attempts to empower research participants and respond to their needs, participatory action research (PAR) seeks to change not only through policy influence but also through the very process of the research'* (Kesselman, 2022, pp. 171–172). Kesselman's research on urban agriculture and food sovereignty in Johannesburg revealed the potential of PAR to empower and have a more direct impact on the lives of local communities through engaged scholarship.

Reintegrating Urban Agroecology in the Breede Valley

This essay focuses on introducing the case studies, and the theoretical framework and methodological approach for exploring how the integration of agroecological urbanism can empower and feed underserved areas, generate new forms of co-produced urbanity and reconstruct ecological resilience in these intermediary towns. The next phase of the research includes mapping urban fragments and identifying potential commons, gathering precedent studies for alternative urban infrastructure systems, co-creating strategies with local stakeholders for areas like the river corridors, and looking for opportunities to connect community-led projects as a local food network. To challenge the inequities in the current systems, other systems like natural ecosystems, traditional farming and indigenous knowledge systems, food sovereignty and the informal economy must be acknowledged and reintegrated into the way cities and landscapes are planned.

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Plots on hold: hybrid landscapes in rural Tamil Nadu through ordinary farmland conversions

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Over last two decades, rural areas around the agglomeration of Pondicherry in Tamil Nadu (South India) have undergone profound changes in their landscapes. Real estate projects are being developed beyond the fronts of urbanization, scattered between rice paddies, in the middle of villages and along roadsides. For the most part, these layouts are left to lie fallow and are resold as building plots for investment or savings purposes. Based on field surveys conducted in 2022 and 2023 in the outskirts of the urban agglomeration of Pondicherry, this paper presents preliminary results of ordinary land conversions. By tracking transfers of ownership and changes in land status and use, the aim is to analyze the biography of land. By taking the landscape as a starting point, we can understand the different strategies used to commodify land. These empty lands and hybrid landscapes, which seem to be neither rural nor urban, raise questions about urban production processes.

Introduction

In a context of structural decline of family farming, India is experiencing a profound transformation of land in its peri-urban and rural spaces (Chakravorty, 2013). In addition to the issues of agricultural land grabbing on the outskirts of Indian metropolises for infrastructure, large real estate, or industrial projects (Vijayabaskar and Menon, 2018); the subdivision of agricultural land into small plots for popular residential construction is constantly expanding, well beyond the urbanization fronts.

In south-eastern India, on the outskirts of the Pondicherry agglomeration, rural areas have been transformed over the past fifteen years under the effect of layouts: these subdivision projects appear along roads, inside villages (Denis, 2016). This process leads to a phenomenon of prolonged fallow land and scattered constructions that disrupt rural landscapes. Despite the visible intensification of these subdivisions, little reliable data is available: many remain unauthorized and are still, in fact, outside of official statistics. Agricultural owners, real estate agents or developers carry out these conversions before reselling on a lot-by-lot basis (Dinh, 2015). This paper aims to document these forms of popular commodification of farmland through the formation of hybrid landscapes, neither urban nor rural. Commodification is understood here as the exacerbation of the exchange value of agricultural land in relation to its use value (Fauveaud, 2022). These popular conversions reveal a mechanism of anticipation of the city through the production of a reserve of land destined for residential construction, occurring at varying distances from the centre of the Pondicherry agglomeration. The term conversion refers to the action of removing land from agriculture by stopping agricultural production suddenly. The subdivision can be carried out immediately or several years later and consists of the demarcation of micro-lots (plots) that are then sold separately[1]. By "popular" we are referring here to the types of actors who mobilize this agricultural land, whether they are real estate agents, small local developers, or farmers: they are distinguished by their lower available capital than the real estate actors present in the projects around the large metropolises. The term "ordinary" is also used to highlight the trivialization of this process of conversion and subdivision, both in the landscape and among the population that participates in it as buyers or intermediaries.

This leads us to question the processes of urbanization beyond the continuity of the built environment, through the phenomena of land commodification, which raise critical interrogations about the very definition of the urban. How do the hybrid landscapes resulting from land conversion help us to understand the process of urbanization and its complex nature?

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[1] A layout is defined as the subdivision of land into a minimum of 8 plots (Town and Country Planning Act 1971, Government of Tamil Nadu).

Analysis at the plot level allows for a detailed approach to the conditions of transformation of agricultural land. Through the study of changes over time in the status and uses associated with these converted agricultural lands, the "biography of the land" (Huard, 2016) makes it possible to trace the stages of conversion. First, the conversions are identified with the help of Google Earth satellite images by going back in time to define the date of the conversion. This conversion is materialized by the sudden stop of agricultural activity, and we then observe a change in land use that is also accompanied by the appearance of dirt roads that delimit the future roads of the subdivision [fig. 1]. These initial data are then enriched by field observations. When visiting the layout to verify the conversion, several clues can help identify it despite the prolonged state of wasteland: the presence of a sign, often yellow, indicating the name of the project and the telephone number of the people in charge of selling the plots; there are also markers that delimit the plots within the layout. Finally, the third phase of the study consists of semi-structured interviews that take place according to informal meetings, often as a snowball effect. These interviews, conducted for the most part in Tamil with the help of two interpreters, took place mainly during a field survey between June and May 2022, supplemented by field visits in March 2023.

—— Outline of *Vedhavalli Nagar* layout
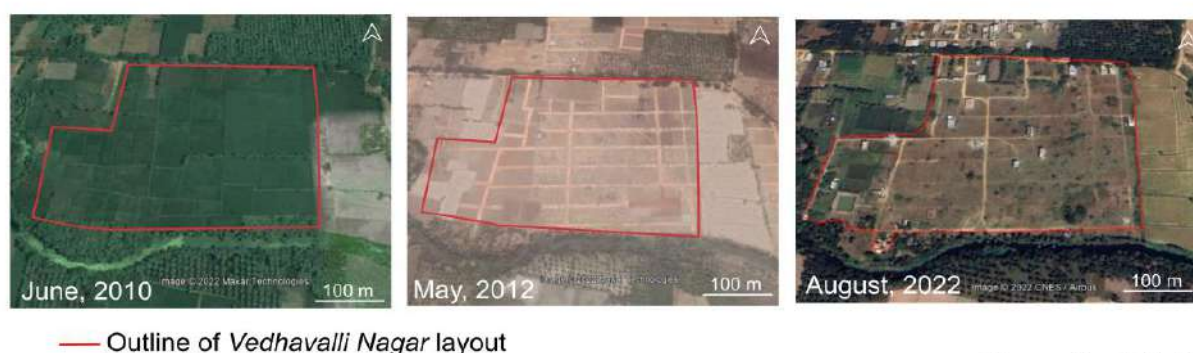
[fig 1]: Conversion stages of Vedhavalli Nagar layout, Pondicherry district. Source: Google Earth, elaborated by the author.

The study area chosen is around the city of Pondicherry, located 150 kilometers south of Chennai which is the capital of the state of Tamil Nadu and the sixth most populous Indian metropolis. It is a dynamic agglomeration of about one million inhabitants with a population growth rate of 3% per year. The different examples presented here are in rural areas within the district of Pondicherry (Pondicherry Union Territory[2]), or within the Viluppuram district (Tamil Nadu) [fig. 2]. This article primarily concentrates on the analysis of landscape transformations and does not delve into the intricate details of the divergent regulation of the land market observed in the two districts.

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[2] The urban agglomeration of Pondicherry is spread over two distinct administrative entities: the Union Territory of Pondicherry and the State of Tamil Nadu. The eight Union Territories are separate administrative entities from the 28 states of the Indian Union and report directly to the central government. Both of those entities are then divided into districts.
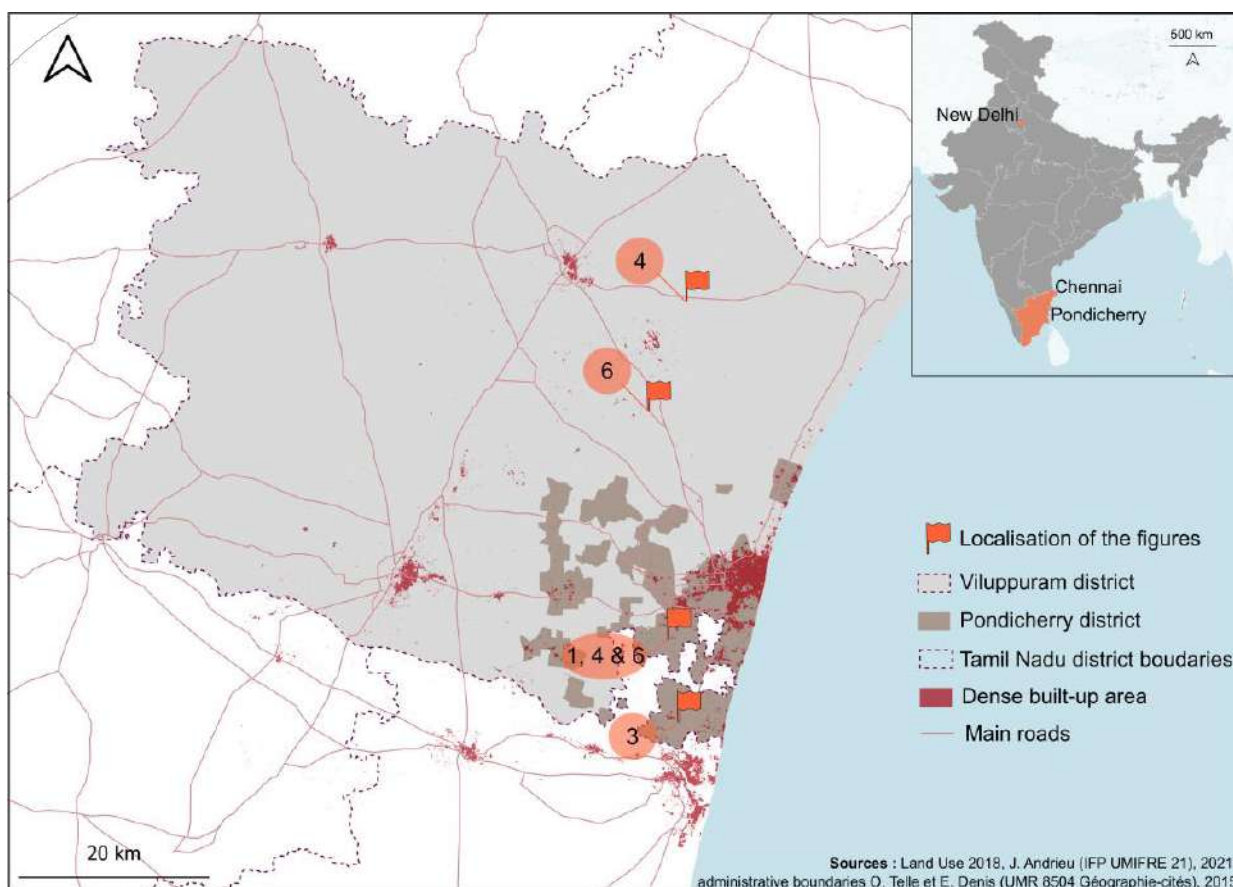
[fig. 2]: Map showing the location of the study area and of the various photos presented in the text. Elaborated by the author.

A context conducive to the commercialization of agricultural land: the decline of the agricultural sector

The agricultural sector has been declining through the last decades, leaving farmers and farmland owners in a difficult economic situation. Statewide, the weight of the agricultural sector in Gross Domestic Product has declined from 25 percent in 1993-94 to 8 percent in 2012-13, the second lowest in the country and half the national average. Despite some of the highest yields in the country for most major crops, including rice, sugarcane, and agricultural products, fertile and irrigated land is being taken out of agriculture. With 40 percent of workers in agriculture and cultivation, the employment structure is still largely agriculture based. However, the 2011 Socio-economic and Caste Census showed that only 18 percent of rural households report agricultural production as their main source of income, compared to 30 percent nationwide. Several factors undermine the conditions of agricultural production in Tamil Nadu and the income that can be derived from it. The average size of farms has continuously decreased since the 1970s, from 2.28 ha to 1.00 ha in 2020 (GOI, 2020). This dynamic of property fragmentation over generations calls into question the viability of farms. The increase in production costs, particularly due to the rise in input prices, destabilizes rural households, many of which are getting into debt (Guérin, 2014). Added to this are environmental changes whose effects on the Tamil countryside are already being felt: irregular monsoons, the drying up of water tables accelerated by competition from urban and industrial demand...

As for the study areas, Viluppuram district is the district with the biggest rural areas within the state. Between 2008-2009 and 2018-2019, the share of farmland in the district remained at around 45%, higher than the state average (35%). The district specializes in rice production (paddy) with 40 % of its cultivable area dedicated to the crop in 2016-17, which is the second highest in the state of Tamil Nadu3. In Pondicherry district, farmland represent only 20 % of the land use. With a

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[3] Tamil Nadu Rural Transformation Project, Viluppuram district diagnosis - *Vazhndhu Kattuvom Project*, Department of Rural Development and Panchayat Raj, Government of Tamil Nadu.

general shift towards tertiary sector in the last three decades, Pondicherry agriculture has been declining rapidly 4. However, some villages still depend on agricultural activities with up to 52 % of the working population in farming activities. Both the district are highly irrigated areas, with a long standing and efficient irrigation system allowing several crops a year, up to even four in some places.

Those layouts mushrooming inside villages or along highways and main roads disrupt these irrigation systems by cutting out or polluting canals. Landscapes of paddy fields are being muted by the appearance of layouts, more or less developed [fig. 3]. By showing different examples of landscapes around the study area, we will try to highlight the spectrum of development and the different ways in which these hybrid landscapes are produced.

[fig. 3]: In the foreground, a converted layout, with white blocks marking the boundaries of individual plots. In the background, a rice field still being cultivated in a very fertile, well-irrigated area.

Spectrum of landscapes showing the gradient of land commodification
The different processes of land conversions and subdivisions seem to create a large spectrum of "layout landscape", also indicating a variety of investment strategies: from empty land subdivided mainly for land speculation, to developed and formalized gated communities. From empty land of underdeveloped layouts to formalized gated community, those examples are showing different stages of land commodification.

Profitable fallow lands

Starting with the first stages of agricultural land conversion, empty land is the first type of landscape to be observed. This fallow land has been withdrawn from agricultural production and is still waiting to be put to good use. At this stage, two situations can explain this landscape: either the land remains the property of a single person, awaiting the necessary authorizations to convert and subdivide agricultural land, or the plots have already been sold and this is a very active land market, even if not much is happening on the surface. Often without any services, very few elements indicate the actual conversions: yellow sign at the entrance, dirt roads, yellow and white blocks delimiting the individual lots and invasive plants like the *prosopis juliflora*[fig.4]. When unauthorized

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4*Comprehensive Development Plan for Puducherry Planning Area- 2036,* Pondicherry Planning Authority

these lands remain in land records as agricultural land, contributing to the statistical illusion of maintaining farmland.

[fig. 4]: Layout left uncultivated since 2010, in the foreground left corner we can wee a yellow sign indicating the entrance to the "layout". The land has been transferred to several owners but remains registered as irrigated cultivable land. In the background on the right, we can see the invasive plants taking over. Pondicherry district. 2022

Those empty spaces seem to occur everywhere, no matter the localisation or the distance from the city centre (refer to picture localisation on the map, fig. 2). These lands can also be the object of reappropriation by the nearby villagers: such as grazing, cricket, or more festive as suggested by the empty liquor bottles often left there. They can also be produced by small local real estate agents or bigger developing companies [fig. 5].

[fig. 5]: An empty layout developed by a Chennai-based developer SSLF, although roads and amenities (including playground that as seen in the background) have been built, no plots have yet been constructed. Viluppuram district, 2022.

Underdeveloped layouts that allow access to home ownership

A second types of layouts that can be observed, are half empty ones with often few houses built but merely any services provided. Just like the example below [fig. 6], those layouts often remain underdeveloped with a lack of basic services and sanitation. Those types of layouts often occur from an untheorized conversion. Indeed, to obtain the necessary authorizations, one must first lay out the land with roads and set aside land for common use (often a playground). By avoiding this process, real estate agents can minimize their investment and get more out of the conversion. Once all the plots have been sold, it's up to the owners to form an association to approach the authorities and request connection to services.

[fig. 6]: Vedhavalli Nagar, a layout converted in 2010 by a local real estate agent who sold all plots within four months still registered as farmland, leaving to each individual plot owner the responsibility to apply for residential land conversion. From 2016, several houses have been built. Mostly by households from the city of Pondicherry who were looking to buy their own land. Roads are still in dirt and only electricity is available, each house has its own drinking water supply and septic tank. In the background, you can see a coconut farm.

Buying land is the first investment households must make. Once that is secured, they will often wait several years before being able to build the house. During this period, land can also be used as a savings vehicle, to be resold at any time when money is needed, whether to pay a hospital bill or the dowry for a daughter's wedding.

Formalized layout as secure investments

The next and last type of conversions observed are considered more formalized. These layouts seem to follow of different process of development and amenities are being offered. Even though asphalts roads and common spaces are developed [fig. 7], very few plots are built on. These types of layouts are enclosed compared to ones that are less developed. These plots seem to be aimed at a slightly higher class of investor, guaranteeing security of ownership thanks to the regularity of administrative formalities. These types of layouts appear closer to regular residential

production; however, by remaining empty they participate in land speculation without contributing to the housing supply.

[fig. 7]: Pondy Gateway is a gated community located 40 minutes away from the center of Pondicherry, along the highway. Converted in 2007 by the landowner, a farmer looking to get out of agriculture, the layout was progressively developed with the first roads appearing in 2017 after obtaining authorization. In 2023, only a dozen houses were built.

Conclusion

In conclusion, this paper seeks to highlight the hybrid landscape resulting from the expansion of the commodification and financialization of land. By converting agricultural land, the various stakeholders seek to make a profit in anticipation of the arrival of the city. Observed at varying distances from the city, and in more or less developed rural areas, these ordinary conversions take place both in developed sectors, often boosted by the construction of new infrastructures (national roads, facilities, industries...), but without necessarily giving rise to real estate construction. The question left to answer is how to categorize these new places? Withdrawn from agricultural production, these lands are no longer truly considered rural, and without construction or development, can they be considered urban?

The absence of planning and the mobilization of this agricultural land as a source of investment and savings testify to a form of financialization of urban production from below. Moving forward, further fieldwork and interviews with investors, households and developers are essential to better understand the factors influencing the development of these different types of conversions.

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Foodscapes: from soil to policies. Food as a design tool for landscape and territory.

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The research considers the notion of foodscapes (FSS), a term increasingly used within the fields of nutrition, public health, and food studies. Considering the increasing number of studies on foodscapes, some hypotheses could be drawn to define how the origin of the idea of foodscapes can be included within the framework of urban landscape. No more exclusively focused on the material aspects of the landscape connected to food, but considering instead a wider spectrum of elements including the intangible features of a cultural landscape. There is a strong link between the materiality and immateriality aspects of food systems, which suggests we frame foodscapes as the sum of material realities, cultural spaces and food-related practices. [Figure 1]

At first, adopting a top-down point of view, a series of protection systems are intercepted, which perimeter and define areas and boundaries within which food production has an economic-social value but not a spatial value.
At the same time, the actions activated by regional and provincial subjects and organisations are analysed, intercepting the projects and practices implemented or still underway.
In a second moment, adopting a bottom-up point of view, a series of associations, projects, actions are intercepted, and implemented in a spontaneous or organised manner that contributes or collaborates in shaping the territory.
Finally, by crossing points of view and traversing the different scales, one intercepts within those systems, those 'best practices' that, at the same time, manage to produce peculiar economies and landscapes and how these can serve as input for common policies for a project of territory.
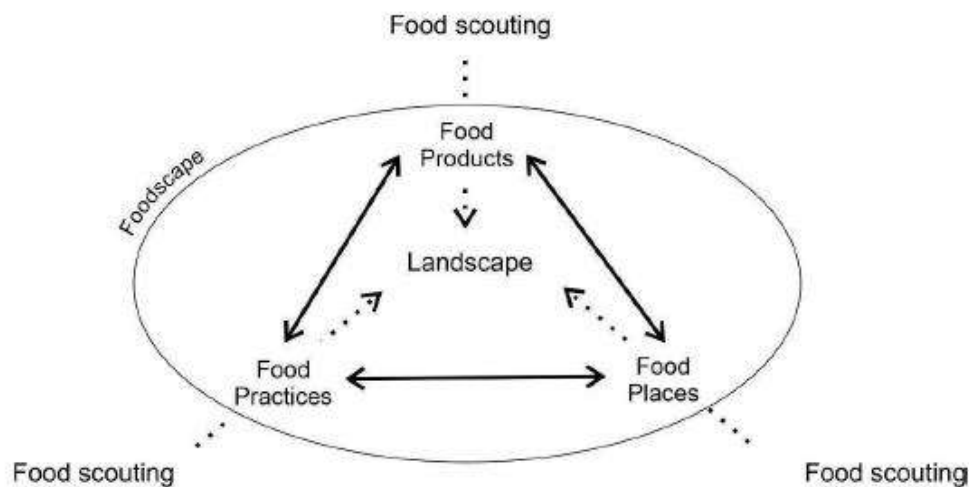
Figure 1. The heuristic model implied by the concept of foodscape (Credit: Michele F. Fontefrancesco).

From top to the territories: landing in the foodscapes

The General Conference of the United Nations Educational, Scientific, and Cultural Organisation adopted the Convention for the Protection of the World Cultural and Natural Heritage in November 1972. The aim of the agreement is to identify, protect and guarantee the transmission of a Heritage considered to be of 'outstanding universal value'. In 1977, Operational Guidelines, periodically revised by the Commission, were added to the Convention and became one of the main tools for determining the inclusion of sites on the World Heritage List. The first part of the text outlines the premises and objectives of the Convention, framing the need for an agreement, which promotes the protection of a heritage destined to be increasingly

vulnerable, due to the sudden and radical changes in social and economic conditions. Therefore, an urgent need for rapid and systematic action is established, on a larger scale than national, to respond to the need to preserve and safeguard the heritage of collective interest, which can be defined as World Heritage.

This is an extremely important operation, which aims to raise the awareness of communities, local as well as national and international, with regard to historical, cultural, and natural heritages that, from the perspective of the Convention, cannot be considered permanent without appropriate strategies to protect them. As much as this is an extremely important stance because it reveals an urgency that can no longer be overlooked about strategies for the protection of human and non-human environments, it is necessary to emphasise that the way in which these arguments are formulated and addressed is not a secondary issue.

Italy's World Heritage Sites are the sites declared by UNESCO[1] as World Heritage in Italy, which became a contracting party to the World Heritage Convention on 23 June 1978.

As of the year 2023, there are fifty-eight sites inscribed on the World Heritage List: fifty-three sites are cultural, and five are 'natural'; seven of them are part of transnational sites. Italy is the country with the largest number of heritages, particularly cultural heritages, within the UNESCO network.

Within the list of heritages of cultural character there are only two areas that include a food species or foodstuff from the title what in other words we can call foodscapes: "Vineyard Landscape of Piedmont: Langhe-Roero and Monferrato (2014)", and "Le Colline del Prosecco di Conegliano e Valdobbiadene (2019)" Those are valued as 'cultural heritage', as 'works of man or combined works of man and nature, including archaeological sites, of outstanding universal value'[1].

It is in this parenthesis generated by the two surveys that the focus of this research lies, investigating everything that is land construction, excluding, thanks to a first elementary distinction, that which is mineral soil, built or impermeable. The area intercepts three regions located in northern Italy: Piedmont, Lombardy and Veneto, which are of particular relevance and importance both geographically and economically. These three portions of Italy's territory are closely interconnected by an important European road axis E70, coinciding with the European corridor Lisbon - Kiev and following the corridors Berlin - Palermo and the Corridor of the Seas. The European and trans-European network of multimodal corridors2 connects the main metropolitan cities of strategic importance for the economy of the Union, also involving the Italian territory.

In this area characterised by the presence of strong economies linked to several fields of production, the physical and economic presence of the primary sector remains relevant. Taken individually, the three regions are potentially autonomous systems, rich in food culture and variety, with a still strong food-related economy, whose food security, particularly in recent years, is compromised by various factors, notably climate change, access to water, and production and sales costs.

Going beyond the physical and territorial aspect of these 'special landscapes', it is intuitive to realise that these niche productions, while enriching certain cultures and economies, alone do not guarantee the survival of communities and the preservation of an essential and non-renewable resource such as soil. These places considered special tend to obscure certain aspects of the food system, in particular, that on which the survival of communities, for whom food remains a fundamental human right, is based.

A second level of information referring to foodscapes is constituted by food quality marks categories. These, superimposed on the first order of mappings derived from the logic dictated by Unesco contribute to the identification of other geographies referring to food productions that produce typical or peculiar foodscapes in precise and localised places and spaces. These are to be superimposed on this first consideration. Quality marks are defined according to Commission Implementing Regulation (EU) No. 668/2014 of 13 June 2014 "laying down detailed rules for implementing Regulation (EU) No. 1151/2012 of the European Parliament and of the Council on quality schemes for agricultural products and foodstuffs "[3]:

Italian products branded PDO - Protected Designation of Origin;
Italian products with PGI - Protected Geographical Indication;
Italian products with TSG - Traditional Speciality Guaranteed;
Italian products with GI - Geographical Indication.

For this reason, the analysis is developed on two fronts. The first intercepts top-down logic and policies. Following the 2014-2020 national reform period, investigate specifically what actions and policies individual regions apply in their territories with regard to issues such as agriculture, biodiversity, and soil.

In this sense, of particular interest are the experiences of the 'Life+ Environmental Policy and Management projects'[3]: 'Life HelpSoil' and 'HelpSoil - After Life" activated by a consortium of five regions including Piedmont, Lombardy, and Veneto, and their respective managing entities, *Regione Piemonte, ERSAF, Veneto Agricoltura.*

'HelpSoil - After Life: The After Life Communication Plan' gives continuity to the 'Life HelpSoil' project.

This is an EU-funded project that started in 2013 and ended in June 2017. This experience has demonstrated and promoted Conservation Agriculture practices and innovative soil management techniques with the aim of:

- improve the ecosystem functions of soils (carbon sequestration, increased biological fertility, protection against erosion, development of agrobiodiversity);
- increase the ability of agricultural systems to adapt to climate change by reducing energy consumption and ensuring crop yield stability;
- enable efficient use of technical means of production (irrigation water, fertilisers, plant protection products) while reducing the impact on the environment;
- increase the sustainability and competitiveness of farms.

One of the products developed thanks to the participation of twenty farms located in the Friuli Venezia Giulia, Veneto, Emilia-Romagna, Lombardy, and Piedmont regions are the guidelines for the application and dissemination of *conservative agriculture.* They aim to define a framework of shared technical references, applicable in the Veneto valley, but open and transferable to other Italian and European territorial and agricultural contexts. In this sense, the scalability and reproducibility of the techniques is one of the criteria according to which the top-down and bottom-up approaches could find a common point of comparison and applicability.

For three consecutive agricultural years, data was collected on the cultivation practices implemented and a series of indicators, both agronomic and environmental, were monitored on the selected farms. The 'Life HelpSoil' project, the project was also created as a tool to support the application of the 2014-2020 'Regional Rural Development Programme' (RDP) measures concerning *conservative agriculture.* The result is a network of companies and contacts and experiences that can become part of a broader and lasting system of dissemination and demonstration in the field of innovation, in the sign of a continuous focus on improving the sustainability of agriculture.

[1]From territories to soil through food based practices and networks.

From a different point of view, adopting a bottom-up gaze and keeping the lenses of soil and food, within the same perimeter, it is possible to intercept, 'others' many interactions.

Those networks, fluid grids, people are conventionally grouped and as Alternative Food Networks (AFN). These new types of organisations, mostly configured at the local level, involve small-scale producers and consumers who aim to increase the sustainability of the agricultural system (Schiff et al., 2014; Matacena, 2016). This is pursued through the adoption of traditional knowledge and ecological principles manifested in low-input agricultural production, local food, zero kilometres, or with an identifiable geographical origin (Matacena, 2016). To respond to this bottom-up demand, city governments around the world are adopting new laws and programmes, the Urban Food Policies, and forming institutional systems, the Food Policy Councils (FPC). In this sense, they seek to bring the actors of the food chain closer together and intercept their demands, promoting innovation in local food systems, applying, and disseminating the principle of environmental, social, and economic sustainability.

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1 Italy, at whc.unesco.org. URL consulted on 10 May 2023.
2 Espon, *agenzia di ricerca della Commissione Europea.*
3 Life+ Helpsoil, http://www.lifehelpsoil.eu/
4 EUR-Lex - 32014R0668 - EN - EUR-Lex, su *eur-lex.europa.eu.* consulted on 16 May 2023.

Agricultural activity shapes and marks landscapes, through a long history of land occupation and sometimes through changes with a spectacular result. Revealing these signs and dynamics to actors is one of the objectives of those dealing with the territory, an often-fruitful premise for a territorial dialogue, capable in turn of influencing many areas of public action that help shape the landscape.

Despite this evidence, as scholars Kameshwari Pothukuchi and Jerome L. Kaufman, there is a gap from the insiders down to the university classrooms, about the awareness of the effects of the food system on spatial planning. In their article, until that food system planning was absent from the writings of urban and planning scholars.

By food system, the two researchers mean the chain of activities that links food production, processing, distribution, consumption and processing, distribution, consumption, and waste management, as well as all associated institutions and regulatory activities, associated activities. (Kaufman, Pothukuchi, 2000) In their article, they begin by examining the major planning journals, texts used to introduce future planners to the profession, some classic texts that have expanded the boundaries of planning thought, presenting evidence of the limited presence of the food system in the list of concerns of planning.

To try to respond to this gap, they invite, among other points, the evaluation of AFNs to promote sustainable activities of the food system, including chemical-free agriculture, waste reduction, and recycling, urban food production urban food production and greater connection between farmers and local consumers. Thus, the concordance of principles and objectives between AFN and FPC is evident, but what spatial effect do they have on the territories in which they are located?

Current approaches to food governance focus on food policies on a (supra)national scale and a top-down view. Rarely taking local food policies into account.

The links between diversity, sustainability and territory are complex and vary according to food products, supply chains and contexts. In this logic, examining what has already been put in place by the Slow Food Italia (SFI) network can help in identifying an overall geography within which to produce some reflections. Moreover, the organisation on which the national scale, at the regional level down to the local action through presidia, means that the action developed is an element of the Slow Food (SF) movement and network. The actions developed are a transversal element supporting inter-scalar geographies. Furthermore, the presidia do not confine a product in a specific area, which has to be rediscussed and eroded in order to wrest the prestige of a food brand. On the contrary, they emphasise a territorial attitude of a community that cultivates a peculiar food product according to good, clean and fair principles.

The territoriality implemented by the presidia, in fact, is not intended to be passive, implemented simply through forms of control of space; rather it is an active territoriality. Rather, it is active territoriality (in a positive sense) that "descends from the territorialised and territorialising collective action of local subjects and makes use of inclusive and operational strategies" (Dematteis, Governa, 2005), in which "people experience both the territorial process and the territorial product through a system of existential and/or productive relations. Indeed, territoriality is a set of relations that arise in a three-dimensional society-space-time system with a view to achieving the greatest possible autonomy compatible with the system's resources' (Raffestin, 1981). Their spatiotemporal spread between 2001 and 2017 grew significantly: from 94 to 368 *presidia*[5]. Despite the apparently excellent results and the policy implemented over the years, even practices activate by SFI kind must be analysed from a methodological point of view, advancing a critique, for example, of the effective monitoring capacity of these systems in the folds of the territory.

[2]Why plants? Why food? Back to the *fermè ornée.*

In 1998, Scholars James Wandersee and Elizabeth Schussler introduced the term 'plant blindness' This attempt seems to be further hampered by our inherent alienation from nature which has prevented us from seeing plants and truly understanding them as more than materials and decorative elements. The authors state that the definition of plant blindness is broad and includes: "the inability to see or notice plants in their environment, leading to an inability to recognise the

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5 www.fondazioneslowfood.com

importance of plants in the biosphere and in human affairs" (Wandersee, Schussler 1998). Plant blindness also includes "the inability to appreciate the unique aesthetic and biological characteristics" of plants and "the anthropocentric misclassification of plants as inferior to animals, which leads to the erroneous conclusion that they are not worthy of human consideration" (Wandersee, Schussler 1998).In recent years, however, new rewritings, scientific discoveries, and philosophical theories have challenged the human-nature dualism that is deeply rooted in Western society.

On this line of reasoning, fifteen years later, at the Stockholm Resilience Center some researchers defined the concept of *bio-cultural refugia* (areas that harbour place-specific social memories related to food security and stewardship of food biodiversity), which could help stop the erosion of diversity in landscapes of food production (Colding, Barthel, 2013). "There is an urgent need to better evaluate the role of these sites that host traditional ecological and food knowledge, when preserving biodiversity and ecosystem services in landscapes of food production and diverse memory carriers, such as natural resources, landscape features, oral and artistic traditions, and self-organised systems of rules, must be included in current debates on landscape ecology and sustainable food systems." (Fontefrancesco, Zocchi Pieroni, 2023)

In this sense, I introduce the term *ferme ornée* as that image used in the history of the English garden introduced by Stephen Switzer to indicate an 'ornamental farm'. The author and gardener describe it, in fact, as a country estate cultivated between agriculture and aesthetic principles. Stephen Switzer, in The Nobleman, Gentleman and Gardener's Recreation (Switzer , 1715), describes the practice of the *ferme ornée*: 'By mixing the useful and profitable parts of gardening with the pleasant ones in the interior parts of my designs, and the paddocks, dark enclosures, etc. in the exterior parts, my designs are thus greatly enlarged, and both profit and pleasure may be pleasantly blended together'. In conclusion, this image is meant to be a provocation and a 'model', an builted Utopia reminding me emphasising how foodscapes are complex and interconnected systems whose characteristics are the results of endogenous and context-based elements and interactions, but also of socio-economic, cultural and political dynamics that occur at more-than-local scales.

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II.c

Water urbanisms

Imagining Public Space beyond metropolization

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Dhaka's essence originates in the interplay of land and water. Monsoon rains sustain the city's sociocultural, economic, and ecological life. Therefore, the variations among the months of heavy and less rainfall during the monsoon and after post-monsoon form fluctuating hydrology. Monsoon, a geomorphic agent responsible for varied ecotones[1], is also instrumental in producing 'otherness', where pocket public spaces (a spatial articulation of specific social practices) emerge as a geographical by-product in a natural constellation. This unique interplay of land and water explains why open space appropriation needs to be understood as a practice in a system and identify their taxonomy rather than putting them under a generic name. An alternative understanding of how public spaces emerge from the unique geographic traits and sociocultural behaviour depending on time and seasonality might offer a way to accurately rearticulate the city's public open space issues for Dhaka's distinct context. Hence, this research opts for a hybrid definition of Dhaka's public open space by mapping spatial and social structures where the city blends with water.

Introduction

Dhaka's public open space is often a by-product of the riverine landscape [fig 1], yet unnoticed and undefined within the discourse of water and landscape urbanism as much as in public space literature. Architects, urbanists, planners, sociologists, geographers, and many other scholars address public space differently. But, in most cases, they are disconnected universal physical manifestations crafted in a city. For example, plazas and parks are the most common form of universally manifested public space, which is disconnected from the notion of spaces emerging from the constant negotiation between wetness and dry land in a different context. Thus, public space emerges from a hydrological phenomenon in a particular geography by native socio-cultural practices based on seasonal adaptations. However, a critical reading of concepts is necessary before embarking upon the discourse of public space. As Mehta (2014) argues about "meanings and uses of the words public space abound" (Mehta, 2014). Therefore, defining public space by decolonizing universal concepts needs to be contextualized.

[fig 1]: Dhaka's monsoon fed liquid landscape. During monsoon, the lower topographical elevation of the western fringe of the Turag-Buriganga River submerges.
Source: (By Huda appointed by Begum, August 2021 fieldwork)

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[1] Ecotone- refers to a transitional area between two ecosystems defined by Andrea Kahn.

The designing of public spaces became an isolated phenomenon without anticipating the role of hydrology in the deltaic Dhaka, which experiences wetness for an extended period of the year, where monsoon punctuates everyday life. For a monsoon-fed landscape, water plays a vital role in shaping varied public spaces and socio-cultural practices. The shifting nature of water shapes urban life and is transformed by it in turn. How do cultural meaning and social interactions produce public space within the constant negotiation between shifting grounds and water transformations without a fixed border, shape, or size? Dhaka urges to redefine public space from water ethos. Since water is the agent for constantly mutating zones between land and water, this produces every day new social and cultural realities. As Ashraf (2014) argues, water challenges the concept of land as ground as a granted concept since it does not assure either dry land or a territory (Ashraf, 2014). New terminology needs to be developed for understanding the constantly moving ground that creates momentary realities. Consequently, how within these ambiguous water dynamics, spaces are produced by socio-cultural practices where water is the fundamental structure of social organization. This paper intends to understand the emergence of a distinct form of public spaces through cultural practice in the constant negotiation of dry ground and wetness embedded within the liquid landscape of the Ture-Buriganga River, Dhaka.

Thus, this paper develops a definition of public space that draws on assorted pieces of literature while expanding knowledge based on fieldwork that provides an entirely different reading from conventional notions of public space. A second objective is to portray how understanding is utilized to explore and support historical and present episodes. I propose to title these spaces as "gradient space," where the geometry of deposition (sandy, silty, or muddy-enclave[2]) and water is unpredictable, blended with native practices, festivals, and seasonal adaptations, can be seen as a contextual matrix that provokes an alternative reading of public space in a terrain of rain.

Methodological positioning

The research follows the interpretative urbanism approach that dwells upon qualitative study based on primary, secondary and hybrid data sources. Primary data are collected from fieldwork, including observation and inquiry of GIS data. The Secondary data is consolidated from multiple sources ranging from archival data to media mapping. The research aims to formulate an atlas that follows a transdisciplinary inquiry system. The tenant of the atlas is maps that use the concept of 'operative mapping' that follows cartographic exploration -a methodological approach that interweaves insights from urbanism, geography, and ethnography. As Paez (2019) notes about mapping, " The map is a graphic device for spatial knowledge and communication, generated in contact with reality, that functions in both interpretive and projective terms" (Paez, 2019).Therefore, the idea is to portray a narrative of multiple stories into one single map followed by a series of 'Myrioramas' that are semantic to each other and developed by decolonizing varying historical episodes, texts, folksongs, maps, and fieldwork.

Visual language is an intense form of communication and storytelling that began as mapmaking or cartography that influenced people's perception through the visual language presenting the historical context of culture (Willard, 2017) . Therefore, this methodology is the essential fit to show how public space emerges within the constant shifts of water embedded in a monsoon-fed landscape and its relation to the more extensive hydrological system changes concerning human settlements. Designing a map means illustrating the complex reality of the world of a selected story in a simplified manner. So, a map illustrates the complex reality of hydrology, geomorphology, ecological changes, and demonstrate how public space embeds itself within these conditions. So, the maps of this atlas aim to bring the complex story about a specific site in one synoptic composition, combining different scales, text blocks, drawing and graphical techniques, typification, hierarchy, contrast, and symbolization.

By developing the atlas, the inquiry aims to search for public open space identity in Dhaka through understanding the emergence of public space at the threshold of water and settlements. Thus, the concept aligns with the artistic research paradigm that can also be positioned within the juxtaposition of transdisciplinary and creative practice as suggested by Woyseth and Nilsson (Woyseth and Nilsson, 2011). Besides, the cartographic mapping idea reflects Kelly Shannon's approach as a research strategy

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[2] Muddey-enclave- refers to a zone of the muddy overlay of land and water that creates a vocabulary of public space from the matrix and shades of mud, sediments, water, and vegetation changing its face with the coming and going of the monsoon.

titled 'An image is worth 1000 words' (Shannon, 2021). So, this atlas is an assemblage of art and science, interpreting insights from hydrology, geomorphology, topography, geography, and landscape, expressed beautifully of places and history through visual language.

Defining public space in the terrain of monsoon:

"The sense of place and embeddedness within local, mythical, and ritual landscapes is important" (Stewart and Strathern, 2003). People who inhabit the place and people who experience it from outside have vastly different mental meanings of a place. Moreover, the dwellers have a cultural meaning gained from living within the social landscape, which defines the normative character of public space. As Howitt (2001) notes, the edges of the ecosystems can be understood as 'liminal spaces', a zone of interaction, transformation, and possibility, instead of lines of separation (Howitt, 2001). So, the patches or pocket spaces that emerge from the gradients of water, vegetation, and a muddy-enclave in the monsoon-fed landscape, which I sometimes title "liminal zones", provide a broader context to situate community and place-based practices.

However, Swanson, Gregory, Sedell, and Campbell (1982) define this zone of interactions as a 'riparian zone', a three-dimensional interface between aquatic environment and terrestrial ground, ranging from water edges and floodplains to vegetation (Swanson *et al.*, 1982). According to Crawford (2008), based on Edward and Lefebvre, conceptually, these spaces can be titled as 'thirdspace', which is a space of representation, potential to have new meaning, and activated socially with actions (Crawford, 2008). In a deltaic landscape, such liminal spaces exist somewhere in the juncture between hydrology, geomorphology, and sociocultural practices, where space evolves beyond boundaries as noted by Cunha (2019) rain blurs the lines of separation (Cunha, 2019). Dhaka's landscape symbolizes a setting beyond the border where the land-water interface acts as the negotiated territory, more of a transformative zone which offers multiple states across different scales (Begum, 2021). Thus "Landscape becomes a form of codification" (Stewart and Strathern, 2003).

These spaces within the monsoon landscape host multiple and simultaneous activities knitted into everyday life patterns, some are fixed, some are subject to changes in the season and timing of a day. Since the land-water interface in Gangetic plains is appropriated by four elements: architectural response, social functions, landscape symbolism and religious rituals (Sinha and Ruggles, 2004) therefore, often these areas are named after socio-economic or cultural activities highly related to festivals and religious rituals. Nevertheless, the land-water interface varies in different parts of Bengal based on a specific mode of visuality driven by religion. Part of them is relevant to many festivals. "Festivals generate regulated and liminal spaces through temporary appropriations of local settings" (Stevens and Shin, 2014). In Dhaka, such collective rituals and festivals bear historically celebrated phenomenon emerged in the space where water and land collide.

The Turag-Buriganga River, on Dhaka's western fringe [fig 2], lies primarily within lowlands, and depression connects the city to the extensive Padma-Ganges-Brahmaputra hydrological network. Even though Dhaka is the birth child of The Buriganga River, and this has always been the primary source of human habitation in the history of Dhaka, yet at present state can be defined as an open dump of wastewater from industries. The river, the most significant open space within the urban fabric, brings cultural significance into physical space. Thus, the geographical features such as rivers, water channels and surrounding areas, following natural dynamics, co-produce spaces between *Aqueous and Terra Firma.* These undefined neglected spaces are the activity patches connecting urban and rural life. Nevertheless, Bremner (2022) defines monsoon as a geomorphic agent (Bremner, 2022) that can unfold the entanglement monsoon in space-making. Therefore, this paper critically explores the changes in the landscape along the Turag-Buriganaga River and emerging liminal spaces to frame the spontaneously appropriated spaces as public spaces as a new way of reading the civic importance of wet landscape in the terrain of monsoon.

LEGENDS

	NARROW VALLEY
	WIDE VALLEY
	MARSH
	ABANDONED CHANNEL
	OXBOW LAKE
	RIVER/CHANNEL
	OLD NATURAL LEVEE
	YOUNGER NATURAL LEVEE
	ELONGATED RIDGES 2-2.5M
	SERIES RIDGES 2-4M
	LOW FLOOD PLAIN 1.5-2.5M
	HIGH FLOOD PLAIN 2-4M
	MAJOR ROAD
	MADHUPUR CLAY LESS 2.5-4M
	MADHUPUR CLAY 4-6M
	MADHUPUR CLAY LESS THAN 6M
	ALLUVIAL SILT AND CLAY
	MADHUPUR CLAY RESIDUUM
	MARSH CLAY AND PEAT
	ALLUVIAL SILT
	AGRICULTURAL LAND
	RESTRICTED GREEN SPACE
	PUBLICLY ACCESSIBLE GREEN SPACE
	PARKS AT MAJOR NODE
	GRAVEYARD
	BRWON SILT
	RED SILT CLAY_MADHUPUR_AQUITARD
	BROWN SAND_DUPI TILA FORMATION
	BRWON SANDY SILT
	BALU RIVER TRANSECT_STUDY AREA
FFZ	FLOOD FLOW ZONE
AGZ	AGRICULTURAL ZONE
RS	RURAL SETTLEMENT
WRA	WATER RETENTION AREA
URZ	URBAN RESIDENTIAL ZONE
MXZ	MIXED USE ZONE
SLA	SLUM AREA
NCZ	NON CONFRONTED ZONE
ADZ	ADMINISTRATIVE ZONE
ROS	RESTRICTED OPEN SPACE

[fig 2]: Fluvial-geomorphology and aquifer formation of the Turag-Buriganga River transect.
Source: (Elaborated by author from Dhaka DAP GIS 2015, Google earth pro-2019, existing open space of Dhaka by Habib, open street map 2018, Geomorphologic Map of Greater Dhaka City, Bangladesh BGR, Schematic geological cross section of Dhaka 2009 by Asian Disaster Preparedness Center and OYO International Corporation)

Emerging practices along the Turag -Buriganga River:
The monsoon-fed liquid landscape of the Turag- Buriganga confluence combines both natural and man-made open water bodies since, traditionally, deep ponds are dug as a tool to anticipate monsoons. Its unique combination contains water systems and lush green swamps. So, primarily nine landscape features characterize the Buriganag landscape: *doba* (ditch), *jolabhumi* (marsh),), *khal* (canals), *pukur* (ponds), *khola jaiga* (open space), *math*(field), *koborsthan (*graveyard) and *bon* (forests) [fig 3]. As we move from north to south, the topography changes from a low elevation of 1.3 m as a floodplain to a 10m elevation with depression and finally more towards the north at Mirpur area with a higher

height of up to 15m composed of red soil. Most of the south is made of alluvial silt and clay.-
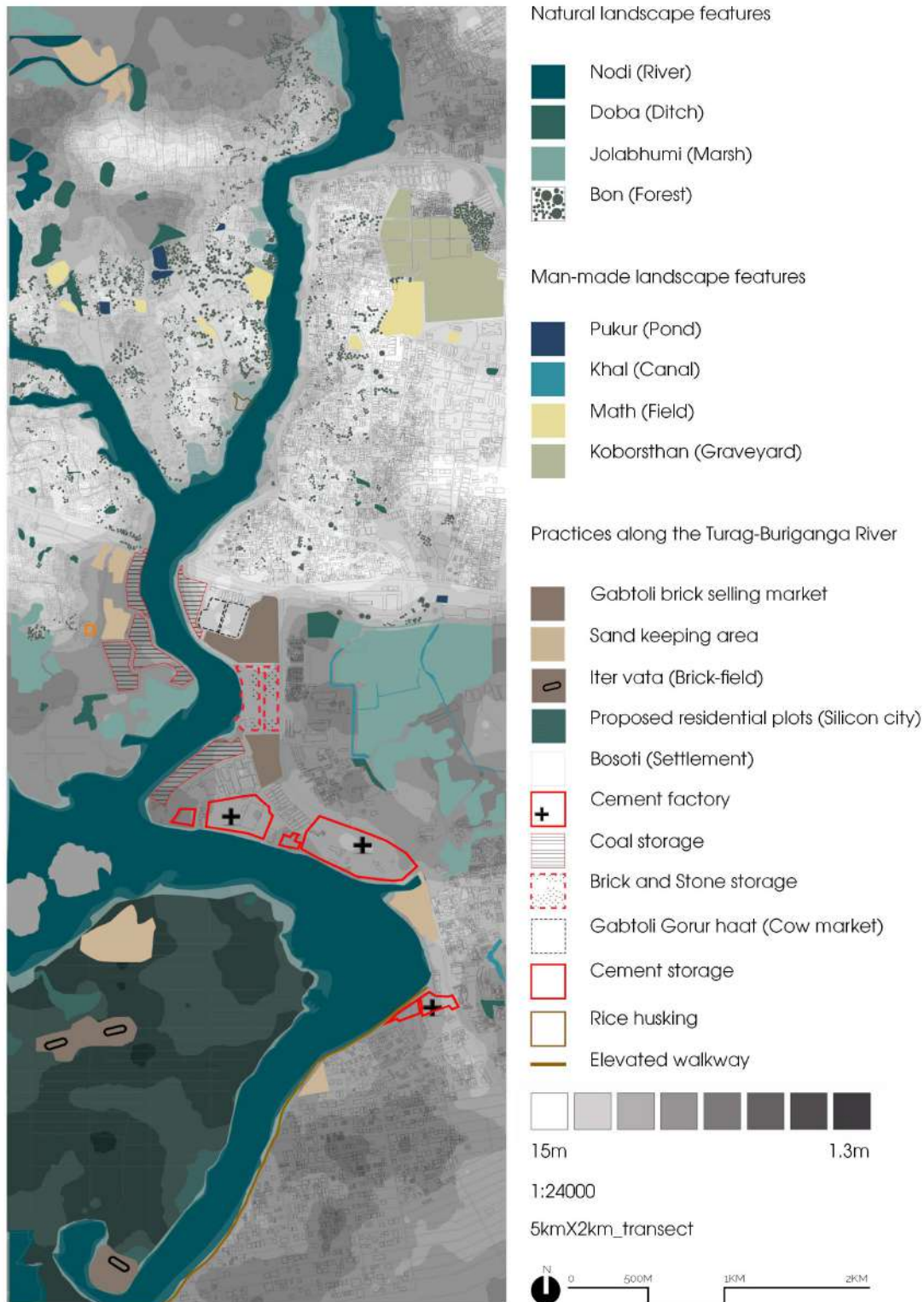
[fig 3]: Landscape and the constructed landscape in the terrain of monsoon along the Turag-Buriganga River
Source: (Elaborated by author from Dhaka DAP GIS 2018, Dhaka GIS 2015, Google earth pro-2021, fieldwork2021)

The overlay of mud and varied water level creates a gradient of height in topography and zone of otherness, which is transient. The impermanent character of the monsoon landscape portrays not only multiple ground planes in the shifting terrain across the river but also inhabits different local practices in the overlayed zones of transformation that emerged from the constant negotiations along the river. Thus, the interplay of water-land and local practices creates a second landscape (Stewart and Strathern, 2003), besides what we see as a landscape. Such practices manifest in the everyday and entangled with landscape changes. The southern and western zone of the river hosts

many different occupations of land on different elevations, starting from the proposed residential plot filled with sand pumping to coal storage space. Moving further to the North of the western fringe is choreographed with traditional settlement nested within the constellation of trees and water system. The Northwestern edge still resonates with the traditional landscape settings, whereas the eastern zone of the river is highly urbanized. The reason behind the rapid-in-migration is the western embankment provides a flood -free elevated highland. However, within this embanked zone, spaces emerge out of different social practices, such as pottery display and selling, kite playing, urban farming by the inhabitants, etc. The southeastern zone along the river shows a different fabric with commercial and industrial use, whereas the southern edge of the south area is powered by rampant urbanization. An elevated walkway with many other mediating devices to water in between brings life to the urban life at this part. Thus, these mediating devices, which have traditionally been used to settle with water for many years, become a part of the public domain that fits well with urban life and emerges as a cultural landscape and a second landscape. Locally these mediating devices, in other words, the water-land interface, are known as *Ghat*[3].

Ghat-as a constructed site in everyday urbanism:
Ghat is a widely known structure or landscape element in the South Asian context with different meanings. This has always been seen as a hinge between water and land. *Ghat* has many forms, shapes, sizes, materials, and uses, which must be explained beyond its functionality. *Ghat* also has religious meaning in the Hindu religion, where it has extensive structural notions and many uses. But besides being religiously significant, *Ghat* in Dhaka and other parts of Bangladesh often is an extension of climatic or site-specific response based on many different uses-starting from domestic to large-scale communal use. *Ghat*-a multipurpose space comprised of site-specific elements, can portray a symbolic image of the physical state of the deltaic Dhaka. However, even though the terminology *Ghat* carries meaning to settle with water, it is a space where public life unfolds daily. It is one of the constructed sites, as Dixon (2021) mentions Burn on the conception of the 'constructed site' as an outcome of the lineage process (Dixon, 2021). The *Ghat* is one of the 'constructed sites', an artificial device to amend and domesticate the landscape. Besides, it has another meaning based on commercial purposes. This is often referred to as a landing station where boats, barges, land to load and unload goods. In Dhaka, the *Ghat* is one of the most successful public spaces yet to be recognized and defined as a public space. In the following discourse, this section will analyse different *Ghats* found across the Turag-Buriganga River to understand their significance as a public space. To understand the meaning a *Ghat* brings into people's life and context, I chose six *Ghats* [fig 4] to explore depending on the scale of operation, accessibility, and function. This paper will discuss four *Ghats* in detail and two synoptic maps that tells different anecdotes in one narrative. The *Ghats* will be discussed on the map from top to bottom in positional order. The four Ghats are *Diabari, Palpara, Malertek,* and Aminbazar-*Gabtoli Ghat.*

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[3] Ghat-refers to a form of land-water interface. The word 'Ghat' is originated from sankskrit word 'Ghatta', meaning a landing place or steps to the river. The Ghat is linear in shape, runs parallel to the river, and allow access to water at any height. Sometimes act as retaining structure and protect the settlement from getting wiped out during high tide. But in East Bengal besides linear steps traditionally the Ghat is built by curving out mud, with bamboo, and wood known as *Ghatla*, that serves multiple purposes ranging from access to a place, household course to economic hub. Many forms of Ghat exist now, which is more urban in terms of materiality.

[fig 4]: Constellation of *Ghats* along the Turag-Buriganga River
Source: (Elaborated by author from Dhaka DAP GIS 2018, Dhaka GIS 2015, Google earth pro-2021, fieldwork2021)

The first *Ghat* lies at the northmost of the transect, known as *Diabari Ghat*, and can be titled +D[4] [fig 5]. The *Ghats* at *Diabari* is flanked by an elevated embankment road, which created a slopey muddy water-land threshold on the river's eastern edge. As a result, this section has a higher topographical variation than the southern edge of the river. The northeast side is made from Madhapur clay with a higher elevation, almost around 15m. Conversely, the western fringe is nearly next to the water level. The part of the west often comprises natural wetlands that go underwater during heavy rainfall. *Diabari Ghat* is primarily a landing station for large boats on the water, which is more formal. But regular small boat passengers use another informal *Ghat* made of a slopey muddy area with few low-height steps that lead to the embankment road [fig 5). This small slopey *Ghat* connects the *Kaundiya*

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[4] +D-D refers to the initial of the place name of Diabari and + refers to the symbol of Ghat.

Ghat on the other side. The section next to the *Diabari Ghat* illustrates higher differences in the topography, the variations of the water-land threshold, and seasonal changes [fig 6]. The muddy slope has vegetation on different levels [fig 7].

[fig 5]: *Ghat* as constructed landscape at Diabari along the Turag River
Source: (Image by author and Huda from fieldwork2021, sketch on the right elaborated by author)
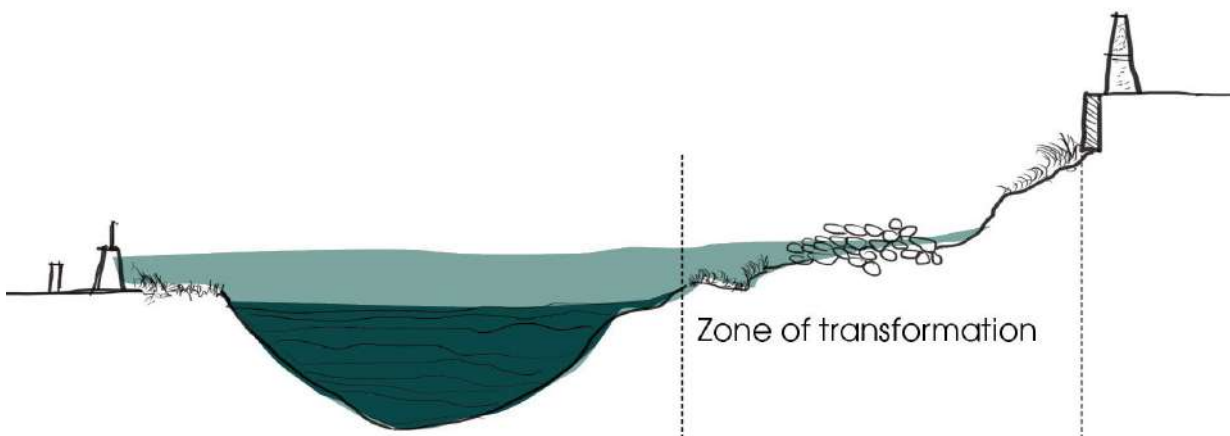
[fig 6]: Ecotones and monsoon water movement in the liminal space at Diabari along the Turag River
Source: (elaborated by author from fieldwork 2021)

[fig 7]: The informal muddy *Diabari Ghat* nested within vegetal slopey liminal space.
Source: (Author from fieldwork 2021)

The second *Ghat* along the belt is the *Palpara Ghat* can be titled +P, which does not have any formal design but rather spontaneously developed and appropriated by native inhabitants in many ways. This *Ghat* is a muddy slope with five major components: a vegetable garden, tea stall, small hut, stair, and pottery display area [fig 8].
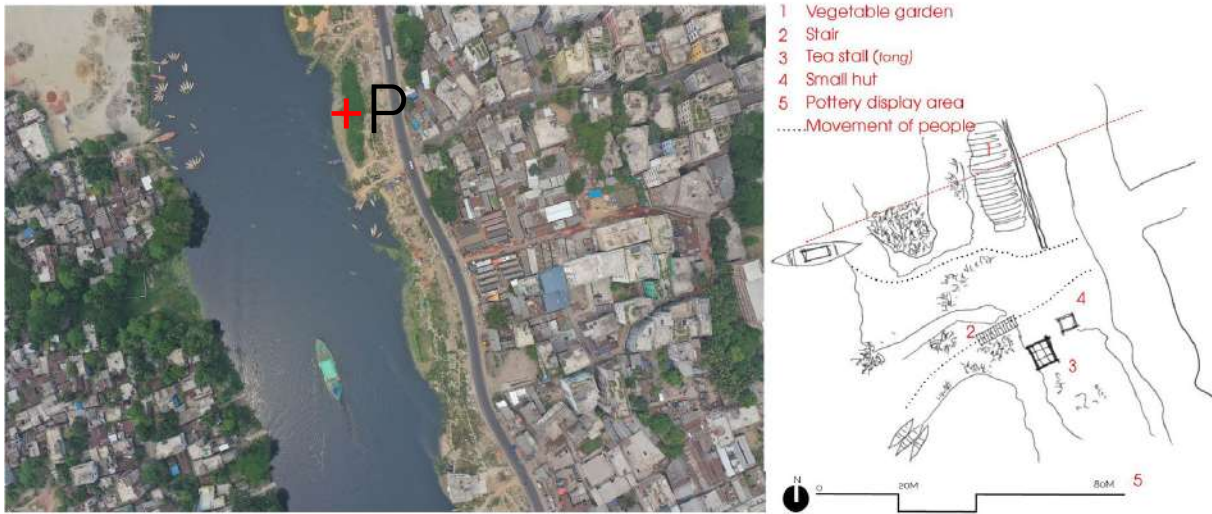
[fig 8]: Palpara *Ghat* & components of *Ghat* making.
Source: (Image by Huda and author from fieldwork 2021; sketch elaborated by author from fieldwork 2021)

The vegetable garden lies between slopes and walkways, fenced with local bamboo sticks, and managed by the inhabitants [figs 9 and 10]. It has local red spinach and other local vegetables. The *Ghat* is approached in two ways: from the embankment road through a muddy slope and a concrete stair, the *Ghat* is accessible from the city side. The muddy path slopes downwards and broadens at the junction of the land and water.

[fig 9]: Water-land threshold as garden at *Palpara Ghat*.
Source: (Image by author from fieldwork 2021)

Interestingly there is no permanent structure next to the water edge. The residential areas cover most of the eastern belt across the road [fig 10]. The tea stall is a temporary structure with low height sitting areas accommodating four to five people [fig 11]. The stair leads to the *Ghat* with smaller boats [fig 12], whereas the muddy slopes take to the motor-driven big boat. The extended part of the *Ghat* to the south displays' pottery [fig 13]. The edges along the Turag River do not follow a specific line. Instead, it has many gradients of pocket spaces along the belt. The pottery

display space is one of those spaces that operate between the water and land, covered with Madhupur clay and tropical vegetation.
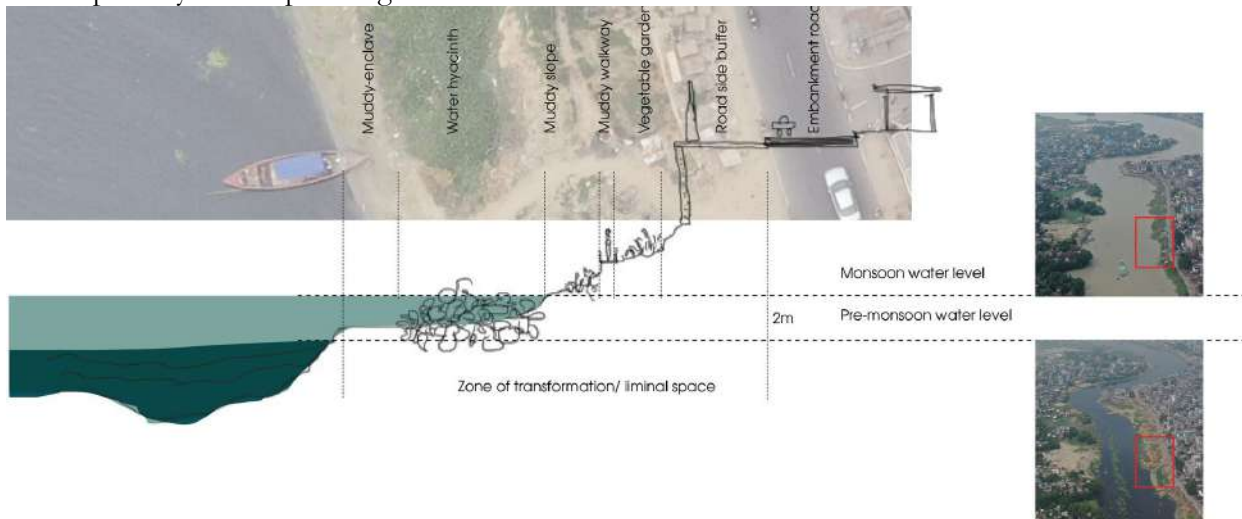
[fig 10]: Section showing different constellation within a liminal space at *Palpara Ghat*. The water rises from .5m up to 3m, from July to September at the beginning of the monsoon to the peak.
Source: (Elaborated by author from fieldwork 2021, and graph on water level hydrographs for Turag, Buriganga, and Balu Rivers and rainfall in Dhaka during 1998 by Huq and Alam, 2003) (Huq and Alam, 2003)

[figs 11 & 12]: Tea stall as part of *Ghat* making at *Palpara Ghat*. Staircase leading to informal *Ghat* area at *Palpara Ghat*.
Source: (Image by author from fieldwork 2021)

[fig 13]: Land-water interface appropriated differently, Everyday practices at *Palpara Ghat*.
Source: (Image by Huda & author from fieldwork 2021)

The third *Ghat* along the Turag River from the top is the *Malertek Ghat*, titled +M, which has an exciting way of dealing with seasonality [fig 14]. The *Malertek Ghat* lies on the western side of the Turag River and is nested within the dense plants and tree fabric. From the top, the *Ghat* compound looks like open spaces, vegetation, clay, and muddy-enclave constellations that transform into floating islands during monsoon. Consequently, people adapt to changes. As a result, these practices evolve from a specific place rooted to the native appropriation that brings the 'notion of identity' mentioned by Escobar (Escobar, 2008).

[fig 14]: *Malertek Ghat* nestled within fluid landscape.
Source: (Image by Huda & author from fieldwork 2021, sketch elaborated by author)

Malertek Ghat has an extensive system with two main *Ghats*: informal steps and formal stairs [fig 14]. One *Ghat* is made from a stone walkway next to the water level in combination with a bamboo platform where the boat stops [fig 15], and the other *Ghat* is a concrete stairway [fig 16] which takes to a higher elevation. The bamboo platform extends from the stone end to the deeper water. The passenger gets off at a certain distance and uses the stones to reach the land. The same stone-bamboo *Ghat* submerges during the high water rise in monsoon. The water spreads until the stairway, which becomes the primary *Ghat* at that period. Therefore, the use of the *Ghat* alternatively changes based on the seasons.

[fig 15]: Stone-bamboo platform *Ghat* -a 'constructed site' in the monsoon fed landscape at *Malertek Ghat*.
Source: (Sketch elaborated by author, image by author from fieldwork 2021)

[fig 16]: Stairs transform to alternative *Ghat* at *Malertek*
Source: (Image by author during fieldwork 2021, sketch elaborated by author)

Moving further south of the Turag River, near Gabtoli, after the confluence of Turag and Buriganga, two types of *Ghat* titled +AM and +GS on both sides seem to harbour the city's life [fig 17). These *Ghats* have a unique character. One is more formal, a landing station with a built structure connecting the land with the floating barge next to the Aminbazar passenger terminal operates under the Bangladesh Inland water transport authority (BIWTA). Giant sand-carrying barges stop at this landing station since this location is significant for the city due to the Aminabazar Bridge and Gabtoli area, famous for material wholesale markets. Therefore, most of the barge's land at this point to unload the goods and send them out to the final destinations across the city. The other *Ghat* informally emerged from traditional knowledge used by the laborers. They use the small-scale informal *Ghat* to carry coal from the barges to the storage area.

[fig 17]: Commercial formal and informal *Ghat* at *Aminbazar and Gabtoli*
Source: (Image by author & Huda during fieldwork 2021, sketches elaborated by author)
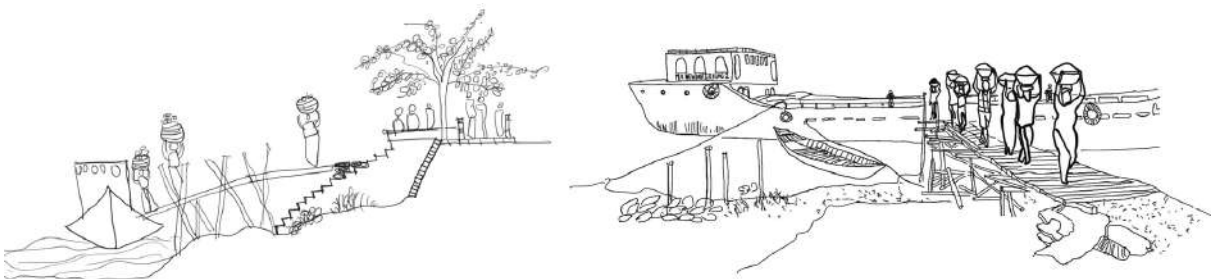
[fig 18]: Land-water threshold tying grounds on different levels at *Gabtoli Ghat*
Source: (Sketches elaborated by author from fieldwork)

Thus, the *Ghats* play a significant role in the local economy. According to Low (2003), "Social and economic relations produce space" (Low, 2003). The *Ghats* at this edge of the city bring both the economic and social aspect, producing spaces in-between as a by-product of the land-water dynamics in the monsoon-fed landscape.

These commercial types of *Ghats* evolved in response to commercial functions [fig 18]. This function requires a mass labor force, generating an alternative dwelling between water and land. Due to the low-income generation, it is difficult for the labor to afford accommodation in the city. Instead, they make temporary boat houses to settle next to the workplace [fig 19]. Therefore, this kind of *Ghat* has a different morphology than the other *Ghats* along this river's edge.

The narrow bamboo platform connects the paved pathway on one side, connected to the storage area. The walkways are aligned with trees [fig 20). A long staircase leads to the water. The *Ghat* combines a stilt bamboo platform, a staircase, a paved walkway lined with canopy trees, and small boathouses.

[fig 19]: Alternative informal dwelling units within the liminal space *Ghat* at *Gabtoli*
Source: (Image by author during fieldwork 2021)

[fig 20]: Walkway shadowed by canopy tree used as public space as part of the constructed site-*Ghat* at *Gabtoli*
Source: (Image by author fieldwork 2021)

Nevertheless, the canopy trees provide shadow, becoming a part of public space-making along the walkway. Traditionally the space under the Banyan tree is known as Tola, which is famous for its prominent canopy that people use for many purposes. The *Ghat* at Gabtoli resonates with the traditional setting of a water-native public space embedded in the landscape.

Map as a 'second landscape'
The map [fig 21] is a synoptic of the 'second landscape' produced through local practices, and *Ghats* understood from fieldwork and interpreted as this brings meaning to the place. In doing so, the map manipulates and re-shapes the liminal space as a social space, portraying these spaces as

threads enmeshed within the city. Additionally, the map unfolds pocket spaces along the Turag-Buriganga River of Dhaka city in constant dialogue with the monsoon.
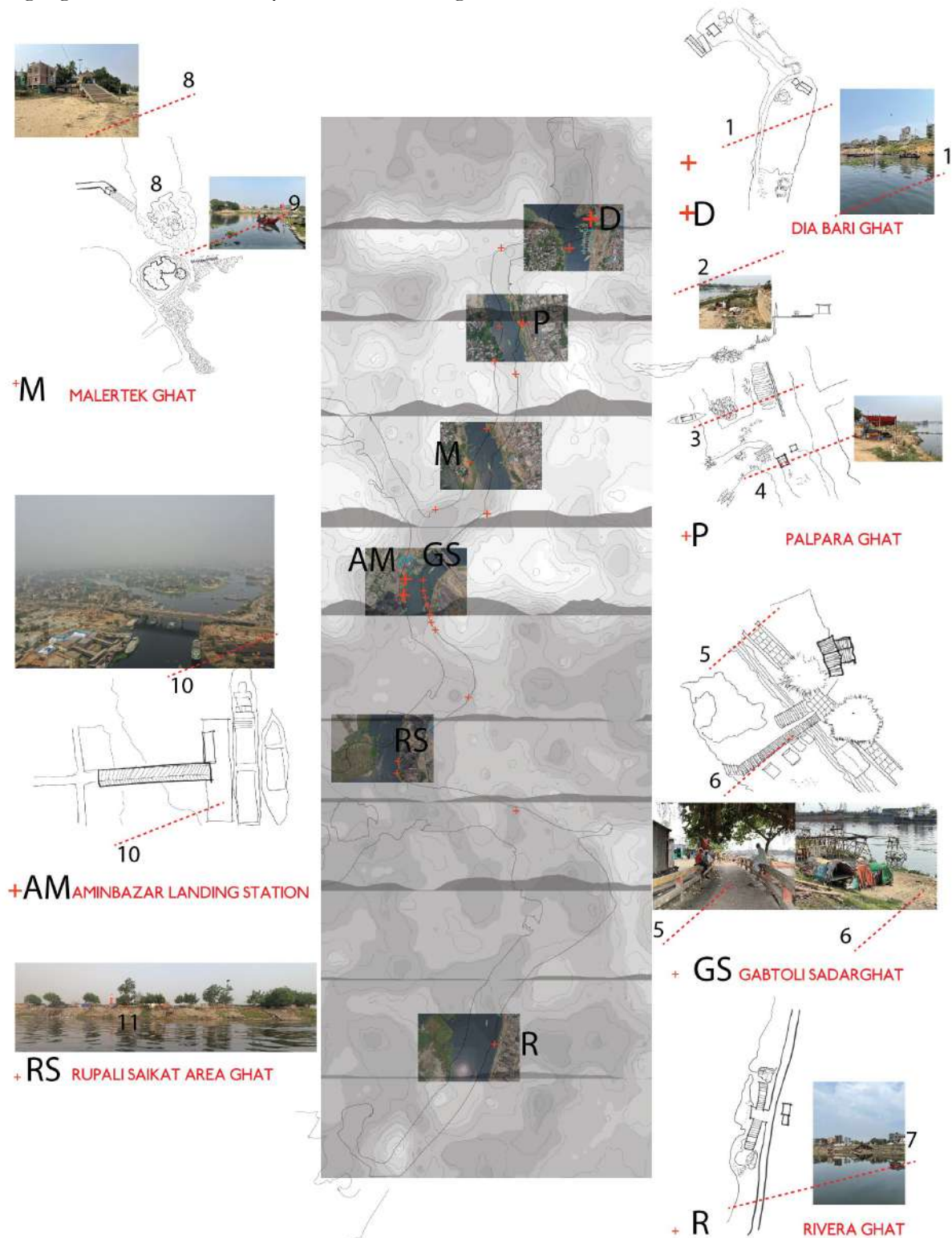
[fig 21]: Constellation of *Ghats* as different episodes of varying anecdotes along the dynamic spine of the Turag-Buriganga River
Source: (Elaborated by author from Dhaka DAP GIS 2018, Dhaka GIS 2015, Google earth pro-2021, and fieldwork 2021)

The map [fig 22] highlights the occupation of space that brings the reasoning for the presence of the *Ghats* following the hydrological cycle and the different ways of nestling within the city mesh.
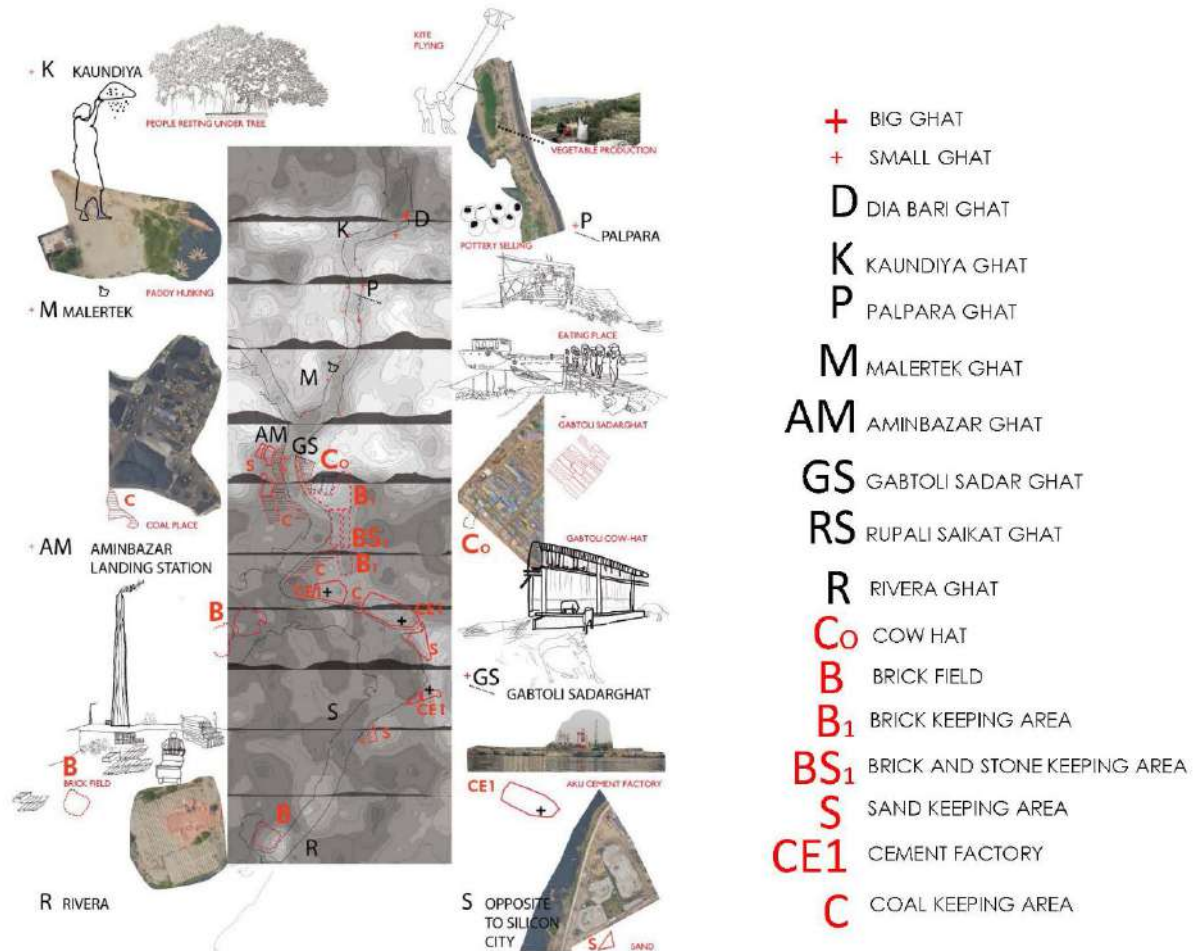
[fig 22]: Inhabited space where *Ghats* are nested in different ways.
Source: (Elaborated by author from Dhaka DAP GIS 2018, Dhaka GIS 2015, Google earth pro-2021, and fieldwork 2021)

Conclusion:

This investigation calls for an alternative reading of public space in Dhaka as a liminal zone, riparian zone, floodplain, shifting ground, and other ground in the terrain of monsoon. It challenges the conventional notion of public space by demonstrating an alternative narrative for a deltaic landscape where the emergence of public space is rooted in a shifting ground woven into an intricate landscape pattern. Nevertheless, emerging public spaces and practices still resonate with the logic of water. Exploring Dhaka's public space emergence along the Turag-Buriganga River through the lens of water-land dynamics shows alternative ways of producing space. For example, *Ghat*, a 'constructed site', is an agent driven by hydrological and geomorphological force in a monsoon-fed landscape that acts to co-produce public space. Therefore, the notion of public space in Dhaka's liquid landscape evolves from episodes of anecdotes along a dynamic spine like a beaded necklace. This paper highlighted the public space-making by the traditional practices and appropriation within in-between zones by the inhabitant based on seasonality and timing. Thus, focusing on the narrative of public space-making in Delta differs from the Westernized notion of making a plaza. Therefore, the spaces in-between land and water in the monsoon-fed landscape of Dhaka demand an alternative reading and naming it as a public space where the investigation requires site-specific methodologies and unconventional approaches for innovative solutions.

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Gradients of wetness: a *wet* experiment towards *wet* transition

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Gradients of Wetness investigates the role and the possible actions of private actors to actively manage rainwater and its pervasive infrastructure in the dense urban environment of the Brussels-Capital Region. The research questions the current socio-technical regime by stressing the tension between private actions and the management of a common-pool resource—as it is rainwater—insisting on the paradigm shift from *dryness* to *wetness*. This shift means, firstly, to comprehend that rain and its flows should be at the core of the reflection. Ground, vegetation, and atmosphere should be considered as *wet* infrastructure, thus infiltration, evaporation, and evapotranspiration as basic *wet* practices. Secondly, the shift suggests to look at dense urban contexts as complex and plural ecosystems that embed today-disguised environmental potentials. To this extend, the research is a wet experiment that actively tests wetness in individual and collective gardens. The research recognizes gardens as testing grounds for potential citizen *wet* stewardship, based on different socio-ecological arrangements to manage rainwater.

The (cultural) act of *dryness*

Water has always been a driver for the constitution of first human settlements, gaining a cultural and symbolic role within communities (Latour 2004). Water is a necessity and an economical element for livelihood and for social structures. Communities privilege areas along rivers and on nearby fertile soils, in between *wet* and *dry* lands. These lands, seasonally affected by floods, are among the most fertile and productive ones, ensuring the development of early forms of agriculture (Laureano 2013; Blackbourn 2006). Inundations bring the sufficient fertile limes for agriculture and sediments that are, among others, a resource for construction materials. The seasonality—therefore the alternation of wet and dry periods—also guarantees an extreme alive environment for a multitude of species. These alluvial lands have been lived and used, thanks to their fluctuating and flexible condition of being both a *wet* and a *dry* environment (Rossano 2021). Over time, communities shift from a social organisation based on rural activities towards one based on urbanity and capital. Hence, communities start to manage water flows by constructing water infrastructure to ensure resource accessibility, provision and protection. In other words, they "domesticate" water (Rossano 2021). They reclaim *wet* lands by drying them out through the construction of pervasive water drainage infrastructure made of above-ground and underground gears. This infrastructure is a complex centralised and spread network that runs underground, along roads, collecting both waste- and rainwater from public and private buildings and open spaces, finally, discharging after treatment into surface water. The water drainage and sanitation infrastructure is structured around the paradigm of *dryness*, which consists in keeping space dry by channelising and discharging waste- and rainwater as quickly as possible. To this extend, the water drainage infrastructure supports the collective cultural shift that transforms what it was "natural" into the "social and urban" question (Graham 2010; Herendeen 1986). The *wet* lands of the alluvial valleys, in which water could seasonally flow, have been reclaimed and become lands in which dikes and riverbanks channel each drop of water. As Dilip da Cunha explicitly says in the introduction of *The Invention of Rivers* (2020: 1), "separating land from water on the earth's surface is one of the most fundamental and enduring acts in the understanding and design of human habitation" and it is in itself an "act of design", that has a strong "cultural value on civilisation and on the establishment of the social upon the natural".

In the Brussels-Capital Region (BCR), as in many other European and North American dense urban environments, the paradigm shift towards *dryness* peaked during the industrialisation process of the 19th century: waste- and rainwater have been conveyed into underground pipes; the remaining alluvial lands have been incrementally reclaimed; watercourses, in the case of the BCR the river Senne and its tributaries, have been progressively channelled; springs have been diverted into the water drainage infrastructure; and the numerous ponds and wetlands have been drained. In the course of a few decades, the *wet* landscape that characterised the BCR almost completely disappeared to make room for new urbanisation (Deligne 2005). Just as quickly, the BCR's *wet* landscape disappeared from

the collective imagination and culture. Even though the construction of the huge machine to dry out the BCR, water still finds its way back (Borgomeo 2020). In fact, the BCR still suffers of considerable hydraulic problems. Floods, rise of water table, and humidity in basements—especially in the lower part of the valleys—are frequent phenomena that affect private and public spaces. During heavy rainfalls, the combined water drainage and sanitation infrastructure cannot cope with the large quantities of water drained, causing widespread flooding (De Bondt, Claeys 2010). This results in 21% of the urbanisation of the BCR being located in flooding risk zones[1], which translates that one out of three inhabitants is affected by this problem (Bruxelles Environnement 2022). The zones at risk of floods correspond to the former alluvial lands of the Brussels *wet* landscape, where rivers were running open-air, while today are diverted in sewer collectors. The today-reclaimed alluvial lands occupy around the 18% of the current regional surface[2]. The two maps show the *wet* landscape of the BCR, made by the large alluvial land of the main river of the BCR, the Senne, and the ones of its tributaries [fig. 1]. The proximity between the two figures—21% and 18%—underlines the fact that although the installation of a huge and pervasive water drainage infrastructure, the space that rainwater takes is almost the same. Beside the shift in the infrastructure, also practices and perception changed: from a *wetness* state in which the urban coexists with rainfall within *wet* lands, to a *dryness* paradigm in which rain is only a source of problems within what is conceived to remain *dry*. In this framework, the dysfunctions in the drainage infrastructures (i.e. floods, leakages, infiltrations, overflows) highlight its obsolescence, and the fact that the infrastructure does no longer manage either the increased runoff[3] from growing urbanisation or the changing precipitation patterns (Karvonen 2011). Moreover, climate changes increase the impact of events and the necessity to act immediately (Tjallingii 2012). Expensive costs for maintenance and institutional fragmentation of stormwater management (Knieper, Pahl-Wostl 2016) underline even more than the centralised water drainage and sanitation infrastructure is no more sustainable (Mitchell 2006) and needs to undergo a process of transformation (Gandy 2014).
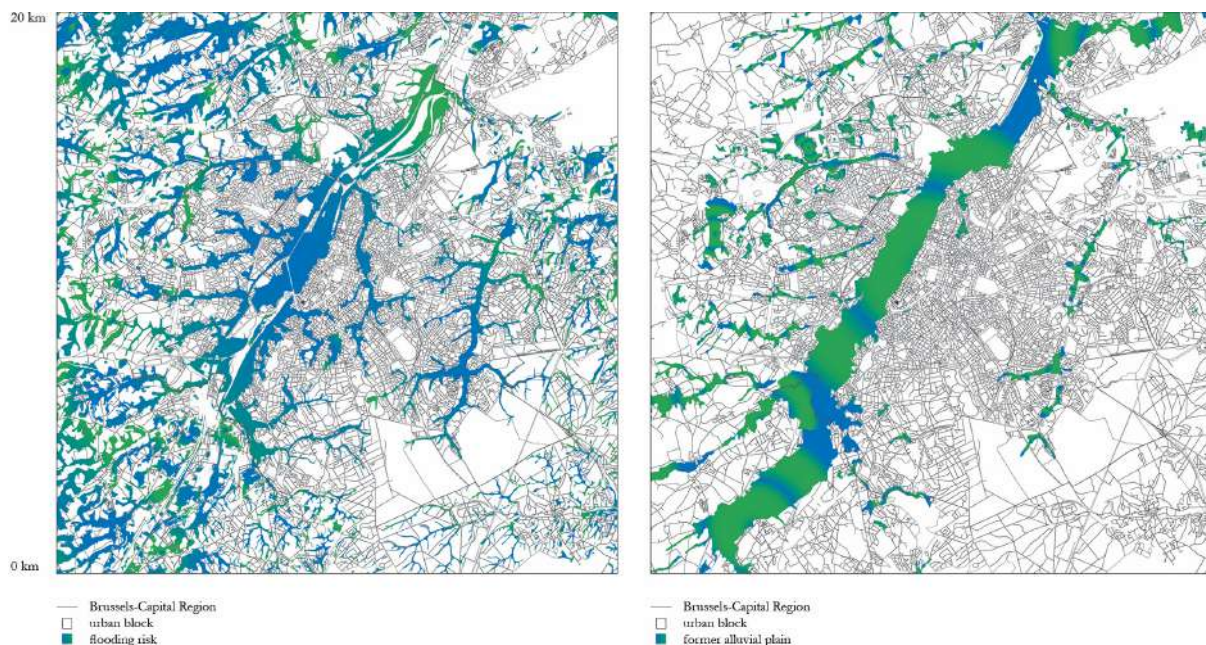
[fig 1] Flooding risk areas (left) and former alluvial plains (right) within the Brussels-Capital Region.
Source: elaborated by the author

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[1] Flood hazard is defined by the regional agency for environment, Bruxelles Environnement (2019). The 21% corresponds to the total of flooding risk zones within the BCR, which are divided as follow: 2% are high-risk zones (a flood every 10 years), 8% are medium-risk zones (a flood every 25 to 50 years), 11% are low-risk zones (a flood every 100 years).
[2] The information is retrieved from the Ferraris map (1777). This is a military map design by Ferraris in which the characteristics of the landscapes have been deeply detailed. Through the reading of the legend, it has been possible to trace the alluvial plains crossing the today Brussels Capital Region and its surroundings via the use of GIS software.
[3] Marsh (2010: 493) defines runoff "in the broadcast sense the flow of water from the land as both surface and subsurface discharge; in the more restricted and common use, surface discharge in the form of overland flow and channel flow".

The (cultural) need to *wetness*

The former *wet* and *dry* conditions that supported the development of first community settlements have been incrementally dismantled. This does not mean that dense urban environments are no longer affected by hydrologic flows; on the contrary, they are still present and manifest themselves more disruptively. Dense urban environments are currently not yet equipped to overcome the ongoing climate crisis (Brenner 2017) and, as above-mentioned, that there is a need to transform the current water drainage and sanitation infrastructure. This transformation can only be achieved when the conditions of the physical, economic, cultural and institutional levels are studied together (Grin, Rotmans, Schot 2010). The transition framework defines transformations to answer to the environmental crisis as "sustainable transitions" (Elzen, Geels, Green 2004). Within this framework, transitions are seen as radical and fundamental changes in the structure, culture and practices (Loorbach, Rotmans 2006). In *Transitions to Sustainable Development*, Grin, Rotmans and Schot (2010) argue that culture has a fundamental role because the transition "involves a change in mind-set or perspective" and that "sustainability transitions also is a quest for new value systems". An opportunity for transforming the current drainage practices, referred to in this research as *wet* transition, arises from the ongoing paradigm shift in urban planning and design from *dryness* to *wetness* (Da Cunha 2018). The shift towards *wetness* suggests looking at the hydrologic cycle differently, thus considering rainwater as a collective resource, instead of an issue that increases floods. If *dryness* places at the centre surface water and its discharging flow, *wetness* comprehends that *rain* is where every flow of water starts, and its runoff should be the core of the reflexion (Da Cunha 2018). Precipitations, runoff, flood, evaporation, evapotranspiration, and infiltration of rainwater are basic *wet* practices; thus, the atmosphere, vegetation, and ground are components of a *wet* infrastructure. At the core, this *wet* infrastructure is a form of decentralised infrastructure—small-scale, spatially distributed, 'fit-for-purpose' and embedded in the urban environment (Yu et al 2011)—that combines both technology (often low-tech) and natural elements. The backbone of the *wet* infrastructure is rainwater that reaches every space in dense urban areas and touches every *human* and *non-human* feature, while falling on every roof and reaching every garden (Tjallingii 2012). By understanding the pervasive behaviour of rainwater, the research highlights the potential of gardens to enable *wet* transition in dense urban environments. Gardens already perform as a structural component of urban environment and biodiversity and rainwater management, through the presence of vegetated species and permeable surfaces (Seitz et al. 2022). In these terms, gardens are strongly embedded in the urban ecosystem (Cameron et al. 2012; Kowarik 2011; Gandy 2022), even though they remain largely understudied and with unexpressed potential (Chalmin-Pui et al. 2019). Gardens disclose concurrently huge cultural and environmental potential (Egerer et al. 2018), being spaces in which *human* and *other-than-human* practices overlap. They are 'real places' of everyday human life marked by the *mitoyenne* experience (Foucault 1986), thus being hybrid urban spaces at the diaphragm between *human* and *wet* practices. Gardens accommodate food production and gardening practices, as well as they host insects and vegetation and they infiltrate rainwater (Egerer et al. 2018; Chalmin-Pui et al. 2019). Beyond their cultural and environmental potentials, gardens are a spatially-spread and pervasive feature of European and North American dense urban environments, occupying large portions of them (Cameron et al. 2012; Jakobsson, Dewaelheyns 2018).

As many other urban environments (Secchi 2011), the majority of the BCR surface is covered by residential parcels that form inaccessible urban blocks, the so called *îlots*. Currently, the 43 percent of the regional surface is covered by residential parcels[4], while the 37% by collective public spaces[5]. Even in terms of rainwater runoff production[6] and management, residential parcels exceed the amount produced by public spaces: the former produce around 30 million m3 of rainwater per year,

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[4] The information is calculated by identify parcels (source: Urbis) that are within residential zones, predominantly residential zones, mixed zones, and highly mixed zone defined by the *Plan Régional d'Affectation du Sol* (Land Use Plan). In the context of this research, residential parcels are both privately and publicly owned plots (e.g. social housing).

[5] The information groups public road network, public parks and public forestry. The information includes spaces managed by municipalities, by the Regional Agency for Environment (Bruxelles Environnment), and by the Regional Mobility Agency (Bruxelles Mobilité). The information excludes spaces such as railway and harbor, which are managed by specific actors (e.g. Infrabel and Port Authority). The information crosses sources from the Brussels-Capital Region cartographic portal Urbis and the *Plan Régional d'Affectation du Sol*.

[6] Rainwater runoff is calculated considering runoff reduction coefficients. For further information see Marsh (2010).

and the latter 19 million m3 per year. By investigating residential parcels in detail, their surface type diversity can be disclosed. The 38% of residential parcel surfaces are covered by roofs, while 62%, which corresponds to the majority, is open-air surfaces—here defined as residential gardens—, either vegetated or sealed [fig 2]. Vegetated open-air surfaces[7] are the 43% and take multiple forms: small domestic gardens, front yards, vegetated pathways, collective gardens in apartments blocks, accessible gardens at the feet of residential slabs. The other 19% of residential open-air surfaces corresponds to sealed—impermeable—spaces such as front-yard parking lots, household terraces, and concrete-tiles pavements.

[fig. 2] residential parcels (left) and residential open-air spaces (right) within the Brussels-Capital Region
Source: elaborated by the author

Vegetated surfaces in residential gardens intercept 24 million m3 of rainwater per year, but they only discharge the 10% of it into the centralised water drainage and sanitation infrastructure (Marsh 2010). On the contrary, sealed open-air surfaces intercept 11 million m3 of rainwater per year, while discharging the 70%. These figures show how residential gardens—where vegetation and permeable ground are in contact with the atmosphere—already partially operate as *wet* infrastructure for *wetness*, via infiltration, evaporation and evapotranspiration, which are *wet* practices. Residential gardens are potential spaces of the urban dense environment where to enable *wet* transition. In this sense, the new regional water management plan—*Plan de Gestion d'Eau 2022-2027* (Bruxelles Environnement 2022)—goes along the necessity to prioritise a different management of rainwater within the BCR, by enhancing *wet* practices. The new water management plan aims at changing the paradigm in rainwater management in order to restore its natural cycle in the region. It underlines the rainwater potential to deliver multiple benefits to face climate change for the urban space: from reducing heat islands and floods to increasing vegetation and biodiversity. The plan states that the regional shift is of collective concern and that all regional actors should commit to regional integrated rainwater management. The plan recognises the importance to engage private users in rainwater management, by managing rainwater *à la parcelle*. To this extend, the plan priorities rainwater management at the parcel scale, to multiply the number of small-scale implementations for rainwater and nature in the urban tissue, especially increasing permeable soil and vegetation designs. This approach has the objective to bring benefits to the quality of life of residents and to the ecological network and biodiversity, while increasing infiltration and evapotranspiration to reduce runoff from sealed surfaces.

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[7] The information concerning vegetated and sealed surfaces is retrieved by the vegetation map (2020) produced by the Regional Agency for Environment (Bruxelles Environnement). The map presents three layers: forestry, grassland, sealed surfaces. Within this research, forestry and grassland are merged together to define the "vegetated open-air surfaces".

Wet stewardship in Brussels' gardens

The shift towards a decentralized and integrated rainwater management proposed by the new regional *Plan de Gestion d'Eau 2022-2027* is aligned with other regional strategic objectives. Like other European contexts, the BCR has recently put environmental issues at the centre of its development, also in reaction to the infrastructure dysfunctions experienced by its users. The main regional objective is to achieve a sustainable urban transition with an emphasis on environment (Degros, De Cleene 2014) through the implementation of the *Plan Régional pour l'Innovation* 2021-2027 (Innoviris 2020), the *Stratégie Régionale de Transition Économique* 2022-2030 and the strategy *Go4Brussels2030* (Conseil économique et social 2020). To achieve this objective, regional institutions increasingly fund research into innovative transition experiments to improve the performance of environmental, health and economic systems and to introduce new participative governance methods (De Muynck, Nalpas 2021). Transition experiments are a means to search for new forms of learning and experience to transform the current infrastructure (Van der Brugge 2009). Transition experiments become the foreground on which current cultural values are discussed (Grin, Rotmans, Schot 2010). Particularly, the transition literature defines urban climate change experiments when their purpose is to reduce climate change vulnerabilities and impacts and, simultaneously, they are developed for/with communities (Broto, Bulkeley 2012). Within this framework, the research here presented can be defined as a climate change—*wet*—experiment that investigates the roles and the actions of private actors to manage rainwater in individual and collective gardens within the BCR. It explores coalitions of private and public-private actors to support *wet* transition by design and implementation of *wet* infrastructures in gardens. The exploration is part of the action research project *Brussel sensible à l'eau Bis* (Brussels sensitive to water Bis – *BrusseauBis*)[8]. *BrusseauBis* benefits of the regional subsidy *Experimental Platform,* funded by the Regional Agency for Innovation and Research—Innoviris—to support on-site experiments to enable ecological transition through the active and multi-scalar collaboration among regional actors (Innoviris 2020). The project aims at accelerate the implementation of a decentralized infrastructure for rainwater management in the region by engaging civil society and public institutions. The action research focuses on the territory of the Molenbeek watershed, a tributary river of the Senne in the North of the BCR. *BrusseauBis* develops transdisciplinary instruments from different disciplines, such as hydrology, urban planning and design. These instruments stimulate the participation of multiple actors, while also raising awareness and reaching out other participants to join. Each instrument answer to a specific objective in order (i) to analyze *wet* flows and territories, (ii) to planning new *wet* multi-actor governance practices, (iv) to design and (v) to implement *wet* infrastructure, and (vi) to define managers of the *wet* infrastructure.

Within the frame of *BrusseauBis*, gardens are seen as one of the key spaces of the urban dense environment where to enable *wet* transition. Gardens become testing grounds for potential citizen *wet* stewardship (Nassauer 2011), based on different socio-ecological arrangements in which livelihood can coexists with watery spaces. They are spaces in which humans interact with nature, being hybrid spaces for the negotiation between users and their *human* and *wet* practices. The *wet* experiment tests the paradigm of *wetness* through low-tech design operations in individual domestic gardens and collective gardens in social housing blocks. The two garden types present different features in terms of ownership and management. Individual domestic gardens are private spaces managed by single private citizens; while collective gardens in social housing blocks are public spaces managed by private citizens in agreement with a private manager. Within the two garden types, the *wet* experiment is supported by a co-design process, based on three collective workshops. During the first workshop, participants are introduced to designing with rain, its flows and seasonality, in order to sketch the *wet* infrastructure. At this stage, participants contextualise the concept of *wetness* by primarily placing rainwater and its flows at the centre of the design project as well as by framing *wet* and *human* practices hosted in the garden. They negotiate their roles and means to manage the *wet* infrastructure. Between the first and the second workshop, the researcher details the *wet* infrastructure for the garden, that is

the object of discussion during the second design workshop. In this moment, participants validate the design of the *wet* infrastructure, while also choosing the vegetation species and their position in the garden based on the *wetness* gradients defined by the *wet* and *human* practices. Finally, participants identify the phases of the collective construction site and their personal implication. The third workshop corresponds to the collective construction site, during which participants are called to engage physically in the implementation of the *wet* infrastructure within individual and collective gardens. The three workshops are collective moments during which a multiplicity of actors participates in the *wet* infrastructure design and implementation: from individual inhabitants to citizens associations, and from researchers to institution representatives.

In this section, two examples of *wet* infrastructure implementations part of *BrusseauBis* are briefly presented: Sebastien's individual domestic garden and the collective garden of the social housing Strauwen. Sebastien's individual domestic garden displays the typological architectural features of a *maison bruxelloise* garden. It is an elongated garden within a private residential parcel, where two third of the surface are dedicate to it and one third to the building. In Sebastien's case, he is the sole owner. The collective garden of the social housing of Strauwen has a more complex spatial and management structure. It is part of an ensemble of social housing buildings of five floors, located in the centre of an urban block surrounded by private residential parcels. The social housing buildings are separated from each other by collective gardens. The social housing is built on a public parcel managed by a private manager. One of the gardens is a collective vegetable garden managed by a group of inhabitants of the social housing. The *wet* infrastructure implementation focuses on the collective vegetable garden and the contiguous garden. Both *wet* infrastructure implementations undergo the multi-actor co-design process. Within the case of Sebastien's garden, he, his neighbours, one representative of the municipality, and researchers attend the three moments. In this way, design choices have been discussed together, by sharing the knowledge of each participant in order to define the collective *wet* infrastructure to transform Sebastian's garden. The result is an infiltration basin that expresses the potential of vegetation and ground of soaking the rain redirected from the roof; a small wetland in the middle of the infiltration basin provides a water body for insects and birds; a *dry* lawn allows Sebastien and his son to play ping-pong [fig. 3]. The design results are implemented during the collective construction site during which all the actors engage physically to put in place the collective choices. The *wet* implementation in Sebastian's garden has reverberations in the neighbourhood and beyond. It attracted the attention of other inhabitants to transform their own garden and become part of the decentralised infrastructure.
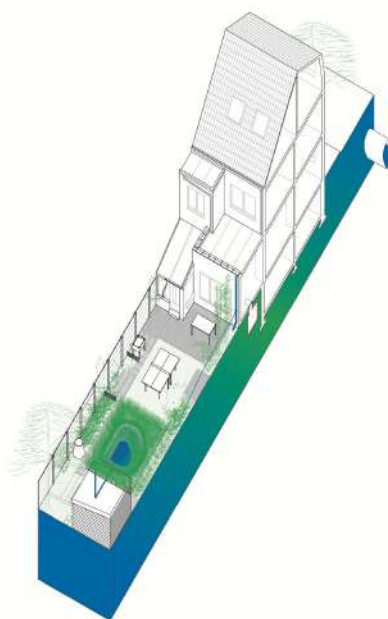
[Fig. 3] The *wet/dry* design project of Sebastien's domestic garden
Source: elaborated by the author

The *wet* implementation within the collective garden in the social housing Strauwen is driven by the need to renovate the vegetable garden, which was underused because of a poor drainage system and the presence of rats. The vegetable garden collective and the socio-cohesion no-profit organisation[9] collaborate together with researchers to design the *wet* infrastructure. The co-design sketch merges the collective's needs and willing with the *wet* infrastructure to valorise roof rainwater flows for reuse and infiltration. The proposed *wet* design also extends into the adjacent garden. Within the vegetable garden, the *wet* infrastructure provides rainwater to a storage tank for watering plants, while its overflow is diverted into an infiltration ditch. The adjacent garden is instead equipped with devices for *wet* and *dry* practices: a vegetated infiltration basin intercepts rainwater from the roof; and a cloth-drying rack system becomes a modular shelter to host inhabitants' outdoor activities. The collective construction site has been the occasion to invite participants outside the inhabitant collective. Students from architecture and landscape architecture universities[10], institutional representatives and associations join the group of inhabitants, researches, and professionals [fig. 4]. The process involving such a variety of participants shows that not all actions are accessible to everyone, even if low-tech design does not require great technical skills. The self-construction of a *wet* infrastructure is a set of actions that have different effort gradients. In this regard, digging the ground to build an infiltration basin requires a particular effort, whereas, for example, planting is a more encompassing action because it is less labour-intensive and therefore involves a wider public (e.g. children).

[Fig. 4] The construction site in the collective garden of the social housing of Strauwen: view on the vegetated infiltration basin in the adjacent garden. Source: Bruno Dias Ventura

Rainwater as common-pool resource via *wet* design and multi-actor governance
The *wet* experiment *BrusseauBis* explores both the physical transformation of the water drainage infrastructure and new methods of multi-actor governance to support the sustainable transition that the BCR aims to enable. To this extend, the *wet* experiment expands its regard to hybrid forms of design and governance structures towards *wetness*, where rainwater is the backbone of the demanded cultural shift. *Wetness* emphasises the hybrid condition to design for/with rainwater. This means to deal with continuous negotiation, uncertainty, porous edges, and incessant transformation (Metta 2017). W*et* infrastructure design proposes an infrastructure that opens up to a multiplicity of *dry* and *wet* conditions and practices. It introduces gradients of *wetness*, where rain and humans are equally living actors negotiating, sometimes together and sometimes against, in dense urban environments (Aït-Touati, Arènes, Grégoire 2019). This negotiation experiments with multi-actor forms of

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[9] In the BCR, most social housing blocks have a corresponding no-profit organization that launches and monitors social cohesion projects. These projects are defined together with the inhabitants. They can range from after-school activities for children to the formation of vegetable garden collective, as in the case of the social housing Strauwen. The no-profit organization is funded by the private manager.
[10] The collective construction site has framed within the *Semaine d'innovation pédagogique*, which is a series of annual workshops dedicated to students of the Faculty of Architecture La Cambre Horta of the Université libre de Bruxelles and of the landscape architecture program of the Gembloux Agro-Bio Tech-Université de Liège.

governance, thus for studying how climate change experiments lead to possible new governance changes (Köhler et al. 2019). *BrusseauBis* points out that even today, non-institutional actors (i.e. no-profit organizations, community groups) are the most engaged profiles in climate change experiments (Broto, Bulkeley 2012), although new collaborations between civil society and institutions need to be increasingly established (Köhler et al. 2019). To trigger *wet* design and multi-actor governance for *wetness*, the required cultural shift to give a different collective value to rainwater is needed. As mentioned in the second paragraph, this means to shift from the current paradigm of *dryness* that emphasizes the perception of rainwater as a source of problems (e.g. floods), to the one of *wetness* that sees rainwater as a constitutive common-pool resource (CPR) for the everyday life. Currently rainwater is not commonly accepted as a CPR, unlike surface water and groundwater (Ostrom 2008). Embracing *wetness* means to enlarge the framework to comprehend that also rainwater is a CPR. As defined by Ostrom (1999: 497), a CPR is a "natural or man-made resource from which it is difficult to exclude or limit users once the resource is provided". This definition underlines the pervasive aspect of rainwater and its nonexcludable feature. If it is true that a CPR reaches (almost) every *body*, it is incorrect to say that the management is unique. A CPR needs to be managed and it can be usually managed by individual, collective, or governmental forms, although none of these works alone efficiently (Ostrom 1999). Ostrom (2010: 552) suggests to manage CPR via a polycentric system that is "characterized by multiple governing authorities at differing scales rather than a monocentric unit". In a polycentric system, each unit[11] has to be engaged in its day-to-day activity in order to cope with the climate actions. In this sense, Ostrom (2010: 553) expresses the importance of the household scale unit to have an impact on the large scale. Differently from large scale units, households are potentially more independent in climate action if they are well informed on the subject (Ostrom 2010). In addition to that, Ostrom (2010) continues that households can easily form stronger reciprocal trust by working locally to engage neighbours in climate action. In particular, citizen engagement, which is voluntary and not imposed, can lead to positive changes and is recognized as a necessity for the integration of rainwater system at different scales (Dobre et al. 2018; Mees et al. 2018).

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[11] Units in a polycentric system range from individuals and families to communities and governments (Ostrom, 2010).

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Water & sand: chronicles of collective trajectories from the valley of Bumbu river, Kinshasa (DRC)

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This paper focuses on the description of the urbanization of a sub-watershed of the Congo river nested in the dispersal urbanization of Kinshasa, within the administrative borders of the Selembao municipality: the Bumbu river watershed. If a diffused awareness of the structural weaknesses (i.e. hydrological as well as socio-ecological) of this territory is observable amongst scholars and public actors, a description of the specific socio-technical arrangements holding up this fragile geography is still lacking. After a five-month period of observation on site, the aim of the paper is to cross the existing narrative of risk of the watershed of Bumbu river with the description of social and spatial patterns of water and soil management, deploying a resource management-oriented perspective. Deepening the understanding of the socio-natural territory of the valley, the paper explores the role of water and soil as new 'urban commons' capable of shape place-based solidarities as well as place-based conflicts.

Introduction

The mighty Congo river ahead, the sandy mountains crossed by its tributaries behind: the geography of the born site of Kinshasa can be read as the emblematic relation between these two elements, shaping a natural theatre where human trajectories overlap and intersect with hydrography and geology of the site, giving life to a never banal spectacle. The Bumbu river is part of the hydrological element shaping the south hilly region of this natural theatre. In the upstream part of its watershed, the municipality of Selembao is known as one of the *cités des extension sud* [fig.1]: one of the first territories hosting the demographic explosion Kinshasa experienced after the independence in 1960 (Lelo Nzusi 2011). Since then, it has been facing an increasing pressure of hydrogeological risks (i.e. landslides and flooding) due to fast paced and unplanned urbanization accentuated by more recent climate change effects.
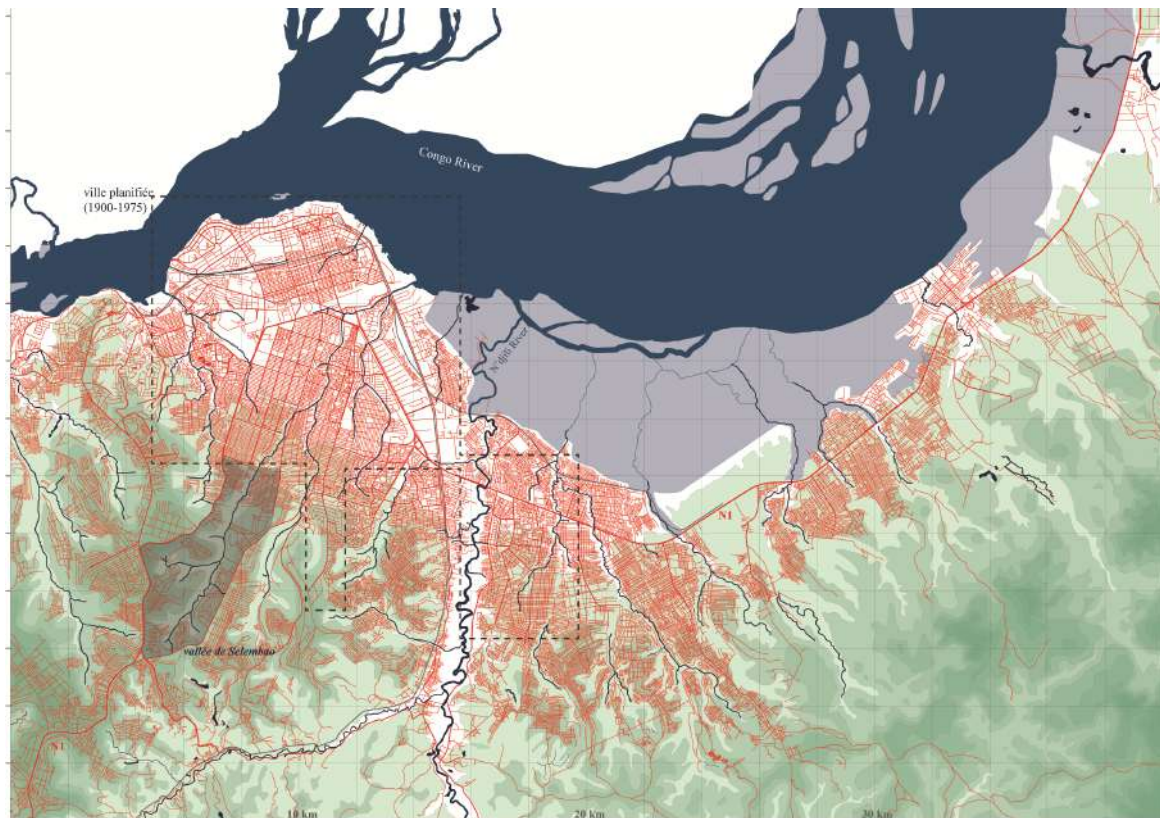
[fig.1] Road pattern of Kinshasa in relation to terrain relief and the main hydrographic network, with the Selembao municipality shaded. Source: elaborated from the author.

Despite its central position within the geography of Kinshasa, and due to its morphology, the valley is weakly connected to the public utilities. The access and management to urban resources (e.g. water, soil, electricity) are sustained by hybrid forms of governance based on the participation of several actors from public and private domain. These features granted to Selembao the official classification of "urban-rural municipality", fostering (or perhaps just emphasising) the common perception of this territory as an urban margin, a peri-urban territory (Leloutre et al. 2021).

In an interesting attempt of problematizing the kinois urban trajectories and imaginaries, Leloutre proposed a specific theoretical framework for the study of the kinois urbanization: the Mboka Bilanga (Leloutre 2019). In a more recent attempt of description, Selembao and the Bumbu river valley were taken as exemplary territory for showing off certain features of the Mboka Bilanga: (a) phenomenon of specific hybrid urbanity instead of generic physical transition space from urban to rural; (b) structuring presence of a socio-morphological gradient based on the topography; (c) territory implemented by place-based survival tactics, where the population itself is protagonist of the urbanisation process (Leloutre et al. 2021). This paper, in continuity with previous efforts of problematisation and spatialization of the kinois urban phenomenon, strives to add a piece to the understanding of this form of urbanity. In the following paragraphs, the intention is to establish a trans-scalar and trans-historical reading of two processes of struggle for access to the basic resources of soil and water. Through the observation of the access and management of two urban resources (i.e. potable water and soil) the article investigates the physical and social outputs of the urbanization of a sub-watershed of the Congo river nested in the dispersal urbanization of Kinshasa, within the administrative borders of the Selembao municipality: the valley of Bumbu river [fig.2].

[fig.2] General view of the valley landscape, 2018
Picture of author's own.

Water & Sand

Ideally re-placing Selembao at the core of the kinois urban conundrum, the paper looks at the urbanization process of Kinshasa as a tangled skein between water, soil and human settlement. From the point of view of the valley, this set of relations is more evident and structuring than in other parts of this city, reinforcing the bipolar and conflictual territorialities of *la ville* and *les cités* (D´Ascenzo 2013; Pain 1984) On one side we have the centre of the former colonial capital, *la ville*: on the alluvial plain where the networked urban city rose up eliding almost completely the relationship between human and physical environment, or at least making it unintelligible for its very inhabitants. In fact, if the space of the former colonial city still refurbishes the imaginary of the

proper, networked and effective city (D´Ascenzo 2010), it also represents the space of emancipation from the voluble logics of nature that structured the pre-colonial and pre-urban living habits (LeloNzusi 2008). On the other side, to look to the *cités* means to look to a sandy and hilly city where disconnections from urban networks and destructive landslides are structuring new post-colonial territorialities grounded in renovated relations between human, soil and water (D´Ascenzo 2013; De Boeck 2019). Taking the point of view of these latter territories, we seek to describe and analyse the geographies of access to land and water in the context of the kinois urbanization in order to reveal the logics of social exclusion embedded in the management and control of these two urban resources.

The question of access to basic urban resources (i.e. soil and water), together with their management within the urban ecosystem, brings us back to the inseparable link between man and nature -essential for political ecology- looking at the process of urbanization as the "historical-geographical process of the urbanisation of nature" (Swyngedouw, 2006a, p.106-107) structured through the creation of new socio-natural configurations and generating specific socio-ecological urban territories (see, among others: Swyngedouw, Heynen, Kaika 2006; Swyngedouw 2006b).

In the last decades, this theoretical field has been a fertile ground for the emergence of new approaches deepening the exploration of various socio-natural configurations, depending on the interaction between human settlement and different ecologic rationales. A first framework is given by Clark and Youssouf (2017) through the conceptualisation of a common field of exploration between earth and social science, where social and geological forces are irremediably entangled in what are defined "geosocial formations". Taking the Anthropocene geoscience as paradigmatic turning point in the definition of the relations between social and geological forces, these scholars stress the importance of investigate the "socio-historical processes that configure human geologic agency", in the seek for new interpretative models (Youssouf, Clark 2017).

A second framework comes from the study of the everyday water use praxis in urban context, leading to the recognition of "hydrosocial cycles" (Swyngedouw 2009). Through the observation of the urbanisation of water, the hydrosocial framework "examines how socio-natural arrangements and water politics either enhance or challenge the unequal distribution of resources and decision-making power in water governance: the mechanisms, structures, knowledge systems and discourses underpinning their operation" (Boelens et al., 2016, p.2). Both geo- and hydro- social perspectives suggest a site-specific approach in observing socio-natural dynamics deepen rooted in struggle processes for 'access-to' and 'manage-of' urban and natural resources: defining new social formations and geographies of power, as well as new socio-technical models for access and maintain natural resources over and below the urban soil (Swyngedouw 1997; Youssouf 2017).

The socio-natural assumption of the inseparability of social and geo/hydro-logic rationales constitutes the starting point for the exploration of two historic-geographies over the urban territory of Kinshasa: 'the right for the land' and 'the right for water'.

The first geography is the more evident and banal product of the historical urban expansion of Kinshasa: from a pre-colonial settlement until the current urban explosion. This geography crystalizes the traces of different logics of inhabitations superposed on the south shores of the Malebo Pool: from indigenous settlements to contemporary urban present, the notion of "right for the land" has been shaped over different societal transformations, and associated with changing notions of "common resource". At the same time, the right for the land opens to questions of socio-environmental justice while urbanization expands and pushes his dwellers to set up over fragile landscapes, in an attempt of domesticate the sandy nature of the soil. The historical geography of soil will be used as a narrative device capable of linking the socio-political narrative of kinois urbanisation with the geographical studies of the ecological limits of its territory.

The second geography seeks to unravel the historical geography of water control in the process of urbanization of Kinshasa. From the need of efficiency of the colonial machine until the recent efforts of social engineering for an equitable access to this resource, the struggle for access to potable water has always been the reflection of logics of exclusion and territorial organisation: the control upon water flow can be seen as a spatialization of power relations throughout the urban territory and through time (Swyngedouw 1997). From this political ecology perspective, water, thanks to its exchange value, has recently assumed a principal role in fostering and shaping new social geographies around its access and distribution. To explore the historic-geography of water

will allow to place recent water related conflicts and alliances in an historical perspective, nourishing the reflection on the role of water as "urban common" capable of foster new place-based alliances as well as place-based conflicts in Congolese urban worlds.

In the attempt to show how these two struggles are constantly intertwined in the valley, the paper is completed by two chronicles of collective trajectory: following the evolution of some specific social project, the aim is to highlight and question the imbrication of water and soil management in these territories. It emerges a description of the counter-geographies taking shape in the valley, giving rise to new social geographies and new socio-technical arrangements (Smith 2021) for common resources management: fundamentally challenging the logics of exclusion and control presented in each narrative of right to the city. Taking the point of view of these neglected territories pushed to the ecological margins of the city, the intention is to show the intertwining of right-to-the-city, and management-of-the-land in its most fragile areas: the hotspots of the socio-ecological challenges to which Kinshasa is increasingly exposed.

To approach the Congolese urban phenomenon from this twofold political ecology perspective, echoes the claiming from anthropological literature that new hybrid forms of city are taking the place of the old colonial logics in a process of re-appropriation of urban space and re-territorialisation both of its physical and social structure (Simone 2010; DeBoeck 2019; Trefon 2009). Lastly, the paper contributes to the unveiling of new communitarian modes of re-making the urban: inscribing the contemporary African city in an historical perspective, we seek for socio-spatial traces of continuity (and discontinuity) between pre-colonial world and "new" postcolonial urban realities (Robinson 2013).

I. Right to the land

Malebo Pool, the birth place of the contemporary Kinshasa, is the remnant of a Pliocene Congo lake dammed by the uplift of the Atlantic Rise: a stepped series of fluvial terraces near flat surfaces on both sides of the Pool (Runge 2008). Its western edge is characterised by a series of turbulent rapids impossible to navigate through: it´s the last navigable spot connecting the inner territories with the Atlantic Ocean, a natural key spot for the extractive logics of the Belgian expedition. The arrival of Norton Stanley at the end of 1870's defines the beginning of an irremediable upset of the social geography of the site due to intrusive colonial land politics of control and exclusion: starting from causing the rising of tensions for the control of the land between Humbu and Teke clans inhabiting the Pool Malebo (De Saint Moulin 1971, De Boeck 2019). We can read the kinois urbanization process as a societal process of meaning shift in the notion of land rights. From the first Land Ownership Act of the Congo Free State in 1885, until the disestablishment of the Belgian Congo in 1960, the colonial period has been punctuated by land reforms (Pain 1984) superimposed with violence over complex pre-colonial territorial management systems organised at the scale of the village: under the authority of a land chief, access to soil and resources where based on traditional rules and beliefs, and inherited through lineage (Bortolami 2009, De Boeck 2019). The colonial will of access and control over urban and productive soil is traduced by various legal devices aiming at generate a denial of the pre-colonial spatial, social and political structures. The creation of a new spatial order around Leopoldville, capital of the colony, was based on the definition of urban zones clearly identified such as *cites indigènes* and *centres extra coutumiers* where indigenous population could live confined, in exchange of labour (Pain 1984, Lelo Nzusi 2011). At the end of 1950s, the city extended all over the alluvial plain, surrounded on the south by the sandy hills, considered a natural barrier for the urbanisation due to their fragile soil. At this time, the colonial land politics of spatial order already accentuated violent clan conflicts for the control of the *cités indigènes* between Kongo populations from the Kongo Central and the populations coming from the Bandundu region (Tshimanga, Verhaegen 2003).

After independence, in 1960, the urban territory became a veritable field of conflict between, on one side, the population reclaiming their precolonial right over the land, and on the other side the population of the so called 'rural exodus' came from the surrounding areas for political reasons. It's the period of the urbanisation under the slogan *sala ngolo zako*: "fend for yourself" or "debrouillez vous" (Titeca, Malukisa Nkuku 2019; Kayembe 2020). Under this slogan the city expanded at an incredible pace, trespassing the southern limit given by the topography and descending down to the sandy valleys surrounding the plain.
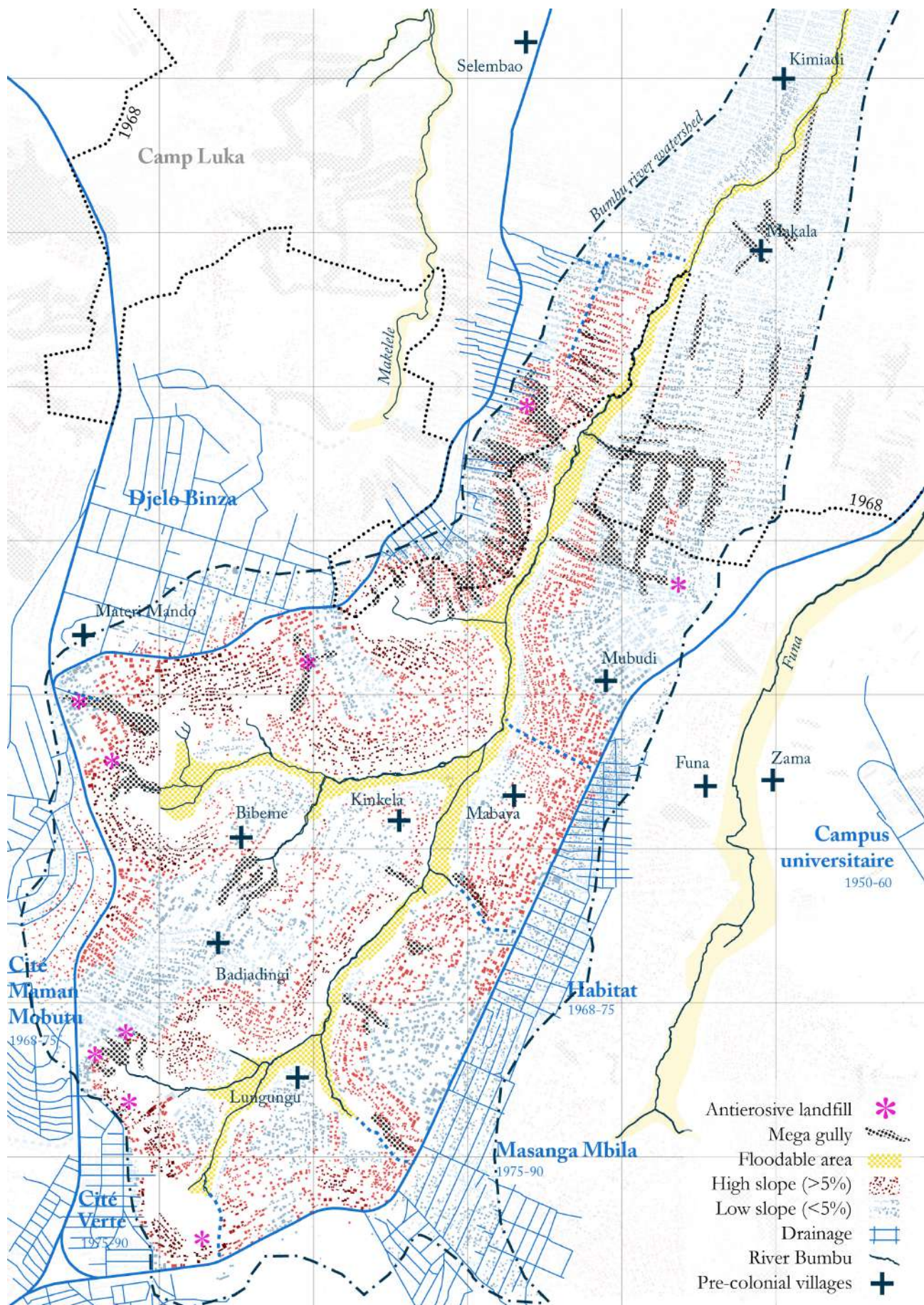
[fig.3] 'Right to the land'
The urbanisation of soil in the valley of Bumbu river, Selembao (Kinshasa).
Source: elaborated from the author.

This urban explosion wasn´t sustained by a real infrastructural project, the only anchor points for this urbanisation were the ridge roads, where new rich neighbourhoods have been built for the new Congolese upper class on the top of the southern hills, linked to basic urban supply system (e.g. water, electricity, drainage). Since then, the deforestation and parcellation of the sandy slopes are considered the origin of the erosive and flooding phenomena affecting the city until now and causing dozens of deaths each year. A shared consensus among researchers, recognize this calamity as an inevitable consequence of the nature of the soil in the southern region of the city (Lateef 2010; Van Caillie 1990), accelerated by human driven factors such as: informal settlement on the slope, inappropriate road construction, lack of drainage system (Makanzu et al. 2014; Girard, Delis 1985).

In the cartography of the right to the land [fig.3], the chronological reading of land occupation and soil degradation is coupled with the reading of the public rainwater-draining machine, letting emerge its functionalist logics of preserving the main roads and serving the rich neighbourhoods: in fact, the steepest parts of the slopes are not served by the drainage system, and, when the public authority intervenes, it does with the help of the public waste service transforming the landslides in veritable open-air landfill within the informal neighbourhoods. While increasingly attention is given to the social impact of these phenomena, the strategies implemented by the population itself are also at the core of different fieldwork researches (Kayembe 2020; Lopanza et al. 2020) highlighting the socio-ecological inequalities in the issue of soil management and rainwater drainage. In a territory such as the valley of Bumbu river, counting more than 750.000 inhabitants, where more than one third are living in risk prone areas, and marked by erosions since the 1960s (Kayembe, Wolff 2015), these hydrogeological questions are more and more infilled by social meaning, raising new speculative reflections about 'cohabiting with' aside from 'fighting' soil erosion. In fact, ancient gullies, already controlled and naturally re-filled with vegetation trough time, starts to be re-parcelled and to be sold to new residents looking for a cheap plot, or became a natural stash for illegal business.

Through the historical geography of the urbanisation of the soil, we can though see how the notion of 'land right' muted through time during this process. From a pre-urban notion of 'common land', subjected to notions of clan membership and heritage, towards a commodified good in the colonial period of land right reforms, breaking de facto the community-based land bonds and preparing the ground for individualistic arrangements of land property and soil management.

II. Right to potable water

The pre-colonial settlement, at the end of the XIX century where structured through the hydrographic network of river and streams of the Pool: along the shore of the Congo and through the lines of its tributaries (De Saint Moulin 1971). The process of urbanization of the south shore of Pool Malebo, can also be read as a process of mastering and engineering of the flow of water necessary to satisfy the growing needs of the expanding station of Leopoldville before and Kinshasa today, at the expenses of its previous inhabitants and of the territory itself. From the end of XIX century the villages on the shore of the Congo river had already suffered the extension of the colonial station of Leopoldville, forced to relocate elsewhere. But, starting from 1929, the urbanization extended its limits over the physical built space towards the surrounding environment in the effort of satisfy the growing needs to sustain the demographic and economic growth of the station. The growing demand for regular water supply from the growing private factories, pushed the colony rulers to build the first pumping station in the watershed of one of the Congo river's tributaries, forcing the villages settled all along this watershed to relocate in order to preserve the quality of the pumping station (De Saint Moulin 1971): the new networked system started then to stand against the traditional systems of land owning and water access, reinforcing the intrusive logics of colonial territorial management. In 1939 the *Régie des Distributions d'eau* (REGIDESO) was created by the colonial government, as company of public-utility. At its creation, the REGIDESO adopted a distribution system based on three different modalities: private taps in domestic house, neighbour taps for groups of two or three families, public standpipe for proximity users (JICA 1990). Until 1960 the spatialization of these practices is the reflection of segregation logics adopted by colonial rulers: the domestic and private tap of the colonial city centre stand against the public standpipe of the indigenous workers' city extension.
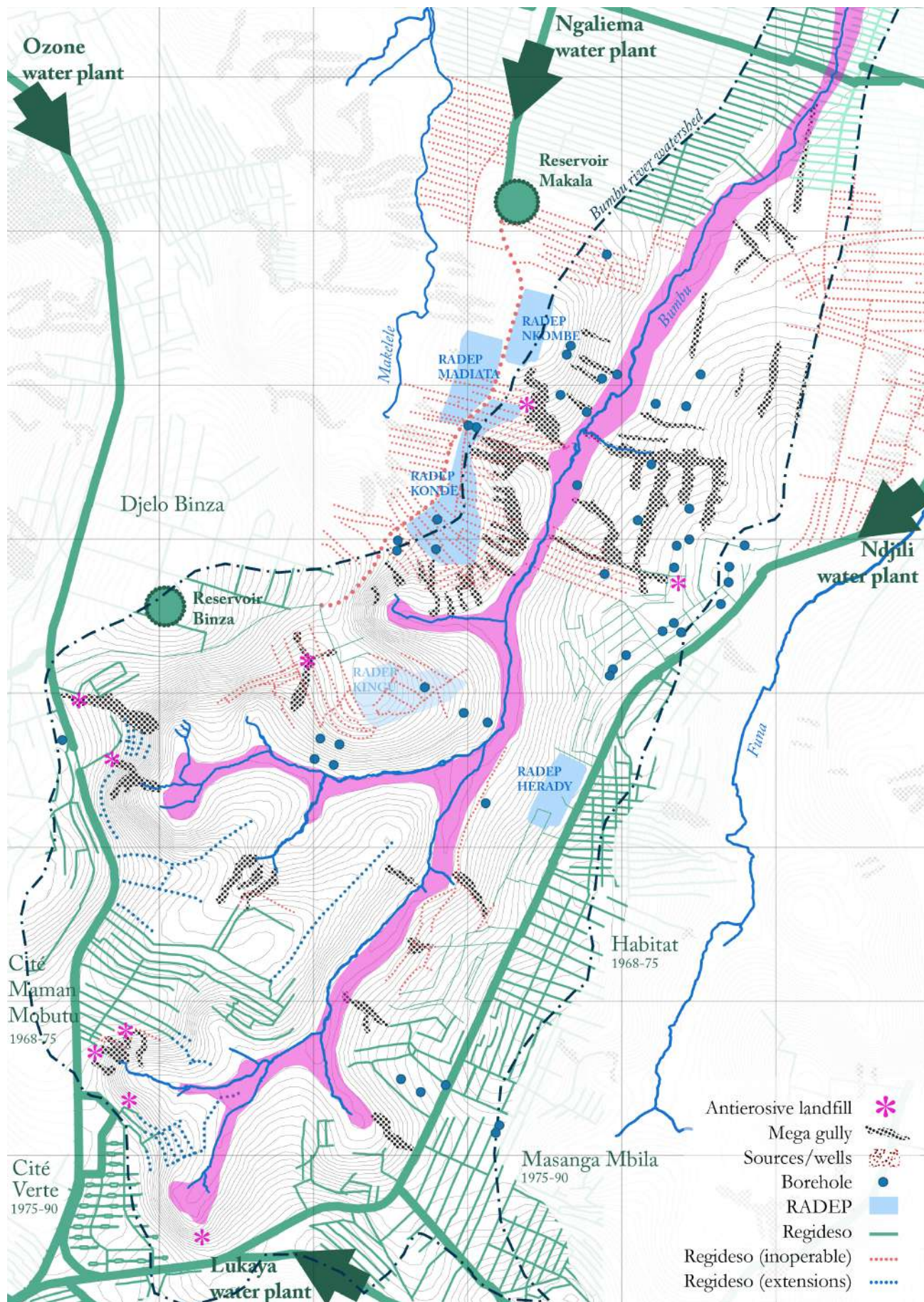
[fig.4] 'Right to potable water'
The urbanisation of water in the valley of Bumbu river, Selembao (Kinshasa).
Source: elaborated from the author

After 1960 the demographic explosion that upset the relation between city and soil, had a severe impact on the urban water supply system: the infrastructures designed to serve about 400.000 inhabitants had to be confronted to the doubling of urban population by the end of 1970s (Lelo Nzusi 2011) revealing the crucial role of natural water resources of this territory marked by the tributaries streams of Congo river and abundant rainfall (Lateef 2010). Tributary rivers though, hosting handmade wells and sources at the bottom of the valleys, can be read as the main natural infrastructure enabling city expansion soon after independence, and still sustaining it. In fact, ever since 1960, the REGIDESO, monopolist of the water distribution in the country, has never been able to fill the gap between water demand and water supply capacity: during the Mobutist regime, the implementation of the urban network has never pursued technical efficiency, rather it followed financial interests related to international development projects (Maratcho, Trefon 2004). The result is a twofold distribution network where the inefficiency of water supply system is coupled by the abundancy of natural water resources (Katalayi Mutombo 2014), raising significant concern among researchers about the impact of urbanization over water quality, and reinforcing the socio-environmental gap introduced in the previous paragraph.

The year 2016 marks a significant turning point in the potable water supply management, a new law is adopted that liberalize the extraction, distribution and selling of potable water (*Loi sur l'eau*, 2016): putting an end to the monopole of REGIDESO in water management and facilitating private investment in the sector. The stakeholder list in the distribution of potable water has considerably enriched since then, increasing competitiveness among actors and the spread of several private initiatives notably in the sector of boreholes for exploiting groundwater. Moreover, in the last decade, various projects of decentralized water supply systems, financed by various international donors, emerged in Kinshasa (Bedecarrats et al. 2019, Cammaerts et al. 2021): especially in the valleys, where inaccessibility due to erosions and landslides have turned these geographically central territories in veritable peripherical spot of the urban network supply (JICA 2009). Basically, the decentralised mini-networks (RADEP: *Réseau de Distribution d'Eau Potable*) work on a borehole-pump-reservoir system linked through an underground network to public standpipes hosted by private plots, distributed at the scale of a neighbourhood. The main feature of these projects is the will for structuring non-profit organizations, run by a water network users' association, structured around the management of the decentralized system.

The cartography of the right to potable water [fig.4] shows the disruptive role of topography and landslides, leaving the water wells and natural springs of the valley floor a major role in the fight for the access to potable water. However, the ongoing shift from a centralized network towards collective decentralized water systems, seems to be an effective approach for filling the gap left by the deterioration of the former urban network and for building new place-based alliances towards the recognition of potable (ground) water as a new 'urban common'.

Chronicles of collective trajectories

If the geographies of the 'right to the land' and 'right to potable water' helped to depict the marginal role of the valleys in the *kinois* urbanization, through two chronicles of collective trajectories, the article aims in this section to investigate the role of water (especially drinking water) and sand (as fragile and erodible soil) in shaping new socio-spatial geographies within the territory of the Bumbu river valley. We can then consider them as 'counter-geographies', where access-to and management-of the two urban resources are the operations that give life to collective chronicles of struggle: the specific trajectories observed aim to investigate the potentials as well as the limits of such arrangements. In both cases, the entanglement of soil and water management lay bare the systemic relations between human, water and sand that structure this neglected urbanity.[1]

Cronicle I : (un)Building commons to cope with water shortages, the RADEP.

The creation of the RADEP/KONDE (*Réseau de Distribution d'Eau Potable, quartier Konde*) goes back to 2011. It is a pilot project of an EU-funded program for the creation of an *Association sans but lucratif à vocation socio-économique et sanitaire* to compensate for the lack drinking water supply due to

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[1] Both chronicles are the result of the on field research carried out in two separate moments: from march to June 2022 and from march to may 2023.

the landslides affecting the neighbourhood since 1970s. The social structure of the association, organised at the neighbourhood scale, is rooted in a broad base of citizen participation: the supreme management body is the General Assembly (GA), composed of one representative per street, accompanied by a Management Unit (MU), elected by the Assembly itself. The economic structure is based on membership fees, which must allow the proper functioning of the common infrastructure, aiming to the reinforcement and extension of the drinking water network. The supervision of the project in undertaken by EU during the launching phase (2011-2015) then taken over by the Ministry of rural development.

In between 2011 and 2015 the distribution network operates as planned: the reinvestments for the maintenance and extension of the network not only grant a proper access to drinking water in the neighbourhood, but it also has positive impacts on territorial management. In fact, since the infrastructure is installed through the road network, it stimulates the take in charge of the roads maintenance, reducing the erosion risk and then providing a community-based system of landslides risk prevention. Fulfilling the need to access drinking water in an unserved area, the social project of RADEP, stimulates a community-based organisation for the protection and development of a common resource: the sandy and erosive soil. In other words, the intention is to promote the common management of urban resources (soil and water) by creating new urban commons based on the needs for access to drinking water ('right to potable water') and the management of erosive soil ('right to the land'). In 2014, thanks to the support of EU program and the reinvestments of the community participation fees, a new borehole-pump-reservoir system was added to the first network, doubling impact area of the distribution system.

However, in 2016, bitter conflicts arise within the GA, undermining the community-based principles on which the arrangement had hitherto been based. It is a turning point: the director of RADEP is ousted and a new private Management Committee (MC) takes the place of the MU, changing the statutes and functioning of the entire RADEP. If, from a technical point of view, the infrastructure does not change, the social organisation changes severely: the AG is dissolved and the membership fee is replaced by a payment system based on consumption. This situation has recently come to the attention of the State, which in 2020 took in charge the supervision of the new structure. In October 2020, the new MC is recognised by the public authority as a 'Crisis Committee' (CC), admitting the ineffectiveness of the previous community-based system with respect to a hierarchical system.

From the point of view of land management and erosion control management, these structural modifications have not caused much change. The virtuous mechanism of access to drinking water and reinvestment in land maintenance is still evident today, but some questions remain from the point of view of service equity. First of all, the taking over of the works by a small group of people supervised by the state has denoted a clear change in the approach to reinvestment: the enlargement of the distribution network is no longer a priority, and the lack of representatives of the population in the CC seems to be a way to avoid to further deal with the issue. It follows, from a spatial point of view, that the network still does not supply the most critical plots (i.e. those on slopes, at risk of erosion), limiting the possible social impact of the original project and emphasising the role of the slope as a factor of social exclusion. Even if potable water supply is still the priority, the socio-technical arrangement has undergone an evident and continuous change over time: mirroring the adaptability of the original social project with respect to the contextual contingencies. What emerges from this example is how an attempt to make water an 'urban common', capable of enhancing a communitarian management of the territory, eventually lead to the emergence of a hybrid, public-private, system that allows for the basic functioning of the infrastructure, dealing with the social conflicts linked to the management of the water resource and its revenues.

Chronicle II : new collaborative approaches for fighting against landslides.
The *Collectif en Esprit Bananier* (CEB) is a local NGO providing grassroots strategies and technical support to populations living in risky and inaccessible areas of the city: subject to soil landslide risk and water scarcity. Its motto reflects the philosophy of its approach: "(as banana trees) aware of our individual weakness, we act together". It operates in Selembao, developing erosion control and recovery systems to recuperate soil loss after landslides. The intervention consists of two complementary actions: firstly, the securing of the gully head to stop its progression upstream,

secondly, the installation of sandbag dams at the bottom of the erosion. Thanks to the accumulation of deposit due to runoff, the dams are gradually raised, until the recover the pre-erosion soil level. To carry out its interventions, CEB relies on the support of the inhabitants affected by the erosions who are asked to associate into informal groups called c*omité de lutte* or *comité de developpement*, reassembling people living in the gully´s watershed: the runoff surface contributing to its advancement. However, such intervention is not always welcomed by the inhabitants: not all the owners of the lost plots support the project of stabilisation and recovery. In the best-case scenario, before starting the operations, the ONG or the new born committee are forced to buy the space previously occupied by the plots and now swollen away by the landslide. In fact, the cohabitation with erosion has led people to consider it a passing phenomenon: "like a seasonal rain, once the gully head has passed, the danger is over". People never stopped to build inside these holes, temporary regaining (until the next catastrophic event) the lost ground.

The repeated failures of the CEB in the communitarian anti-erosion fight led them to initiate a new type of approach: in order to strengthen cohesion between committee members and to motivate people living nearby, they started testing an anti-erosion fight model based on the combined action of access to drinking water and recovery of soil loss. The *forage antiérosif* ("anti-erosive water well") is based on the creation of a hand-made drill well at the bottom of the erosion: where the dept of the gully allows to reach the water table without heavy machineries, unusable due to the inaccessibility of the slopes.

The results of this approach are evident: the perspective of the creation of a decentred water distribution system in a non-deserved area, serves as encouragement to allow the access to the soil of the erosion and to promote collective effort, extremely facilitating effective interventions in the gullies. In fact, if during the rainy season the priority is to recover soil, during the dry season the forage can operate at full capacity: at the time of greatest need and gain. To foster collaboration between NGOs and communities, the management and the incomes of the new technical arrangement is thus divided between several actors: NGOs, committee and private owners of the plots hosting the boreholes and taps for water distribution. Technically, once the gully head is blocked and the dikes are placed on the bed of the erosion, the water well is placed on the side of the runoff channel at the bottom of the erosion. As the soil level raises, PVC pipes are added to the borehole allowing the simultaneous rising of the drinking infrastructure.

This example represents a very basic but effective socio-technical arrangement, which show us how an individualistic approach to soil management can be overcome through the creation of new forms of communitarian land management, tackling the access to more resources at once in order to overcome the conflicting rationalities underlying its creation. But, despite the effectiveness of this approach, these arrangements are still fragile: collaboration is always based on personal interests and aspirations that often override the public interest. To cite a recent example: in one of the forages created last year, a prototype of the *forage antiérosif*, the collaboration between private owners and the association lasted a few months. Just long enough for rising quarrels and misunderstandings over the management of drinking water revenue. Once the fight against erosion is won, social cohesion has been undermined by the fight around the commodification value of drinking water. But here the aim is not to show or propose efficient or flawed land management systems, rather we try to make a transversal reading of the logics that guide the management of a marginal territory.

Conclusions

The two geographies of the 'right to the land' and 'right to potable water' tell us about the marginal role of the Selembao municipality in the urban geography: an "urban-rural" municipality surrounded by the network of narrow streets and urban junctions. It is considered a leftover of an extensive urbanisation structured around veritable urban holes, the valleys. These voids invite a stigmatizing representation of this type of settlement, result of an uncontrolled and deregulated human settlement. From the water access point of view, the valley floor remains an off-grid area in relation to the weak water supply network. At the same time, the landslides affecting this territory are left out of public intervention, unless they affect the main ridge roads circumscribing the valley. In spite of this, and precisely because of this "marginal" role in the *kinois* urban discourse, this space is characterized by a process of stratification capable of tracing an historical continuum between

indigenous settlements, colonial urbanization, post-colonial settlement and contemporary densification: towards new hybrid forms of territorial governance, challenging its dichotomous categorizations. First: 'centre-periphery', in the relativization of the geographical position compared to the mental and social one. Second: 'public-private', through the study of the complex relations between different stakeholders involved, included human and non-human. Third: 'upstream-downstream', in the imbrication of the fight for access to potable water and urban soil revealing the social gradient existing between these two extremities.

Looking beyond these categorizations, the article contributes to the socio-spatial delineation of "new" urban forms (Robinson 2013) taking place in contemporary Congolese urban realities. In order to nuance the "decentralization-privatization-participation" approach dear to developmental studies (Jaglin et al. 2018), a focus on the stubborn and conflictual rationalities (Watson 2013; Yiftachel 2006) supporting urban resources management is proposed: favouring the appearance and delineation of the "practical norms" underlying the production of hybrid forms of governance, rather than proposing "good governance" perspectives (De Sardan 2015).

In this sense, the chronicles of collective trajectories open a path towards the recognition of new collectives based on proximity and on sharing a 'common ground' at the socio-ecological margins of the city: suggesting a paradigm shift from the precolonial notion of 'common land'. This common ground has been left in the hands of the most precarious city dwellers, along with the burden of the management of its sandy soil. Here, the study of the imbricated practices of water and soil management, and their evolution through time, reveal the essential role of transversal systemic relationships embedded in the social organization of this territory. The soil stability (sand) in fact, is not a priority: apart from massive public intervention for recovering major urban infrastructure after catastrophic events occurrence, the rest is in the hands of individual and sporadic initiatives of those directly concerned. In order to motivate people to act collectively and to increase effectiveness of development projects, local NGOs (Chronicle II) and international donors (Chronicle I) implement strategies to combine water access and soil control needs, in order to avoid land access conflicts and to increase the rentability of their strategy. What emerges from this narrative is the image of a territory in which urban resources management is in constant balance between ecological rationality and personal interests for profit. Sometimes the logic of profit prevails, undermining virtuous collective management systems and causing their mutation, or collapse. Other times the logic of protecting endangered resources prevails, favouring the creation of community forms of management and the creation of urban commons.

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Developing Spatio-Temporal Mappings of the Polder Landscape in the Yangtze River Delta based on Educative Speculations

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As part of the doctoral research studying landscape urbanism in a polder (Wei-Tian)-based area in China's Yangtze River Delta (YRD), speculative mapping is an approach to site analysis and bridge gaps from spatiotemporal perspectives. Based on observation, the paper linked the potential emergence of the characteristics of Chinese mappings to the invisible polder systems. To examine the idea, a framework of speculative mapping and a chosen site are introduced. Followed by a series of mappings, a narrative of urbanism is embedded. By comparatively observing the historical and the created pieces, initial findings are discussed on the necessicity of mapping as a method, the inheritance of water-land representations, and the identity of the indigenous polder-based landscape behind it. It is inspired that under modern urbanization the historical ways of mapping the site provide referable intrepretations to enhance the indigenous polder-based landscape.

Intro

Mapping involves a subjective interpretation of the site based on objective observations, which can be interpreted as conveying the critical site perception and cognition with creative illustrations (Corner 1999 ; Crampton, Krygier 2018). The emergence of Chinese map-making in a scientific way can be traced back to Xiu Pei (224-271 AD), a cartographer who proposed the concept of "six components of mapping" (scale, orientation, road distance, elevation, gradient, and curvature). However, it has been observed that the six components were not rigorously adhered to as principles in practical application, and in some cases, they were entirely absent in a range of stylistically diverse works (Yee 1994). There is an ongoing debate regarding the appropriate approach to studying ancient cartography. One perspective advocates for a quantitative analysis of the science and technology involved in achieving accuracy, while the other perspective emphasizes a qualitative interpretation of the maps as a means of communication and expression, which may intentionally incorporate artistic, cultural, and political elements (Harley 1989). Different from reproduction or imposition of geographical features through direct tracing, the process of mapping is often found to reveal previously unseen or unimagined realities through the use of open-ended and creative techniques employed by the cartographer (Corner 1999). The process of mapping has led to the depiction of more conspicuous variations, which may have been deliberately introduced. It is important to observe and provide speculative explanations for those variations that are based on historical interpretive illustrations.

For the YRD, deltaic urbanism can be traced for thousands of years. Mapping water and land is an ever-lasting challenge, especially when considering their spatial and temporal characteristics. From a historical hydraulic perspective, the instability of the landscape largely refers to the reshaping caused by flow, land subsidence, and human intervention throughout decades and centuries (Miu 1985; Zheng 1987; Wang 2016). The pre-modern era is characterized by a dearth of references owing to the limitations of techniques and inadequate preservation of materials. While in the later era, the integration of modern technologies with geo-coordinated satellite images has facilitated site observation. Despite its usefulness, mapping is still challenged by the selection and visualization of details echoing that in ancient pieces, which inevitably entails emphasis and exclusion. Moreover, modern urban sprawl is facilitated by enhanced control of water through vast engineering based on historical practices. Significant transformations are hypothesized to pose a challenge in mapping the site with a potential alternative understanding of the indigenous water-based practices, that perished, preserved, and transformed. The research applies site-specific examples to examine the linkage of mappings from a spatiotemporal perspective. It gains knowledge from making new mappings to understanding water urbanism diachronically.

Water-land illustrations from a historical perspective

Overview of the available mappings

The YRD, being a historical hub of China, has a considerable amount of mappings preserved. Nevertheless, they do not possess the ideal level of abundance across all dynasties. In general, the availability is in accordance with the development and preservation of Chinese cartographies. The chronology of cartography in Chinese monographs typically employs a division at the end of the Yuan dynasty (1271-1368 AD) (Cao, 1900). The main reason is that before the Yuan dynasty, the majority of mappings were either attested to merely in literary or preserved through subsequent copies (Yee, 1994). Contemporary scholars have produced mappings that cover dynasties (Guo,1979; Tan, 1982), but the majority of these works tend to focus on national and provincial scales. Similar circumstances can be discerned in the mappings encompassing or situated in the YRD. Depictions of the delta's shape on a national scale can be traced back to the 13th century, whereas mappings of the delta on a smaller scale can only be traced back to the 17th century. During the early years of the Qing dynasty (1644-1912), Chinese cartographers started to be influenced by Western techniques and created pieces more in a modern way. Or, in essence, the Western approach to cartography has regenerated Pei's six elements of cartography. Mappings that feature scales and intricate depictions of civic settlements, land-water contours, and other details were then predominantly produced. In short, the zenith of referable ancient maps falls only within the last five hundred years.

Mainstream deltaic land-water representations

Scholars have recognised the different kinds of ancient mappings based on the main content (Harley, Woodward, 1994). For the plan mappings, as the major type, land and water are quite articulated, while cities and towns are often only visible as labels. Water is thus an alternative entity to indirectly understand urbanism from the mappings, particularly for the deltaic region for its nature of being water sensitive. Three summarised co-existed styles of mapping depicting the deltaic water environment are referred to (Ding 2011): the hydrographic net representation [fig.1, no.1], the densified water representation [fig. 1, no.2], and the hybrid of the two [fig.1, no.3]. According to such categorization, the critical difference between the representations is whether to ignore the dense water or to sacrifice the hydro hierarchy of the main tributaries. The hydrographic net representation is the most classic style, initially applied in mappings of the national territorial scales. It is considered relatively rational and quantitative as it is often proven to meet the archaeological facts of the elements' spatial relations. Deemed as an opposite, the densified water representation is described as a scale-adaptive innovation inspired by Song dynasty (960-1279AD)'s impressionism drawings. Under this style, the lowland is mapped with a chase for symbolic similarity of the scenic impression. The mode of representation is hereby explained by styles while deeming it as "a situated knowledge construing the site" (J.Burns, Kahn 2005) is less revealed and expressed.

(1) Provincial Atlas of the Great Qing 大清分省舆图 (unknown author, 1760);
(2) Water Conservancy Map of the Entire Suzhou Prefecture 苏州府全境水利图 (Zhang, 1638);
(3) Military Map of Jiangnan Corps 江南水陆营汛全图 (unknown author, 1843)
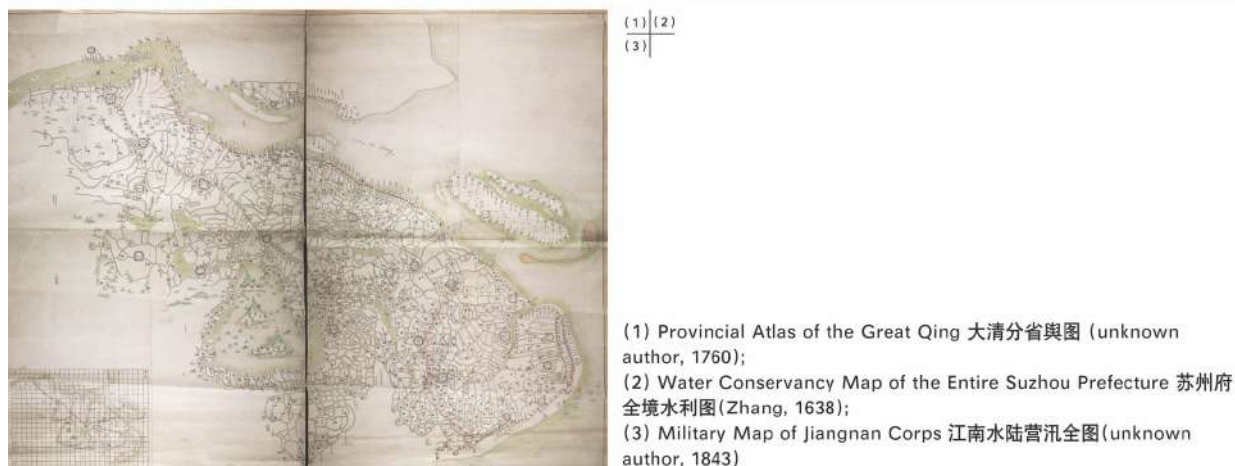
[fig.1] Selected mapping examples corresponding to the summarized three styles. Source : from (1) (3)数位方舆；(2) 《中国古代地图集（明代）》

As shown in the examples, although the depicted land's texture bears an obvious resemblance to that of nowadays polder areas, particularly in the mapping pieces under the style of the densified water representation, it does not depict polders at all. The polder-based landscape is uncommonly mapped, even in those pieces that focus on much smaller city and town scales. Despite their absence from cartographic representations, the historical linkage between polder reclamation and water management was undoubtedly recognized by ancient practitioners (Wang, et.al. 1980; Miu 1985). It is thus speculated that the development of the polder system plays a crucial role in the mapping of the land and water where the polders are located. The alteration in cartographic representation is associated with the progressive development of polder systems and human settlements, rather than a mere deviation towards an alternative artistic style. The knowledge of polder-based water urbanism is linked to how cartographers think of the site and then utilise the graphics as a tool.

Invisible polders behind

The water-land illustrations that have changed over time are supposed to be associated with the historical discourse regarding the prioritization of water versus reclamation. From the hydro hierarchy of the main tributaries to the non-hierarchical water net, the change seems to eco the switches. The hydrographic network representation can be regarded as a response to the imperative of prioritizing transportation along major canals and rivers. It is easily observed that non-primary waterways for transportation are often overlooked, where cartographers intentionally amalgamated small land masses into larger ones. The shift from water transportation to flood control and polder management during the later dynasties can be attributed to extensive land reclamation. The increased frequency of flooding has resulted in a growing significance of managing waterways aside from the major canals and big rivers. The emergence of settlements, particularly the prominent market towns, necessitated the accentuation of the contour of the primary land masses to indicate their locations. Despite the absence of direct representation of polders in those cartographic depictions, it can be speculated that the selected land masses that were illustrated had been reclaimed and inhabited because of a prevalent graphic technique that omits extraneous details.

In general, the polders in the YRD region exhibit a tendency towards significant variations in size [figure.2]. The early ancestors initiated small-scale reclamations in the lowland, which were subsequently followed by the introduction of gridded polders through garrison reclamation by the kingdoms between the 3rd and the end of the 10th century. According to the description provided, such gridded polders were big enough to compare to a large walled city[1]. The giant polders characterized by elevated embankments and extensive irrigation channels underwent gradual

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[1] Tang-Pu (塘浦): Tang (embankments)-Pu(ditches) is a polder system initially created by the garrison reclamation. Such polder units used to be gridded and giant, described as "garrison bases are arranged like the combs, governmental agencies are set up like the chess on the board." （"屯营栉比，廨署棋布。" 左思记载于《吴都赋》), and "2.5-3.5km per longitudinal Lou, 3.5-5km per horizontal Pu." （"五里七里一纵浦，七里十里为一横塘。"）.

degradation and alteration due to the loose management of the central government, taking place by the smaller polders. The emerged smaller polders are speculated to present significant challenges to cartographers because they were less resilient to flooding and thus often changed in their shapes. And many were recorded to be vast uncontrollable illegal reclamation in the lower areas (Wang 2016). After the feudal period, it is noteworthy that the modern agricultural social campaigns have reintroduced a comparably large-scale polder system to the YRD, making polders bigger and stabler, and thus easier to be mapped. With the shapes of the traditional small-scale polders being predominantly preserved rather than being restructured into the historical gridded pattern, such a polder system is somehow a hybrid of modern engineering and the two different indigenous practices. The correlation between water management and the reclamation of polders, as well as the resulting alterations to the landscape, ought to be associated with the various cartographic techniques employed.
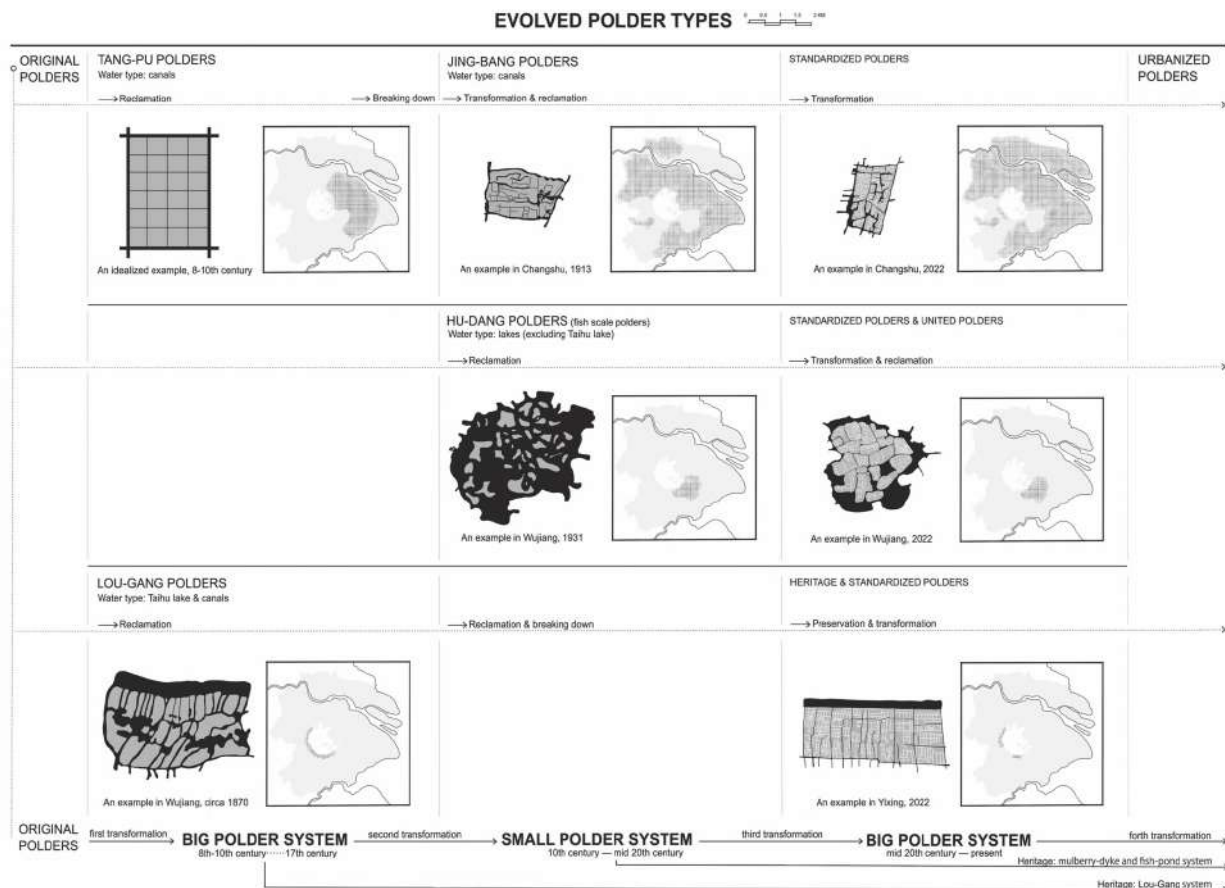
[fig.2] The evolved polder types throughout history. In general, there is a trend of a reiterative switch from small polders to big polders, from loose bottom-up management to strong top-down control. Source: elaborated by the author based on references (Miu 1985; Xie 2017).

Method and Study Case

In this study, it is posited that indigenous mapping techniques hold significant value in comprehending the historical utilization of water-based practices. It is essential to recognise not only the indigenous ways of depicting the deltaic waterscape through mapping but also the similarities that might be shared in mapping practices nowadays and thus acknowledge the legacy of the indigenous landscape. Conducting experimental mapping based on a specific site is deemed a chance to directly examine the appropriateness and indispensability of various visual representations. The mapping is a process of hybridizing the cross-disciplinary findings and bridging the gaps of insufficient visualised spatiotemporal materials based on educative speculations. The depiction of details in historical mapping poses an alternative reference, particularly concerning the intentional omission of the predominant regional polder-based landscape and settlement shapes. The study posits that the traditional methods of mapping retain a degree of relevance in certain contexts. Numerous research findings have been put forth to elucidate their rationales (Ye 1994; Yu 2006; Ding 2011), while the

knowledge is mostly only based on historical pieces. As a further way to approach the mappings, new spatially and temporally consistent mappings based on synthesised historical materials, cross-disciplinary conclusions, and necessary educative speculation has been experimented with [figure 3].
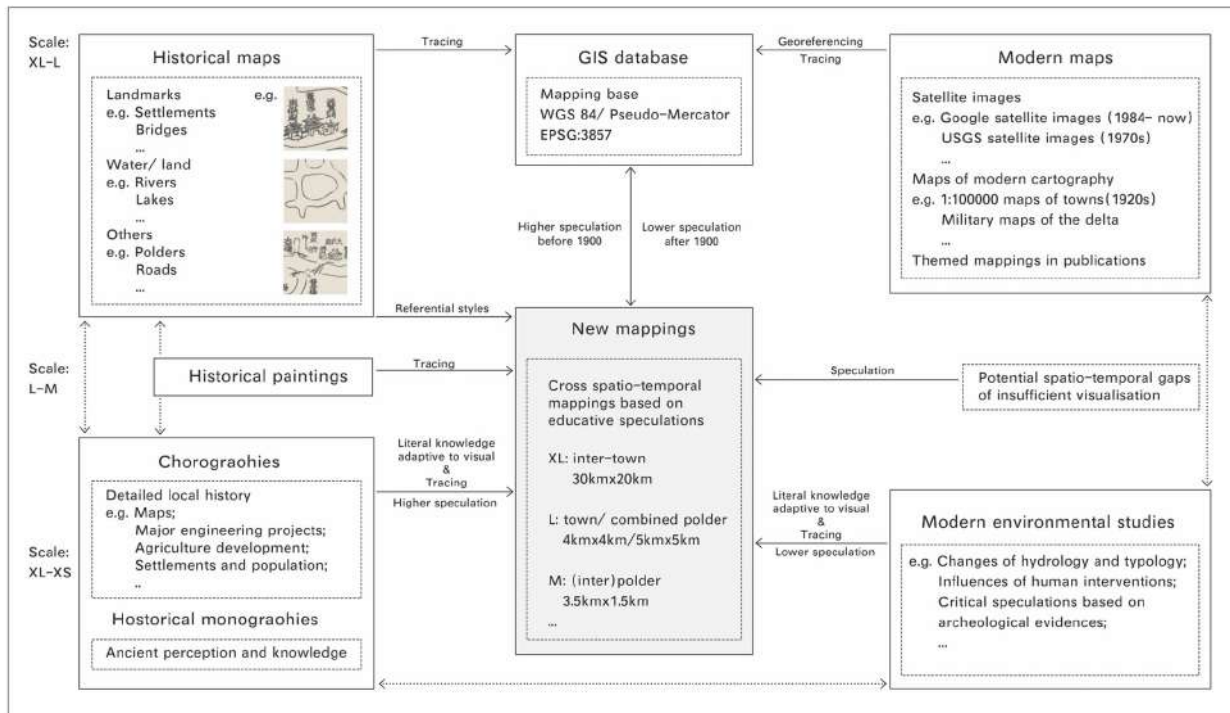
[fig.3] The procedure of educative mapping based on materials of speculations, source: elaborated by author.

The sample area is a site of 30km x 20km in Wujiang, a county of Suzhou, located on the east bank of Taihu Lake [fig.4 and 5]. The scale of the site is in between the delta scale and the city (town) scale, which is less common in historical mappings. Utilizing this scale in between avoids becoming bogged down in the intricate geographic details of the complete delta while retaining an extensive scope. The sample is a typical water-sensitive lowland of proven significant landscape change throughout history (Wang 2016). Owning a tributary joint of major canals has given rise to the development of historical water-based agriculture, industry, towns, and villages over an extended period. During the contemporary era, as a suburban area belonging to the metropolis, rapid urbanisation and fast sprawl based on the ancient water towns can be observed. Nonetheless, for the limitation of the typology, plenty of lakes, canals, and polders are not erased and continue to operate. Bearing profound environmental changes, it is a rather peculiar piece of lowland in the YRD where the reclamation is delayed, resulting in a landscape that is primarily characterized by the presence of Hu (lake)-Dang (ponds) polders. It is one of the certain regions that still bear similarities to the indigenous polder-based landscape concerning the vast urbanization and the loss of the indigenous landscape in the YRD. The site's historical evolution is categorized into three distinct phases based on the succession of dynasties and the advancement of canal engineering, settlements, and reclamation efforts. A variety of historical cartographic materials have been chosen and listed as visual aids for each phase [table.1].
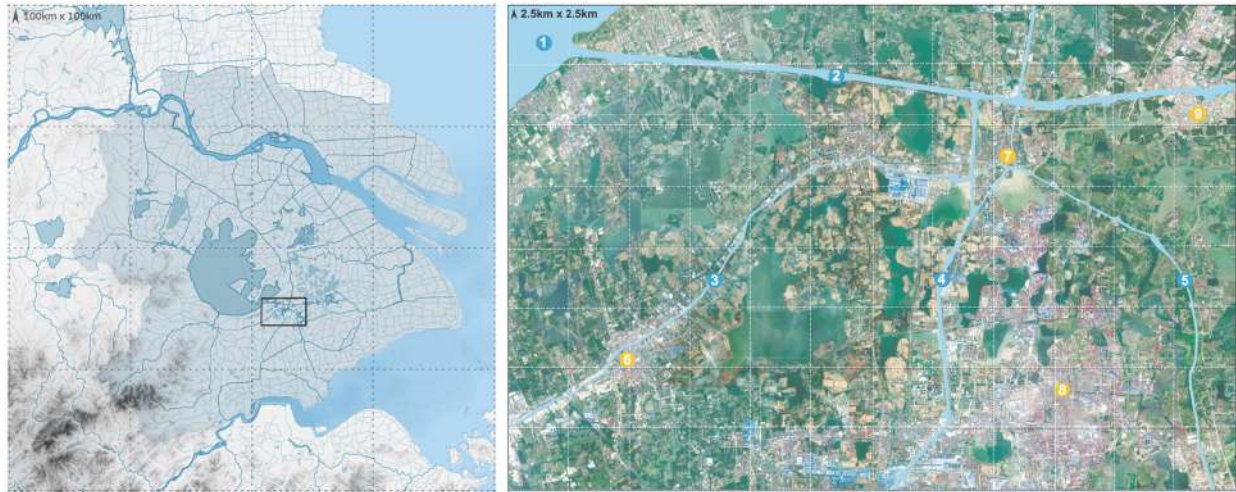
[fig.4] Typology and the main water network of the YRD and the location of the selected sample (30km x 20km). Source: elaborated by the author from China Geological Survey, GeoCloud.

[fig.5] Major canals and several historical water towns can be found in the 30km x 20km sample : (1) the Taihu Lake ; (2) the Taipu Canal ; (3) the Ditang Canal ; (4) the Lanxi Canal ; (5) the Grand Canal ; (6) Zhenze (town) ; (7) Pingwang (town) ; (8) Shengze (town) ; (9) Lili (town). Source: elaborated by the author from Google Earth.

Table 1: Level of the speculations according to the mapping references. The criteria of mapping selection are based on the availability of the limited mappings containing readable and referable information.

Divided Stages	Speculation	Main referable map(pings)
Stage 1 (circa 200-1350)	High	/
Stage 2 (circa 1350-1930)	Medium-high	Water Conservancy Map of the Seven Southeastern Cities 东南水利七府总图, and Panorama of Taihu Lake 太湖全图, made by Qi Shen, circa 1500, Water Conservancy Survey of Wujiang County 吴江水考增辑 ; Panorama of Taihu Lake 太湖全图,1748, Chorography of Suzhou during Emperor Qianlong ; Map of Wujiang County and Zhenze County 震泽吴江两县图, circa 1870, Chorography of Suzhou during Emperor Tongzhi ; Panorama of Wujiang County 旧吴江县全境图, 1893, Chorography of Zhenze County during Emperor Guangxu ; Military Map of Jiangnan Corps 江南水陆营汛全图, 1843, Academia Sinica; 1893 Wade and Villard Hunting Map of Shanghai and its Environs, 1893, Greograohicus ; 1:450000 Map of the shooting districts lying between Hangchow-Nanking-Wuhu and Shanghai, made by Fred Mann, 1909, Virtual Shanghai ; 1:240000 General map showing the district around and the approaches to Shanghai, 1920, made by Whangpoo Conservancy Board, Virtual Shanghai ; 1:250000 Shanghai and Hangzhou, made by War Office. General Staff. Geographical Section. Ordnance Survey Office, 1927, Virtual Shanghai ; 1:5000, map_loc_052865 平望鎮 (Pingwang), 1937, Academia Sinica ; 1:5000, map_loc_052863 震澤鎮 (Zhenze), 1929, Academia Sinica ; 1:10000, map_loc_008350 吳江縣 (Wujiang), 1931, Academia Sinica;
Stage 3 (circa 1930-now)	Low	1:250000 Shanghai West and Hang-Chou, made by the United States Army Map Service, 1959, Old Maps Online ; Satellite images captured by the U-2 reconnaissance aircraft in 1976, USGS Eather Explorer ; Satellite images ((low resolution available from 1984)), Google Earth; Satellite images, Google Earth ;

3. Spatio-temporal mapping with the narrative of urbanism

The mappings that were experimented with exhibit a resemblance to the depictions found in historical artefacts, where the primary subjects were depicted on land and water. Prior to showcasing the final artwork, various sketches of illustrations are experimented with. The land is deliberately kept unoccupied, akin to the historical ones. Additionally and differently, semitransparency is employed to denote unstable land pieces. Given that the selected site only formed a substantial amount of stable land masses by the end of the first millennium, and subsequently experienced intermittent scarcities of arable land, it is reasonable to classify all of the stable land masses depicted in the maps as reclaimed polders. Except for that, the new mappings are accompanied by directional indicators of the water flower, while the historical pieces lack such features. The purpose of these extra elements is to highlight the significance of several monographs that place great emphasis on the development of deltaic typology and aquatic environments (Miu 1985; Zheng 1987; Wang 2016). Based on the new mappings, it appears that urbanization has solely taken place in the most recent phase. In fact, each phase has the potential to establish a robust connection with urbanism, especially when linking to the zoom-out regional perspectives. The mappings highlighted by the water are thus explained by text from the perspective of water-based urbanism.

Cross-scalar urban infrastructure

The engineering of China's canal system resulted in the creation of waterways and accompanying embankment roads that served as cross-scalar urban infrastructure (Vannoorbeek, Nolf 2019). Canals not only passed through many suburban areas, but they also defined the functions and spatial layouts of those areas (Wang 2019). Top-down functional positionings are primarily directed by the distant capital city and the numerous nearby provincial capitals. At this relatively small spatial scale, the first stage lacks any ancient mapping references, despite the canals conforming to the recognizable spatial layout. Historically, the canals were primarily utilized for military purposes, but over time, their function evolved to include the transportation of grain to the capital. Evidently, the excavation of the canals was not carried out with the intention of facilitating the development of the site per se. Prior to the Song Dynasty, reclamation efforts within the Eastern Taihu Lake Basin were primarily concentrated downstream of the Wusong River (Zheng 1987). The region of Wujiang, situated in the upstream vicinity of the Wusong River, was predominantly submerged. During that period, the site was characterized by open water due to its function as the flow outlet of Taihu Lake. A mud-based embankment was constructed along Ditang Canal around 810 AD to safeguard the ships from the large waves from Taihu Lake on the western side. In this sense, though visually staying suburbs, urbanism is cross-scalar rooted in the future development of the site from the very ancient time.
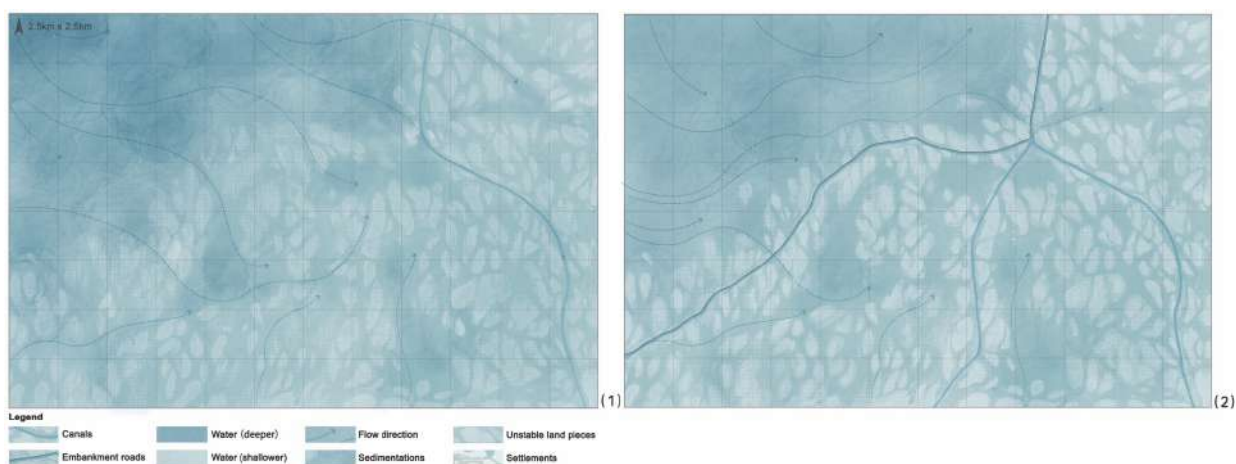
[fig.6] Mappings of the site: (1) circa 200 AD and (2) circa 1000 AD. Source: elaborated by the author.

Emergence of the reclaimed dish-shaped lowland

In contrast to the initial phase, a notable alteration in the topography occurred as a result of both geographical and human interventions (Xie 2015 ; Wang 2016). In terms of geography, circa 1000 AD, there was a notable occurrence of earth subsidence centred in Wujiang, laying the typological foundation for the dish-shaped lowland. And during that particular period, the fluctuation of sea level

resulted in the accumulation of sediment in the downstream river outlet, generating additional sedimentary land masses upstream due to the decelerated flow of the stream. Regarding human intervention in typology, the double-sided stone-based embankment roads were developed around 1025 AD as an improvement to the single-side mud-based embankment aiming to enhance the protection of ships and facilitate land transportation. As a side effect, the implementation of advanced canal engineering significantly disrupted the smooth flow of water, further accelerating sedimentation. Moreover, the sediments facilitated and concurrently expedited the process of land reclamation, necessitated by a significant influx of refugees from the Northern region circa 1131 AD. The development of polders was highly privatized and overseen in a less stringent manner by the weaker government. The culmination of the dish-shaped lowland is deemed to be signified by the lakefront Lou-Gang polder system formed circa 1660 (Zheng 1987). Under the function of such a lakefront system, the site ceased to maintain a direct unblocked connection with the lake.
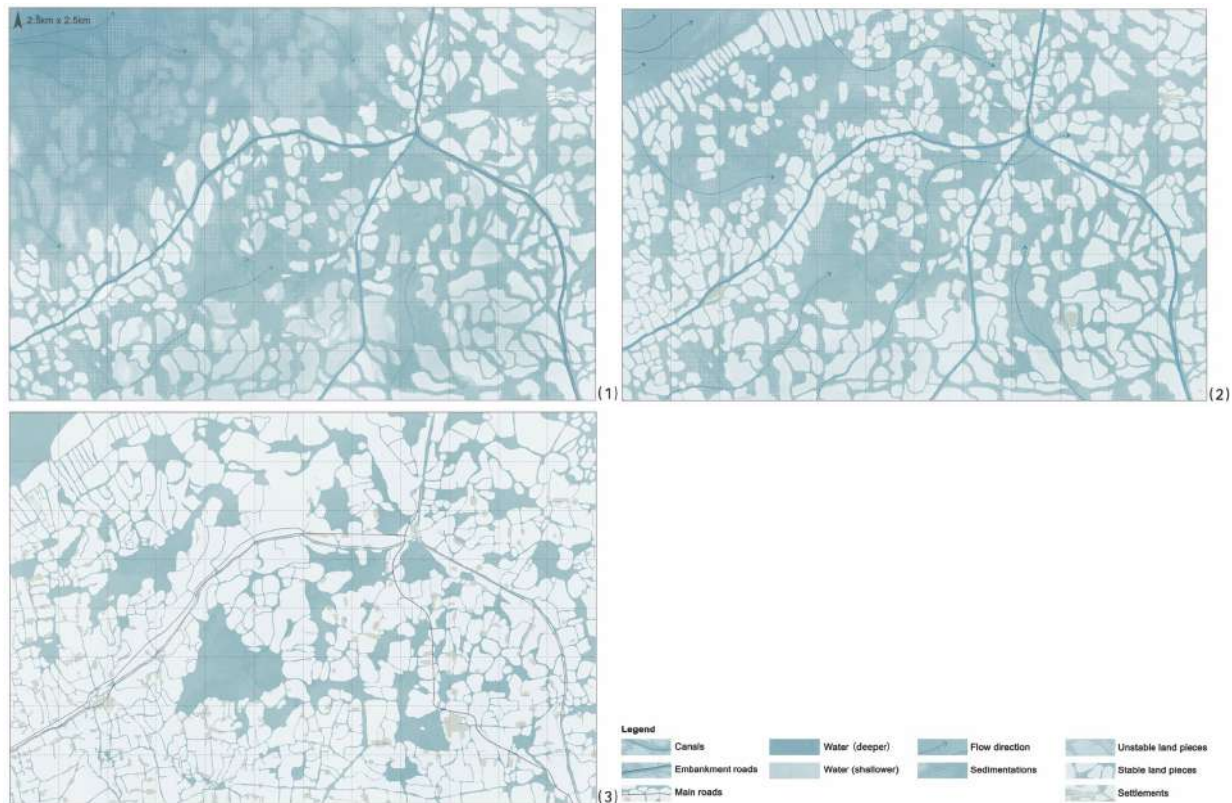
[fig.7] Mappings of the site : (1) circa 1350 AD ; (2) circa 1650 AD ; (3) circa 1930 AD. Source: elaborated by the author.

The onset of urbanization from garrisons and small villages was observed at the outset of the first millennium on the site. It is commonly acknowledged that polder reclamation gradually reached a saturation point in the Ming dynasty, unable to keep pace with the increasing population (Huang 1990). Despite the fertility of the land, the size of the farmland is insufficient to sustain a household. The small-scale peasant economies have experienced overpopulation. As alternatives to make a living, ndustries that are based on family units, such as the production of silk textiles, have increasingly emerged as a significant means of generating revenue. This phenomenon established the groundwork and expedited the process of urbanization centred around market towns, transitioning from a region primarily focused on agricultural output to one that caters to the needs of the capital with diversified products. Urbanization encompasses not only the expansion of settlements and early industrialization but also the distinctive urban way of life that was introduced by travellers and immigrants. Typical elements like gardens and ornamental trees can be observed in ancient paintings indicating a shift from a utilitarian landscape to an urban one. Despite experiencing periodic flooding and destruction due to wars, the market towns have persevered and continue to thrive to this day.

Vast water engineering and the following urban sprawl
The perceptible expansion of urban areas, which is visually identifiable in this scale of mapping, has occurred solely in the last twenty years. Prior to that, extensive hydraulic engineering laid the

foundation for its occurrence in this lowland. One major engineering involves the excavation of new canals. The Taipu River (Canal) is considered the most strategically significant, as it restores the site's historical role as the primary outlet of Taihu Lake. This can be interpreted as a means of restoring the indigenous water system that existed prior to the Ming Dynasty. Since the issue of blockage of sea outlets has consistently posed a challenge for the delta region, such a project significantly influenced the feasibility in which the expansive lower regions can be intensively developed. The other major engining involves polders. Broadly speaking, the vast polder engineering can be attributed from a technical standpoint to the gradual prevalence of electrical hydraulic devices from the 1930s, while from a socio-political perspective, the reemergence of a powerful central government that effectively spearheaded extensive social campaigns spanning several decades. In 1985, a significant achievement was announced to have reached, characterized by the completion of four distinct polder-based engineering projects: 1) field irrigation using channels and pumping stations; 2) field flood control using sluices and embankments; 3) drainage and storage of major rivers and lakes using the crisscross canal network; and 4) regional flood control using the great embankment of Taihu Lake and the sluices along it. With further development, this is the water-based system that is still functioning on the site serving contemporary urbanised areas and the surrounding suburbs.
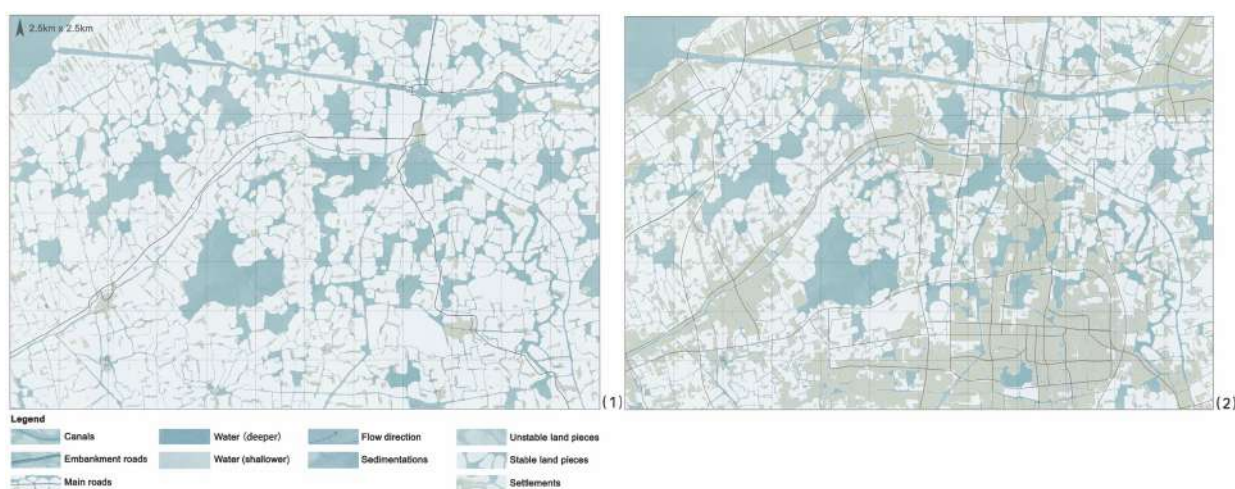
[fig.8] Mappings of the site: (1) circa 1975; (2) circa 2020. Source: elaborated by the author.

Discussion

The necessity of reproducing mappings

The many educative speculations and trials of illustration suggest a significant necessity in making mappings. It should be noted that the selected site, owing to its unique location, is frequently cited in numerous publications spanning multiple disciplines. Numerous monographs containing extensive accounts of the environmental transformations in the YRD have been consulted in order to produce the mapping. Nevertheless, a clear impediment exists in projecting the explicit literal content onto the mapping where a significant disparity is between the ostensibly well-articulated phenomena and mappings to be made. Besides, despite several referable ancient mappings mentioned, there is difficulty in linking them to the site shortly. From the limited examples presented in this article, it is evident that they possess a range of distinctive illustrative features. The utilization of leaving blank space, as commonly observed in traditional Chinese ink drawings, necessitates a level of speculation that is rooted in a comprehensive comprehension of the site. In addition, due to the different georeferencing systems, it is necessary to employ tracing methods that rely on identifiable components. Although urban and rural areas are typically identifiable by their names, significant spatial distortions can frequently be observed, which can complicate the interpretation of other spatial data. In short, the aforementioned experiences underscore the need for the creation of supplementary mappings that run parallel to both historical mappings and modern literal works.

Inheritance in mapping based on iteration in the polder system

It is not hard to find that the evolving water-land spatial characters in the mappings are visually linked to the indigenous densified water representation and the hydrographic net representation. They co-existed in the mappings in most cases, however, one prevailed over the other during distinct time

periods. The densified water representation in the experimental mappings dominates the pre-modernization period, during which the river systems were too dense to stratify in the early stages of the typical dish-shaped lowland typology. Therefore, it is pragmatically speculated that this factor is a primary consideration in the initial implementation of this illustrative representation, in addition to the suggested association with the Song dynasty's artistic genre. Over time, due to the expansion of reclaimed land, it has become increasingly suitable to utilize hydrographic network representation. Discernible primary tributaries began to emerge, particularly following the implementation of modern polder-based campaigns. Joint polders formed water management zones and began to visually coalesce into cohesive land masses. Once strategically ignore or made the dammed tributaries between the polders less visible [figure.9], the mappings highly resemble the ancient pieces under the style of the densified water representation [figure.10]. In the context of enhanced water networks, the modern polder system renders such omissions more justifiable.

[fig.9] An alternative illustration which only remains the main tributaries : (1) classification by jointed polders (water management zones) and (2) classification by the non-dammed water at the status quo (2020). Source: elaborated by the author.

A part of Panorama of the Grand Canal 运河全图 (Zhang, 1703)

A part of Panorama of the Grand Canal in Four Provinces 四省运河水利源泉河道全图 (unkown author, made before 1855).

[fig.10] Drawings from a bird-view perspective depict the landscape along the Grand Canal, passing around Suzhou and Wujiang. The settlements within the fortressed cities and the polders on the islands outside the cities were left vacant. Source: (1) from 《治河全书》 (2) from Library of Congress.

An alternative urbanized polder

With the emergence of the modern polder system and the following vast urbanization, there is a significant change in the polder-based landscape. The identification of the inherited indigenous polder landscape is a subject of discussion (Wang et al, 2022). During the pre-modern era, the dimensions of towns and villages were comparatively diminutive and closely linked to the polders. In comparison with the present, this is not the same case applicable at all. A zoom-in sample centred by a historical water town Zhenze is given as an example to further depict the relationship between urbanization and the existing polders. It can be observed that a significant number of land pieces have been entirely urbanized surrounding the historic town [figure.11]. Despite the existence of several preserved agricultural fields, they are no longer surrounded by traditional waterfront farmhouses or bodies of water, and thus can not be classified as polders under a narrow definition.

Although modern polder engineering did not directly impact the function of single polder units, they do have a noteworthy impact on water management, particularly in the areas of flood control and water storage. Consequently, the polder units in this modern system exhibit greater potential for urbanization with fewer constraints compared to their previous state less resilient to flooding. This phenomenon is not solely associated with the depletion of polders in peri-urban regions; rather, it is primarily due to the fact that the polder-based landscape is less connected to urbanization.

Legend

Water outside the jointed polder units	Boundaries of the jointed polder	Settlements	
Water within the jointed polder units	Boundaries of the single polder units		
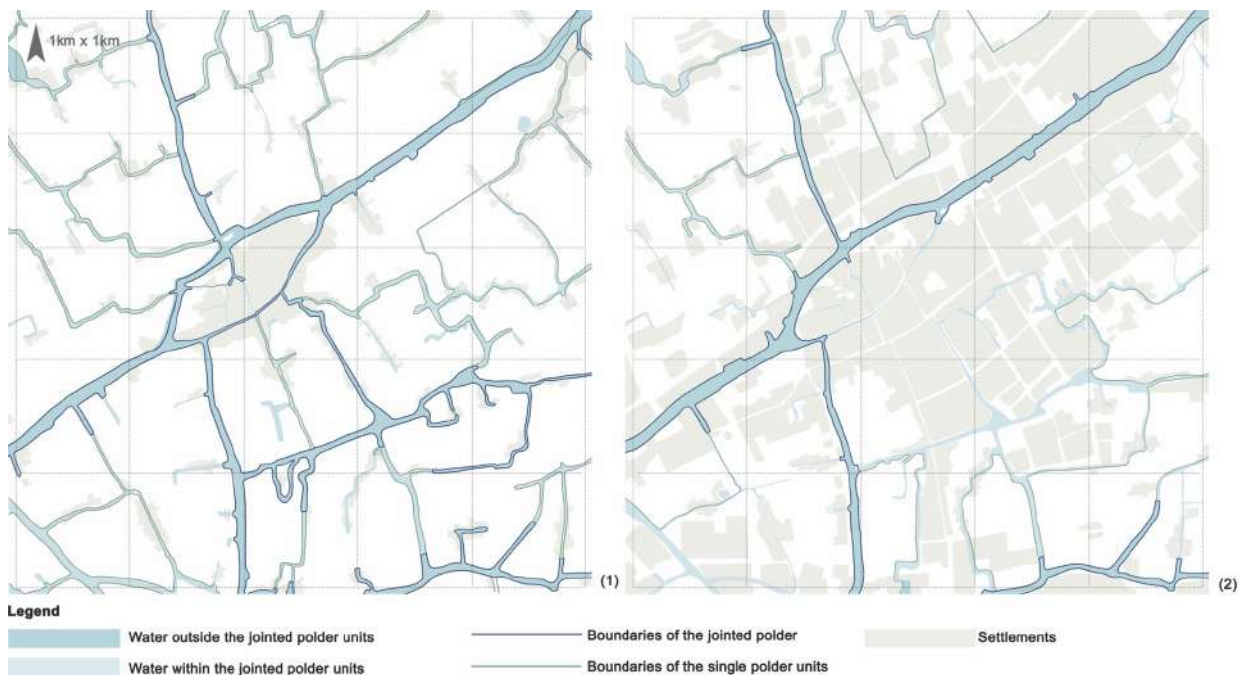
[fig.11] The extension of the jointed polders and the disappearing polder units under urbanization in the 5km x 5km sample centred by the historical town of Zhenze: (1) 1976; (2) 2020. Source: elaborated by the author.

The purpose of the argument is not to provide criticism of the phenomenon through learning from and making mappings. Instead, the mappings clearly suggest that the new jointed polder units take the place of the original ones defined by single polders based on a subjective preference that the indigenous ways of mapping are to be learnt and inherited. While under modern urbanization, the historical polder units present two extremes. One type is (almost) fully urbanised and deprived of the polder-based water system. The other, though highly influenced by modern agriculture, still maintain the functionality of the polder. Taking the zoom-in sample Zhenze as an example, the sample of mapping centred by urbanization can hardly recognize complete polder units [figure.11]. In contrast, when the choice of mapping on this certain scale is given centred by the jointed polder unit, despite being heavily urbanized, the jointed polder unit upholds the fundamental roles of the individual polders with an active water management system [figure.12]. Moreover, several units of the single polder can be recognized within with basic productive landscape and traditional waterfront settlements remained [figure.13]. By this way of depicting the site through mapping, the conceptual preservation of the identity of the polder-based landscape is achieved despite the effects of urbanization. Additionally, the consistency between mappings from various periods is maintained. While mapping alone does not provide a substantial solution to the issue of indigenous landscape loss, it can offer a strategic perspective to highlight their existence over urbanization at present and build connections to various historical clues backwards.

Legend

Water outside the jointed polder unit	Traditional settlements	Agricultural fields
Water inside the jointed polder unite	Modern urban blocks	Polder units
Boundary of the jointed polder		Water sluices
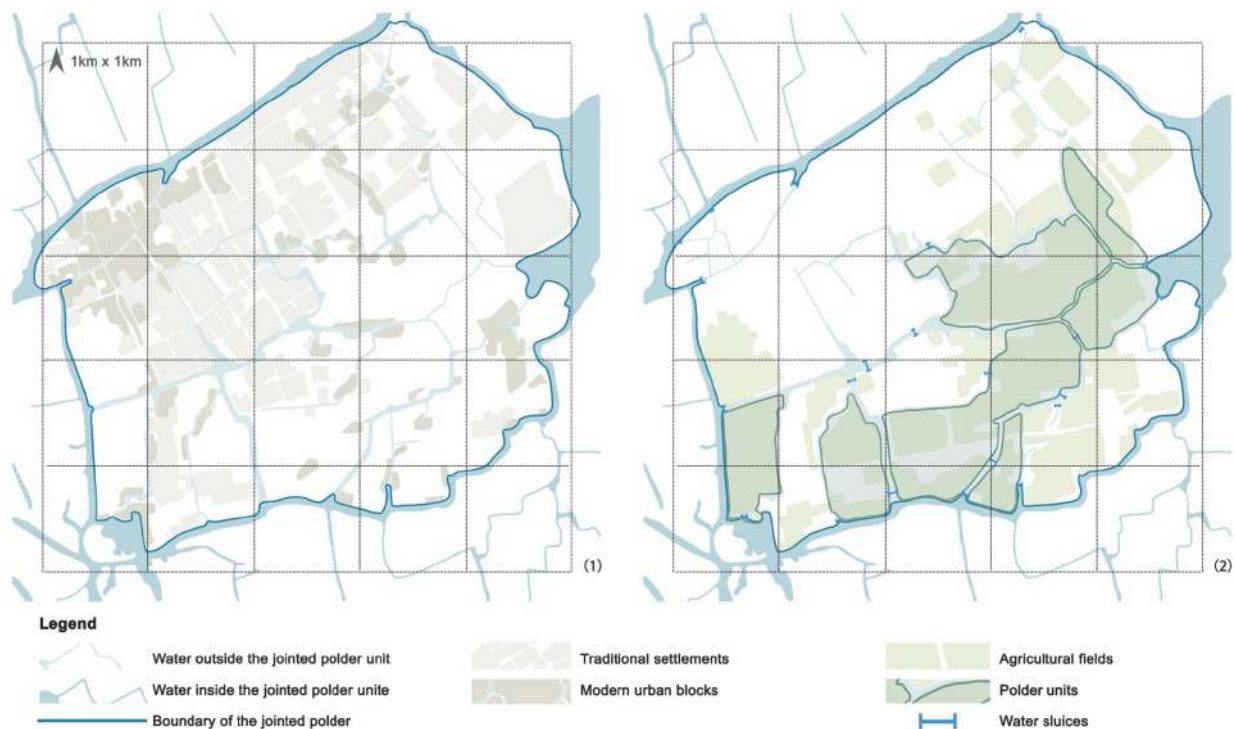
[fig.12] An alternative 5km x 5km sample centred by the polder rather than urbanization (2020). Source: elaborated by the author.

Legend

Water within the jointed polder unit	Irrigation channels inside the polder unit	Traditional waterfront settlements
Water outside the jointed polder unit	Machine-cultivated fields	Factories and warehousest
Sluices	Traditional small fields	Main roads
Boundaries of the polder units	Forests	
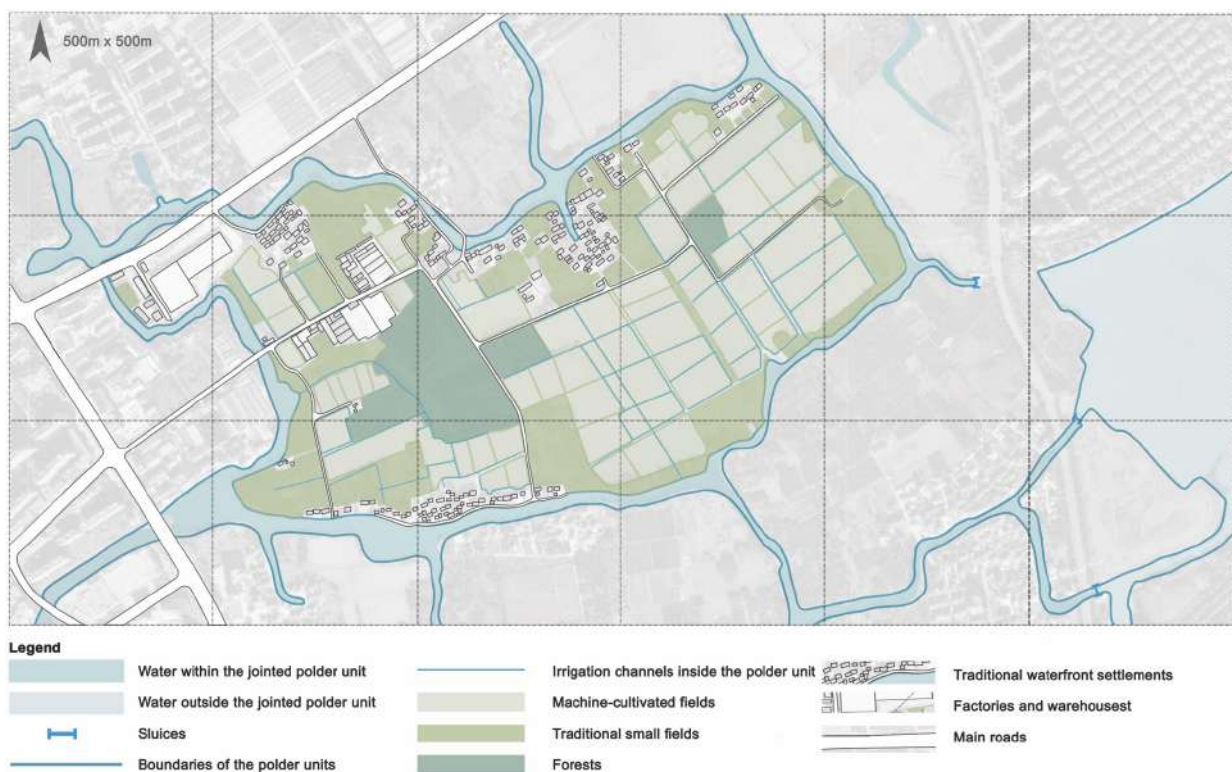
[fig.13] A single polder unit in a zoom-in 3.5km x 1.5km sample. Source: elaborated by the author.

Conclusion

The paper experimented with a procedure of mapping based on educative speculations. The illustrative representations learnt from the ancient mappings are highlighted, rationalised, and adaptively applied on a specific site. The process of creating mappings on a particular site elucidates various potential ways in which the ancient illustrative depictions could be relevant and applicable to modern-day mapping practices. And further, a conceptual suggestion has been put forth based on historical reasons to adaptively apply the indigenous way of mapping for the purpose of maintaining visual inheritance in spatiotemporal mappings. Behind such a diachronic concern, the utilization of

mapping is a subjective tool to emphasize the polder-based landscape and its historical linkages. The loss of the single polder units due to urbanization will alternatively be highlighted with remained polder system by strategically mapping the formed joint polder units to replace them. The mappings, as presented in this paper, have the potential to be expanded in terms of their quantity, level of detail, and range of zoom-in and zoom-out scales. The experimental expansion is expected to further yield valuable insights for future observations, as opposed to the limited mappings currently utilized for each long time gap.

Acknowledgement

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Water as ecosystems driver for the Ecological Transition in the Vietnamese Mekong Delta

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As a vast rural agrarian landscape with approximately 30% of urbanization, Vietnam's Southern central metropolitan region is trending towards the peri-urbanization of the greater Ho Chi Minh City, some of which crosses the border into the Vietnamese Mekong Delta region in the South (Kontgis 2014). At the territorial scale, the thesis uncovers the dynamic transformation of the Delta's urban-rural territories, revealing rururban expansion across the agrarian fabric resulting from agricultural and non-agricultural activities, a phenomenon identified by Terry McGee in South East Asia as *"Desa-Kota"* or "village-city," (1991), as the Asia equivalent condition to *Citta Diffusa*, as identified in the Veneto region by Indovina (1999)—however much can be learned from their radically opposite social, historical, political, economic and environmental atmosphere.

The research includes palimpsest atlases across urban-rural territories of Long Xuyen Quadrangle in the Vietnamese Mekong Delta; and how the once agrarian-oriented production region has transformed into that of diversified mixed fabrics—for habitat, leisure, commercial services, and production in agriculture, orchard and aquaculture—evident of a Social-Ecological resilience at play resulting from dynamic activities. The research concludes different patterns of alternating landscape mixes and patches, shedding light on farmers' alternative use of existing water infrastructure to better adapt to the changing fresh and saline water ecosystems resulting from the impact of climate change and anthropogenic modifications of the Delta by large-scale hydraulic projects.

These hybrid land transformations reveal a new value propelled by the local population of farmers and families, which evokes alternative rationalities concerning the initial infrastructure investment made to drain and irrigate land during the Green Revolution since the 1990s. An alternative way of metropolitanization is discussed through the perspective of the Horizontal Metropolis (2018, 2018, 2022) and the lens of Urban Political Ecology as a radical Social-Ecological urban-rural integration strategy (Swyndegouw 2003). Furthermore, in addressing the Vietnamese government's current promotion of an integrated sustainable development strategy across the Mekong Delta regions (Resolution 120) through their proposed *Agri-business* plan (MDP 2013, MDIRP 2022), the thesis aims to promote an Ecological Transition for the Mekong Delta's communities, under the principles of Agropolitan development in the Asian context as defined by Friedman (1978). A research-by-design approach is taken to synthesize the mappings and integrate principles through urban design.

A brief introduction to the Mekong Delta, challenges

Centered in the Southeast Asian milieu, the Mekong River branches out into tributaries, together with Hau River's tributaries; they make up the "Nine Dragon River Delta" in the Delta in southern Vietnam. Vietnam's Mekong Delta area lies south of Ho Chi Minh City, with a population of over 17 million. As one of the world's largest rice export, the Mekong Delta is known as the "rice bowl" of Vietnam, exporting approximately 80% of its total agricultural production (Biggs, 2005).

The Delta's naturally self-regenerating river estuary faces the consequences of climate change and sea-level rise, whereby formerly fertile soils have become degraded by land subsidence and salination due to weather fluctuation and temperature rise, excessive groundwater extraction, increasingly infrastructurally controlled water resources, and the intensification of irrigation. Numerous scientific studies conducted from the Mekong River transboundary region down to the Vietnam Mekong basin conclude the dire impacts of climate change, sea-level rise, and anthropogenic processes on the Mekong Delta.

Consequently, future projects are even more urgent in addressing the numerous overlapping alarming claims in the increase in sea-level rise, flooding, drought, land subsidence, salinity intrusion, and a decrease in sedimentation necessary, which generally nourishes the Delta's estuary and enables ecosystem services in agriculture production. In particular, climate change impacts have exacerbated environmental degradation and risk in dense urban areas in the Mekong Delta over the last few decades. In addition, climate change impacts are compounded by anthropogenic impacts, including the urban heat island effect, urban water pollution, urban flooding, and ground subsidence, escalating the urgency to rethink future projects to ameliorate the challenges faced in dense cities. These challenges highlight the need for a shift towards a more adaptive climate and geomorphic processes as a resilient, sustainable development approach.

Palimpsest research and findings

The Vietnamese Mekong Delta's evolution towards modernization stems from a Marxist view of economic progress, that of capitalist production—as it has undergone what Lefebvre defines as the stages in spaces-of-production, a progressive spatial shift from the extraction and exploitation of environmental resources into the commodification of ecosystems services and towards an acontextual capitalist-driven globalization of services, resulting in the fragmentation of spaces and territorial processes.

The Delta has established its state as 'second nature,' and its water ecosystems must become the subject of discourse moving forward in the state of the Anthropocene. The Delta's current state, composed of canalized irrigation works, these complex processes between water nature and techno-hydraulics have paved the way to New Nature as new kinds of spaces: Spaces for production, spaces for inhabitation, and spaces whereby regenerative social-ecologies could emerge as the new deltaic territorial dynamic between humans and nature.

The historical narrative generated from the palimpsest atlases in Figure 1 reveals how centralized and decentralized mechanisms led by hydro social-technology and managerial water policy have radically altered the Delta by transforming its territory against the laws of nature. The palimpsest maps show the progression of the planning of territories through regional zoning of different water control mechanisms added over time, from the alignment of the first canals to the artificially devised watershed management zoning, and on top of this system, large-scale hydraulic projects were added —all mechanisms partaking in water control.
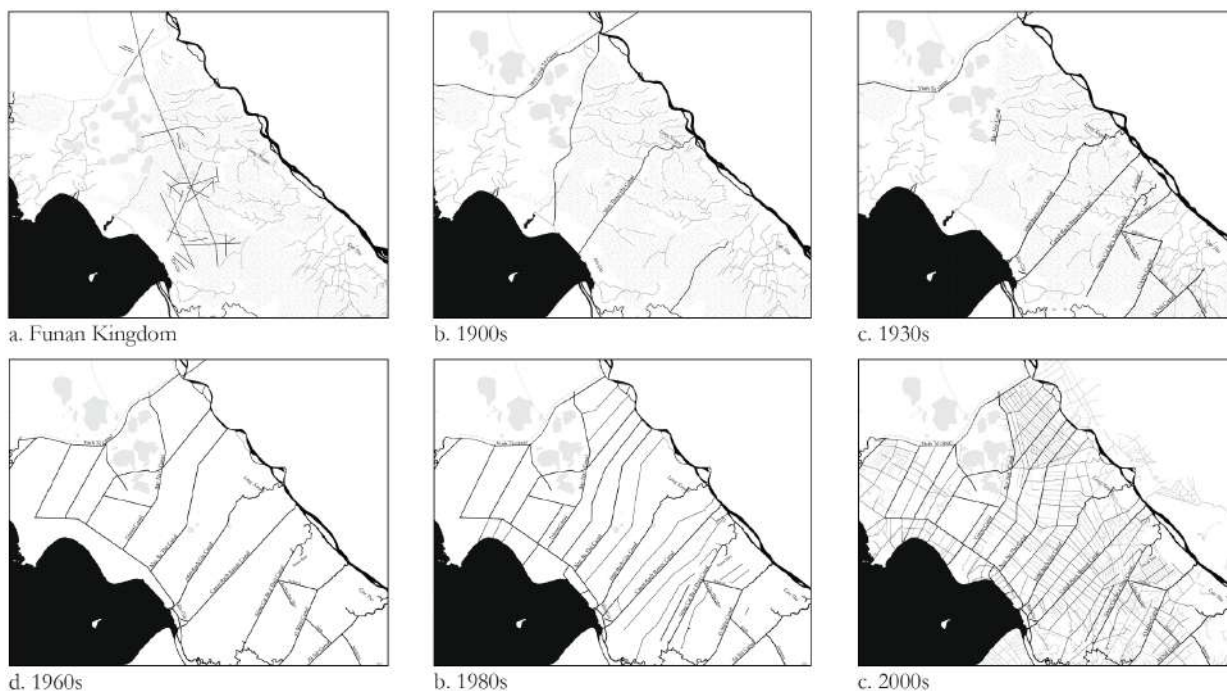
[fig.1] Palimpsest of Long Xuyen Quadrangle and the West Bassac Region, from the Funan Kingdom period to the 2000s. Elaborated by the author.

Desakota response

The rural-urban territory in the Mekong Delta exhibits a new value propelled by the local population, characterized by rururban *Desakota* activities. These activities challenge the traditional infrastructural investments made during the Green Revolution and present alternative rationalities for development. The land mosaic and hegemonic transformations found in the Mekong Delta's rural-urban territory reveal a new value that evokes alternative rationalities concerning the initial infrastructural investment made to drain and irrigate land during the Green Revolution since the 1970s.

The Section in Figure 2 illustrates a hypothetical construction of the canal over time to rationalize the sequence of logic behind development: Step 1, stilt homes are locally and historically built along the river levee; step 2, dikes are built behind stilt homes to prevent flooding and to cultivate ricefields, and shophouses appear with ramp access to the road; and Step 3, once dikes are further raised and stilt dwellings relocated, the local response is to densify mixed uses adjacent to it and, provide direct platform access into houses, & illegally breach the agricultural field zones by extending the orchard zone via an extended landfill.
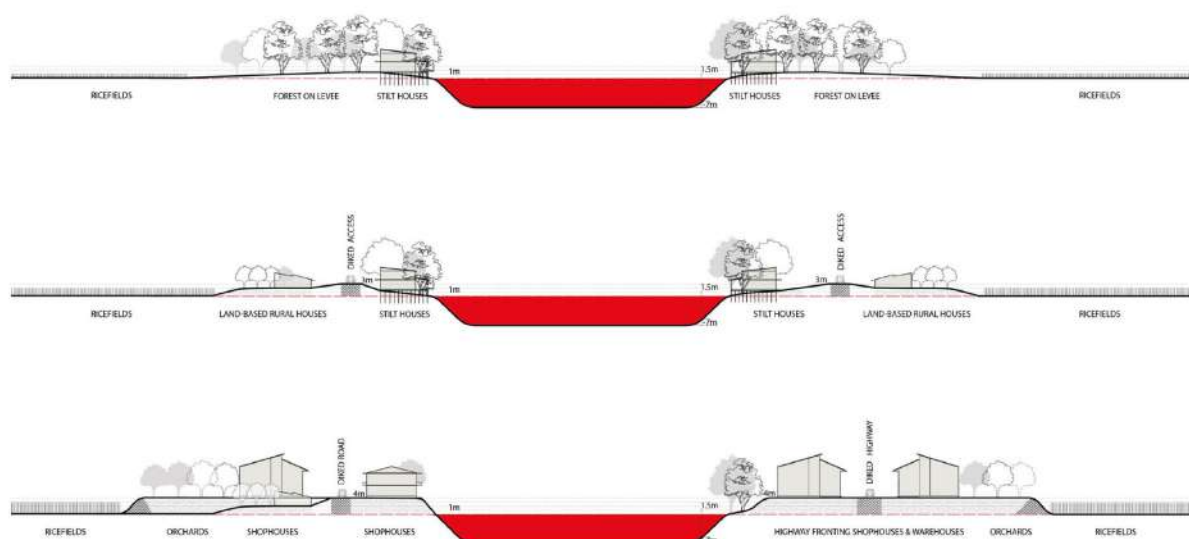
[fig.2] Diagrams showing the logical sequence of canal fronting construction. Elaborated by the author.

314

As a result, the area becomes densified with old and new fabric along the 'multi-functional' dike-based roads; new development appears to thicken the riverfront fabric, however, by turning their backs on the waters and catering to commercial activities along the roadside. Thus, throughout the decades, the Desakota response to infrastructure investment was to capitalize on the elevated embankments along the canals, the flood protection provided by the dikes by building shophouses along them, and, by activating the street fronts with commercial activities with direct access to industrial processes. Paradoxically, the investments made during the Green Revolution to capitalize on water irrigation works to bolster rice production, have attracted the encroachment of habitat and commercial activities into the intensified fields. This reveals resilient actions at the local level in response to socio-economic needs to bridge the climate change impact gap by diversifying crops as the gradual bottom-up proliferation.

Case Study sample: Long Xuyen

Over time, the Mekong Delta's land cultivation and development patterns have evolved. From mixed perennials and seasonal rice fields in the past, there has been a shift towards rice intensification and urban-rural growth due to water infrastructure improvements. The valorization of water infrastructure through landfill and highway linkages further led to rice intensification and urban densification. However, environmental degradation has necessitated diversification away from intensified rice crops towards orchards and aquaculture in saline and freshwater areas.

The research raises the question of how future diversification can mitigate threats to the Mekong Delta's water ecosystems in the face of climate change and anthropogenic impacts. The case studies highlight a transition where the original investment in engineered infrastructure, such as irrigation, has been adapted to meet Social-Ecological needs. The Desakota movement towards a rururban horizontal model has transformed *Hard Structures,* or engineered infrastructural structures, into multi-functional spaces, integrating living, working, and agricultural activities. Despite the limited presence of public open spaces, the concept of *Weak Structures*, which emphasizes the continuity in ecological open space systems and processes, holds the potential to reshape the Delta's currently gridded hydraulic infrastructure system.

Figure 3 shows how the overall changes over four decades from 1988 to 2018 through the LandSAT land-use mapping. Here, the rationality of the final conversion into a buildable area logically expands from the old city and territorially dispersed within the green corridors, whereby double rice and perennials were converted into built areas (in orange and light pink). Moreover, green corridors are at the edge of the urban extents, whereby larger sprinkles of triple rice have been converted into small built areas (in bright pink). As a result, more diversified primary canals have emerged along the identified 'double-triple rice corridors,' with thickened orchards and settlement areas, whereby some triple rice crops have been converted into water bodies or fish ponds in the form of gridded pond compartments.
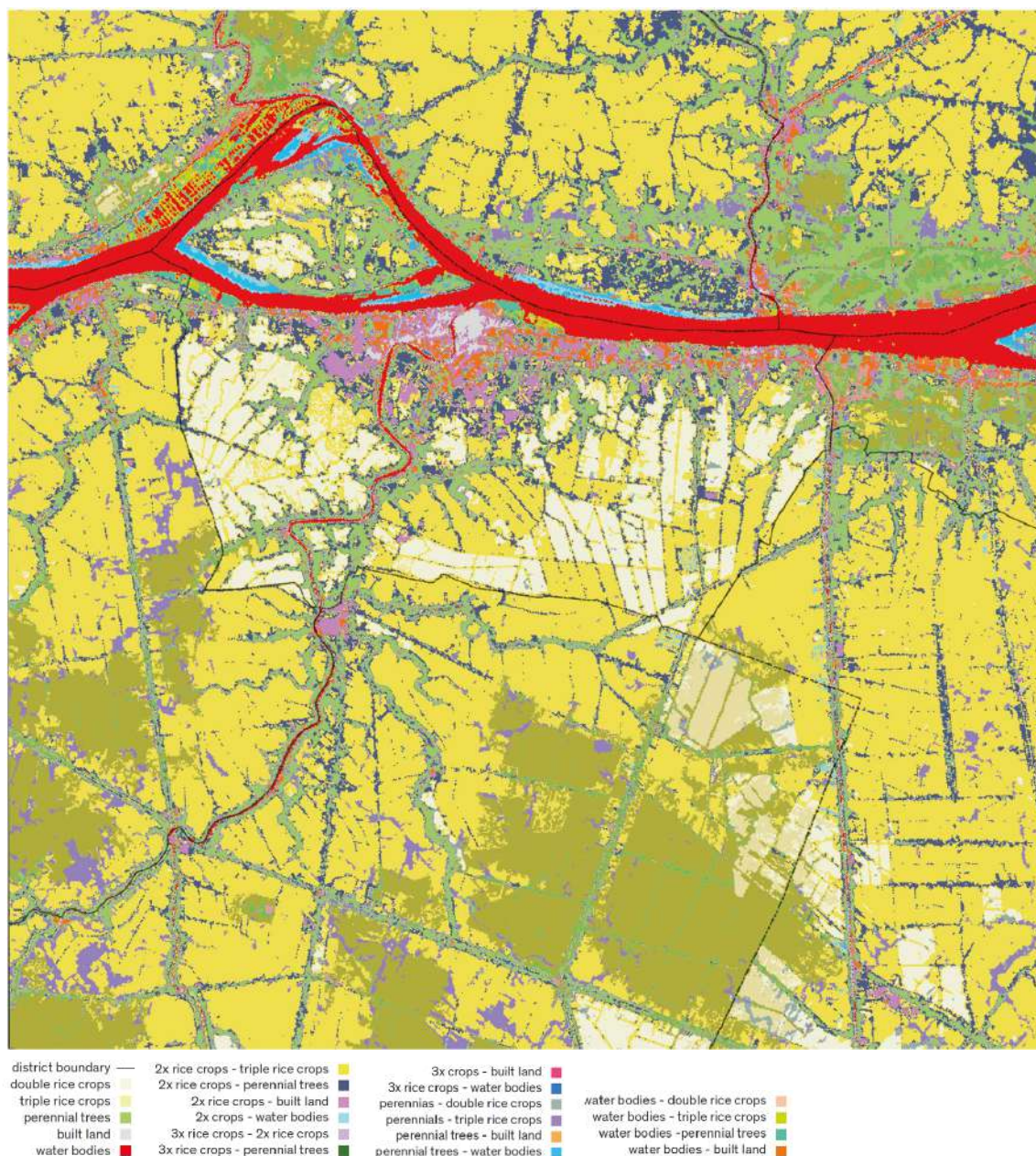
[fig.3] Map of Long Xuyen City's study area land-use from 1988 to 2018. Elaborated by the author from Can Tho University in collaboration with Diem Kieu Phan, Land Resources Department.

Radical territorial transformations have occurred since 1988. First, the most ecologically pressing changes to the land include the vast amount of monorice crop fields in the deep-water region, which were gradually intensified and converted into triple rice crops. Second, the fact that almost the entire region at some point (at over 80% coverage) had been converted in one way or another into double and triple rice crops, notably from double rice crops. Third, by 2018 amount of rice fields was reduced by converting smaller areas into triple rice crops—thus yielding the same amount of rice and making room for more diversified perennials by converting the combined double-triple rice zones, more than doubling the number of perennials from 2008 to 2018. Lastly, a visibly significant land shift was into buildable areas, which shaped the Long Xuyen urban extent, multiplied by almost triple.

An Ecological Transition for the MD

The Mekong Delta's hybrid land transformations and the engagement of farmers and local communities in diversification indicate the potential for an Ecological Transition. This transition involves integrating urban and natural processes through territorial projects that shall foster resilient development strategies–under the Urban Political Ecology lens and the Horizontal Metropolis paradigm.

The Delta under the Urban Political Ecology lens

Prevailing political and historical events have propelled the Mekong Delta into its current state of a 'Delta Hydraulic Machine' (Biggs et al. 2009), turning it into a great case for demonstrating the process of modernization in a relatively short period of the history of materialism based on land resource extraction, appropriation, and capitalistic production. These processes have exploited the Delta's ecosystem services mainly for agricultural production, treating the Delta as an *object*, as a local and global commodity.

As processes in the Delta consist of an action and reaction, political local, global, or ecological winners and losers from the complex dynamics (between humans and nonhumans), it is manifest that Urban Political Ecology is at play in the metabolic transformation of the Delta's ecosystems mainly for industrialization and urbanization purposes. The Urban Political Ecology perspective theoretically claims that global and local forms of capitalism are integrated into social life, which has Social-Ecological consequences, as it reclaims the natural order of things and reconfigures it (Erik Swyngedouw, Maria Kaika, and Esteban Castro 2002; Heynen, Kaika, and Swyngedouw 2006).

The call by Urban Political Ecologists is to address Social-Ecological justice through the emergence of the democratic project (Heynen, Kaika, and Swyngedouw 2006). Hence, Vietnam's rapid rise onto the world stage as one of the principal rice exporters in the world must be challenged, as it has subsequently transformed the Mekong Delta's dynamics into a global competitor at the Social-Ecological cost of the livelihood of its local demographics and the environmental cost of its water ecosystems.

Resolution 120 and Mekong Delta Plans

Despite the massive investment made in hydraulic works in the widespread extension of irrigation systems across the Delta since the 1970s, today's "Green Revolution" in Vietnam is centered on *Resolution 120*. As a new nationwide mandate, Resolution 120 takes on a radically different approach via environmental adaptation based on more adaptive models, as a means of adapting to extreme weather conditions from climate change, sea-level rise, and the consequential fresh water and saline water soil conditions, as the new norm in the Delta (Resolution 120). This mandate has been further developed through the Dutch and Vietnamese bilateral cooperation through the Mekong Delta Plan, with the approved *Agri-business* scenario, and further implemented through the Mekong Delta Integrated Regional Plan (MDP 2013, MDIRP 2022). These newly approved master plans reflect sensitivity with respect to nature, for example, through the Dutch Delta Approach in Nature-Based solutions, which are encouraged in the 2050 master planning vision for the Mekong Delta's Agri-business plan, with the intention to elevate 80% of the agriculture sector based on ecological and high-quality agriculture (The Socialist Republic of Vietnam and the Kingdom of the Netherlands 2013; VNA 2019; Socialist Republic of Vietnam and the Kingdom of the Netherlands 2020).

Moreover, Resolution 120 calls for interregional development across provincial and district scales of implementation via planning strategies across multiple projects and subprojects adapted to different contextual soil qualities. This call brings purpose to the (re)consideration of the Delta at the watershed level, with the potential to explore the cross-scalar and interrelationships built across water ecosystems. Therefore, Resolution 120 serves as an excellent opportunity to foster not only the Delta's natural ecosystems but the farmers' livelihoods as a community living in the rural and rururban territories of the Delta. Through this initiative, the thesis aims to promote an Ecological Transition for the Mekong Delta's communities, through a radical project vision, with principles founded by Friedman in the *Agropolitan* district within the Asian context (Friedmann 1979). Furthermore, the thesis proposes *in-situ* urban design frameworks to realize further the *Agri-Business* plan vision as a Techno-Nature-based, Agro-Social-Ecological framework that could build the rururban population.

The MDIRP's latest plan offers a strategic integration of past hydraulic projects and new sub-hydraulic projects (2022) based on a more interconnected water management plan of mechanisms associated across existing canals (the dikes, sluice gates, pumping stations), which has the potential to be integrated into the thesis' proposal of an Agro-Social-Ecological framework by (re)configuring sub-hydraulic projects across multiple functional waterscapes, in relationship to socio-ecologies. This integration would benefit not only water ecosystems but society via new relationships to work, live, and outdoor leisure. In addition, engineered water structures established by canalized hydraulic infrastructure could be reorganized under the principles of blue-green ecological corridors, comprised of elements of natural waterscapes and collective open water spaces.

The Horizontal Metropolis, a new project paradigm for the Mekong Delta

Having challenges discussed through the aims of Swyndegouw's Urban Political Ecology serves as an alternative way of metropolitanization, which shall be explored through the perspective of the *Horizontal Metropolis*; as an alternative way of metropolitanization, which was observed by Bernardo Secchi and Paola Viganò across explorations of Brussel's regions (1990-2014)(Barcelloni Corte, Cavalieri, and Viganò 2018; Barcelloni Corte 2019; Barcelloni and Viganò 2022). The *Horizontal Metropolis* is a radical Social-Ecological approach to integrating urban, rural, and natural territorial processes; it regards the idea of the European metropolitan city as a diffuse urbanization phenomenon characterized by self-organizing processes across dispersed living territories, also known as *Citta Diffusa*. Discovered in Italy, Citta Diffusa was founded by Indovina in 1990 and further investigated by Secchi and Viganò, whereby once dispersed territories were found to be transformed by centralized urbanization.

Thus, the research-by-design epistemology centers on a hypothesis that the Citta Diffusa concept can be applied across the Mekong's territorial organization, however, based on the East Asia equivalent existing phenomenon found in *Desakota*—despite its significant difference to Citta Diffusa. The Citta Diffusa concept was derived from Indovina's study of the Veneto region (1990), whereby a new pattern of diffused urbanization was found across the rural region, a diverse mix of old and new, big and small settlements of self-built and self-organized homes, exempt from rent. This phenomenon results from the outmigration of urban dwellers into the rural region, within a zone of different economic conditions, under a low level of essential services and even limited road access—however, some are attracted by production access or technological opportunities in peripheral areas. Nevertheless, it is a self-sufficient work-live environment for middle-income inhabitants whereby production takes place at decentralized locations as a response to the dissatisfaction felt living in the centralized city. These diffused territories are home-oriented, with some elements of urbanism and a weak link to community services.

In contrast, the Desakota phenomenon in the Mekong Delta is driven by infrastructural investments and primarily attracts local farmers seeking better economic livelihoods. Desakota is attracted to ecosystem services that help fill the livelihood gap. While, Citta Diffusa critiques centralized cities, Desakota embraces cities' intensity, density, and commercial activities. Both phenomena challenge traditional urban and rural planning policies and transform the context to meet social needs.

However, Citta Diffusa has received positive responses and support from public-private cooperatives, while Desakota territories in the Mekong Delta remain unrecognized and face water ecosystem stress and infrastructure strain. Ultimately, as a concept that could benefit Desakota's future projection, Citta Diffusa is well characterized by the ideas highlighted in the Horizontal Metropolis, whereby horizontal connections diffuse the ranking of places to create a "non-hierarchical" territory. The diffused city is thus not characterized by any spatial hierarchies as everything is equally accessible in all directions or multi-directional—thus. Although it is non-hierarchical internally, it is still set inside a regional context of traditional territorial hierarchies. On the contrary, though the Desakota phenomenon began from a networked territory of dispersed linear urbanization, it has resulted in a hierarchy of spatial destinations, increasingly hierarchically organized around infrastructure and urban centers, resulting in environmental fragmentation.

Therefore, the challenges posed by the Mekong Delta's Desakota conditions under the umbrella of not only climate change and Second Nature's State of the Anthropocene but the challenges posed by the Delta's water ecosystems due to centralized and decentralized geopolitical processes all become subject to a radical project based on the figure of discourse posed by the Horizontal Metropolis: To answer the challenges between the disconnected, diffused and clashing mixed territories resulting from processes of technological modernization, the centralization of urbanized planning (and spatial social capital, between the natural and political) as well as the decentralization of production (privatization, globalization, and corporation). Under the discourse of the Horizontal Metropolis, the region's future extended metropolis can act as an agency of transformation of horizontality and metropolis—as a radical project whereby non-hierarchical horizontal processes and relations between water nature and human urbanization can be (re)introduced across the extended post water techno-managerial territory (Barcelloni Corte 2019).

Proposing an Ecological Transition for the Vietnamese Mekong Delta Rururban Political Socio-Ecologies

The research-by-design proposition aims to bridge the scale and processes between the proposed Mekong Delta-wide *Agri-business* plan and the local Social-Techno-Ecological interrelationships between a work-and-live lifestyle. With the ambition of fostering the Horizontal Metropolis paradigm for the future

rururban development patterns across the deltaic territory, the project aim is to release the stress imposed on water ecosystems and promote cohabitation between humans and nonhumans. The objective for the future vision of the Mekong Delta is to mitigate between a history of centralized planning and mega-engineered water management based on engineered hydraulic systems and to foster the local resilience pattern reflective of the multi-functional Socio-Techno-Ecological relationships found in the fabric. This objective can be achieved by formalizing a spatial territorial design framework in relation to the current infrastructure and associated Social-Ecological surroundings through blue-green corridors characterized by *Weak Structures.*

The Agropolitan model

The thesis proposes adopting Friedman's Agropolitan model (1979) as a beneficial principle for the Mekong Delta's urban-rural Ecological Transition. In the 1970s, the Agropolitan model was a radical stance taken against the negative impact of the industrial and urban transition, resulting in urban flight and an outmigration into rural milieus in search of freedom in housing and jobs in agriculture. In addition, the model fosters the need to emancipate the farmers and rural peasants from the centralized planning model often endorsed in urban planning via the decentralized autonomous model based on community self-organization and self-sufficiency (Friedmann 1979). Therefore, the Agropolitan model shall serve as a basis for investigating the Mekong Delta's current Desakota phenomenon and intensified rural development trends, particularly toward urbanization.

As a gridded hydraulic machine, the development of the Mekong's agrarian territory has yielded some quantitative and modular characteristics, whereby improved prototypical projects could well serve by better responding to different environmental and geographic contexts. For example, the existing conditions of the typical distance between feeder or primary canals range from 7km to 14km, and the standard canal width of the inner primary canal range from 35 to 50m. As massive hydraulic infrastructural systems, they should be reframed to transform the industrial scale set by the agrarian regime to a livable scale as part of the urban-rural milieu.

The prototype for diversification proposes a 500m for Social-Ecological 'diversification' processes by offsetting the span on both sides of the primary canal to create a 1km wide ecological corridor. This corridor is envisioned conceptually as a dedicated ecological multi-functional space to foster paradigms in making "room for the river," diversified types of ecosystems based on different freshwater bodies and soils, i.e., renaturalized water bodies by wetlands, mangroves, and forests, reintroducing spaces whereby ecological wisdom in cultivation practices, e.g., traditional floating rice. These new types of water and open spaces could foster farming based-communities and introduce other innovative practices in permaculture and agronomy.

Depoldering infrastructure to make way for the Weak Water Structure

These propositions are envisioned as a post-rationality for the existing technological systems of canals. If parts of the dikes were depoldered or released, the trend towards Social-Ecological diversification in habitability, land cultivation, and aquaculture could well be fostered by freeing up some open water space for natural, however, controlled, open space relationship between nature and the seasonal flooding pattern—as well as planning for the long-term flooding events. The deltaic water's natural cleansing processes could partially resume within the 1km corridor at parts deemed compatible with the ecosystem functions and land cultivation practices.

Figure 4 shows the stages of canal front development; the stilt homes which grew organically lined along the natural levee of rivers or canals became increasingly overlooked after flood protection was introduced in favor of rice production by the addition of dikes to the back of the linear settlements. The rural fabric grew through road-oriented shophouse development. Consequently, the stilt homes were unmanaged and disregarded, leading to the environmental degradation of the river or canal embankment, water pollution, and subsequent Social-Ecological risk due to environmental conditions.

The research-by-design proposes to restructure the existing hydraulic infrastructure by providing a framework along the new *Social-techno-ecological water corridors* as a solution that respects the rural population's water-fronting lifestyle while ensuring safety, security, and Social-Ecological opportunities. As the existing irrigation structure is already gridded, different patterns of the dike's depoldering process could occur along the canal based on contextual conditions and community needs. Figure 5 shows the proposal, whereby rather than excavating sand from the canals to build dikes along the immediate embankments, the project

proposes a stepping terraced relationship of excavated soils at 1m increments from the canal up to 500km away from both sides of the water, whereby existing dikes continue to serve as flood protection to inhabited areas, and replacement dikes could restructure depoldered land areas based of specific configurations between water and inhabitant spaces. This new prototype would open up the possibilities for variations in water levels and water controls based on contextual conditions and community needs to promote the diversification of land use and cultivation practices.

[fig.4] section showing the existing canal conditions, general condition of stilt housing along canals with added dikes. Elaborated by the author.

[fig.5] Section showing the proposed expansion of existing canals by depoldering and stepped terracing, with relocation houses. Elaborated by the author.

Figure 6 depicts the 'comb-like' irrigation system established during the French colonization, with primary canals designed for water drainage. Over time, these canals have become densely urbanized, accompanied by parallel road networks and increased land densification. Subsequent subdividing canals, implemented after the 'Doi Moi' reform period, primarily serve as irrigation systems and water management for the sparsely inhabited Long Xuyen Quadrangle region. These newer canals fill the wide scalar gaps in between the original colonial canal structure, providing more frequent water irrigation to support the lightly settled corridors that present an opportunity for a prototypical model to foster the Ecological Transition and support the diversification initiative.

[fig.6] Map showing existing conditions of the regional study area, particularly noting the relationship between the currently densified linear areas along the historically dredged canals and the low-density subdividing canals added in the 80s. Elaborated by the author.

These new *Social-techno-ecological water corridors* reframed within the 1km wide ecological corridors shall serve as attractive new places to work and live—while integrating the few existing rural settlements; meanwhile, existing linear settlements of Desakota-based activities shall remain along the colonial-era primary canals. These ecological corridors would offer a more dynamic Social-Ecological habitat within the formerly engineered water canal infrastructure, ecologically transformed to foster the relationship between the human and natural milieu. As a newly multi-functional techno-water-scape, these Social-Ecological corridors serve as multi-function grounds of waterscapes, ecological, cultivable, and open spaces to foster the Agropolitan communities as places for work, live, and leisure.

As shown in Figure 7, characterized by *Social-techno-ecological water corridors* whereby natural and artificial processes could coexist between water ecosystems and habitats, they are proposed along subdividing canals to foster a resilient and diversified interrelationship between different ecologies, habitats, and water ecosystems as a Social-Ecological framework. Therefore, whereas the economic activities existing in the historical canals can resume, a phasing of new activities based on water as the agency and its interrelationships between humans and nonhumans alike shall be generated as a new attractive place for cohabitation. Once implemented, this framework shall promote the continuity of species across corridors and the regeneration of biodiversity across the Mekong Delta to reinstate the countryside and its more

urbanized characteristics through well-being and belonging through community cultural identity for those living along the canals, as a diffused Agropolitan territory.

[fig.7] Urban design framework proposing 1km wide *Social-techno-ecological water corridors* to reframe the subdividing primary canals as Weak Structures characterized by water ecological continuities. Elaborated by the author.

At the transect project scale, the section to the top in Figure 8 shows a typically engineered canal with dike and irrigation system based on existing conditions; the primary canal is approximately 25m to 35m in width. The elevated embankment characterizes both sides of the canal, supported by 2.5m high dikes doubled up as a general road linkage for narrow traffic flow at approximately 3 meters in width. Homes typically line these roads with privately provided access; in this case, the house is built on an elevated concrete platform with light ramp access to the road. Orchards are cultivated on top of the plot and intensified agricultural fields span the rest of the area. The section to the bottom in Figure 8 depicts the transformation achieved by depoldering part of the canal's dike to create a new water space for various ecosystem services. The design includes stepped water terraces and proposes a water pond for retention or fisheries. In addition, the dwellings are set-back with water gardens along the canal, and a new diked road allows for the development of a polder town.
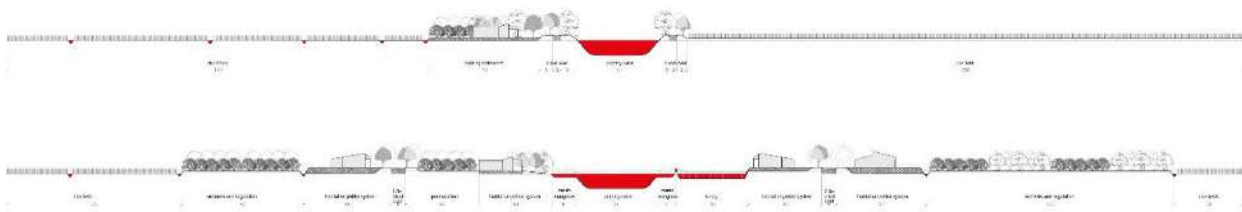
[fig.8] Sections of the existing and proposed ecological corridor scenario. The proposed new ecological section to the bottom, shows the proposed stepped terraces whereby the canal is expanded to accommodate different water bodies. Elaborated by the author.

Figure 9 depicts the transformation of the canal, highlighting the distinction between lowered water levels and the poldered habitat area along the road. Various water types support diverse wildlife habitats. Traditional fishing methods are used, and the flow of deltaic waters contributes to the growth of marshes, mangroves, and water-compatible species. Irrigation channels serve as part of the cultivation system for trees and vegetation. Adaptation to climate change is possible by alternating between aquaculture and floating rice or shrimp and rice. Improvements in public services can include collective gardening spaces and water filtration systems, enhancing the countryside lifestyle.
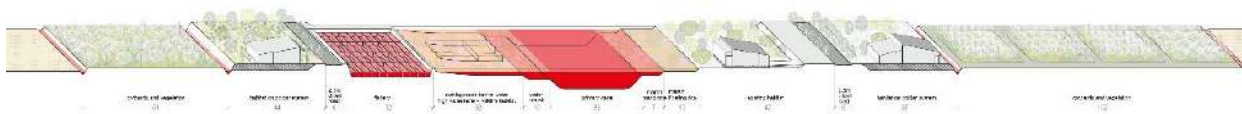
[fig.9] The axon illustrates the transect across the canal, proposing different types of water spaces for fauna and flora and various water-land-based cultivation practices within the surrounding community. Elaborated by the author.

The Ecological Transition scenario of the existing canal into the *Social-techno-ecological water corridors* paradigm shall transform the canal with thickened moments composed of multi-layered types of open spaces along the canal, resulting in diversified landscapes whereby ecosystem processes and cohabitation could take place. These *Social-techno-ecological water corridors* ensure the adaptation to living with the water as climate change impacts intensify, and it introduces a new water ecosystem through the alteration of the built water infrastructure by offering more diffused water and landscape relationships. New landscapes are envisioned to offer diversified services to neutralize the current fragmented geopolitical territories and improve environmental qualities by partially reinstating natural water processes.

Conclusion

The proposition for an Ecological Transition in the Vietnamese Mekong Delta presents a radical project that seeks to address the challenges faced by the region in the face of climate change and environmental degradation. Resolution 120, a nationwide mandate in Vietnam, emphasizes the importance of environmental adaptation and living in harmony with extreme weather conditions. It calls for ecological and high-quality agriculture, signaling a shift towards a more sustainable and nature-based approach to farming. This mandate presents an excellent opportunity to protect the Delta's natural ecosystems and improve farmers' livelihoods in rural and rururban areas. The project proposal suggests adopting Friedman's Agropolitan model by promoting autonomous and self-sufficient farming habitats. The Agropolitan model can support family farms and foster a sense of belonging and connection to the land, offering an alternative path that capitalizes on the Delta's ecosystem as a competitive advantage.

The integration of past and new hydraulic projects, as outlined in the MDIRP plan, can contribute to the Social-Ecological development of the Delta. By reconfiguring hydraulic infrastructure and incorporating civic open spaces, water ecosystems can be better protected, and society can benefit from improved living and leisure spaces. The proposed creation of a 1km wide ecological corridor along primary canals further promotes Social-Ecological diversification, with a focus on renaturalized water bodies and innovative farming practices, by depoldering and stepped terracing techniques to create variations in water levels and controls, fostering the diversification of land use and cultivation practices.

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II.d

Social actions : from sharing to appropriations

Generative analogy for a collective action in urban design

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This paper examines the use of analogy in addressing collective action in urban design and proposes an analytical framework centered on generativity driving collective action. The cases discussed - Atelier des Place du Grand Paris and la Preuve par 7 - showcase the evolution of collaborative practices in urban design, highlighting two key aspects: the expansion of collaboration to tackle complex design challenges and the dissemination of results, whether in terms of products or processes, leading to significant collective action endeavors. Both cases aim to develop an analogy for creative adaptations within the realm of collective action. The discussion explores the distinct nature of these analogies as catalysts for cognitive displacement or as new frameworks for inquiry.

Introduction

The use of analogy in learning, scientific research, or design has been the subject of numerous studies, from its trivial forms to its more creative and decisive contributions (Sander, 2000; Durand-Richard, 2008; Chupin, 2013). These works highlight the different registers of analogical reasoning in their respective fields, while also showing the difficulties in establishing a robust analytical framework for their research object due to its vast boundaries. In fact, analogy is an omnipresent form of reasoning in human thinking (Hofstadter & Sander, 2013).

This paper focuses on the use of analogy to address collective action in urban design and aims to propose an analytical framework based on generativity driving collective action (Schön 1979). The cases explored in this paper are selected from my ongoing PhD research on the evolution of collaborative practices in urban design. The research focuses on cases that exhibit two main aspects: the expansion of the sphere of collaboration in response to the complexity of the design challenges, and the desire to disseminate their results, whether it be the product or the process, ultimately leading to significant collective action undertakings.

The drive for dissemination incorporates a form of standardization and normative leap within it, which engenders inherent tensions in urban design, where the context and singularity of a given project are of primary importance. Such tensions lead to a shift in the object of design, where the focus moves upstream in the process of urban fabrication. The objective of this kind of initiative becomes to develop design principles and to create the social and political environments and measures to integrate these ways of designing on a larger scale. The use of analogy in these situations meets the need to encourage creative appropriations of actors engaged in the process of dissemination. It presents a particularly hybrid aspect that incorporates the reflexive and pedagogical dimensions beyond the issue of spatial design.

Two cases located in France are under study in this paper, namely the concept of 'scripting (scenarisation)' in the Atelier des places du Grand Paris and the concept of 'case law (jurisprudence)' by La Preuve par 7. The former is an action carried out by the Société du Grand Paris and the TVK group to develop a design guidebook of the public spaces around the 68 stations of the Grand Paris Express subway network. The latter is an approach initiated by the architect-scenographer Patrick Bouchain and his networks of actors aiming to disseminate 'architectural permanence' and to promote the "right of experimentation" in urbanism. Both analogical concepts aim to create an open framework to encourage forms of appropriation specific to each context by local actors, and are the result of collective elaboration by designers-protagonists over several years.

This paper outlines the context, the actors, and the process of elaborating these analogical concepts. Although the two cases under study share the objective of developing an analogy for creative appropriations within the context of collective action, they are rooted in different contexts, implying different aims and constraints. Consequently, a simple comparison proves ineffective. Instead, the discussion focuses on the distinct nature of these analogies as catalysts for cognitive displacement or as new frameworks of inquiry. Furthermore, the contributions and limitations of analogies will be discussed, drawing upon the testimonies of the actors involved in these collective actions.

The current research is based on document analysis, participatory observations, and semi-directed interviews with actors and stakeholders of each case under study.

The case context and main features of analogy in the two case studies
'Scripting (scenarisation)' as an alternative approach to planning in urban design

The concept of scripting developed by TVK has evolved through various prospective research missions the agency has been engaged in since 2012. By drawing a parallel between the 'scripting' of TV series (in the realm of storytelling) and urban planning (which involves tangible interventions in material and spatial urban conditions), the analogy of 'scripting' proposes an alternative perspective on urban design. It acknowledges the need to address long-term and uncertain situations that cannot be effectively managed through deterministic planning approaches.

This analogy introduces the following conceptual framework: the 'bible', representing the main idea of the story line (which can be translated as the prospective vision in urbanisme), and the 'seasons', which are relatively independent, yet cohesive narratives derived from the 'bible'. Additionally, it emphasizes the significance of the present as a state with its own coherence, which is not just serving the future.

The concept of scripting emerged during the Atelier International du Grand Paris (AIGP, 2012-2016), a prospective study on the urban conditions of the Grand Paris in which TVK participated as one of the fifteen international multidisciplinary teams. The idea was initially put forward by Martin Vanier, a geographer from Acadie[1] and a member of the TVK group[2]. It was subsequently adopted as one of the central themes guiding the group's final proposal[3].

Compared to the analogical concepts proposed by other participants in the AIGP teams, one of the distinguishing features of 'scripting' is that it focuses not on the urban or architectural form as a design object, but on the approach and methodology of design. It incorporates a reflexive dimension, thereby highlighting the unique perspective of the TVK group.

Since then, the concept of scripting has been further developed through TVK's subsequent urban prospective missions in various French and international territories (Trévelo et al, 2021). Over time, it has become one of the agency's primary conceptual approaches in urban projects that involve long-term vision and planning.

In October 2016, the TVK group[4] was selected to participate in the Atelier des places du Grand Paris (APGP, 2017-2019). Their task was to develop a guidebook for the creation of public spaces surrounding the 68 stations of the Grand Paris Express (GPE), the new suburban subway network for the Grand Paris area. This mission was commissioned by the Société du Grand Paris (SGP), the institution in charge of the implementation and maintenance of the GPE.

This mission presented a significant opportunity for TVK to test and refine the concept of scripting, which was initially developed in response to the complex urban situations encountered in the Grand Paris project. The concept was considered well-suited for the guidebook due to the inherent complexities involved, including:

- Governance and cooperation: The guidebook had to serve as a tool for governing and fostering collaboration among multiple stakeholders involved in the Grand Paris Express (GPE) network. This encompassed local authorities responsible for implementing public spaces and central institutions such as SGP and Ile de France Mobilité, which oversaw the quality of public spaces around subway stations through partial funding.

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1 Adadie is a consulting cooperative agency mainly composed of researchers and research-professors in urbanism.

2 The TVK group refers to the consortium composed of multiple agencies and experts who are mandated by the TVK agency.

3 'System Ouvert', the group's final report of the mission, presents an illustrated story developed in four "seasons" with unforeseen urban consequences of the new subway network, Grand Paris Express (GPE). Known as "the worksite of the century," this extensive subway network (equivalent in total length to the existing railway network of the Grand Paris region) is the primary urban policy simultaneously developed by the Sarkozy's government in relation to the reflections of the Consultation Internationale du Grand Paris (CIGP, 2008-2010). AIGP's participants, most of whom also participated in CIGP, had a critical stance on GPE, concerned with the simplification or impoverishment of their reflections in the implementation of a new public transportation network.

4 Mandated by TVK, architect-urbanist agency, the group consists of experts and agencies specializing in diverse fields relevant to public space, such as landscape architecture, mobility, environmental sustainability, geography, urban sociology, history, and more. In addition, the group includes experts in coordinating collaborative practices, fostering multi-institutional cooperation.

- Diverse urban situations: The guidebook needed to address the diverse urban contexts surrounding the 68 GPE stations, combining a comprehensive vision with practical methodologies that could be applied effectively in each unique setting.
- Sequential network completion: With the planned sequential completion of the entire subway network scheduled between 2022 and 2030, special attention was required to anticipate significant changes in the surrounding public spaces over time. The guidebook needed to account for the evolving patterns of usage and adaptability of these spaces.

The concept of scripting has served to structure the group's collective investigation and its results during the first phase of the mission. The Phase 1 report presents the skeleton of the 'bible' and 'seasons', the first related to themed research accompanied by examples of public space implementations, and the second related to the analysis of the urban and temporal situations of the 68 sites of GPE[5].

As the mission progressed, the concept of scripting underwent a transformation and found its expression in various forms within the final guidebook. One of the main editorial lines of the guidebook focuses on the temporal dimensions of urban design. This is illustrated through opening visuals and introductory or themed texts that provided perspectives on the evolving urban environment. Additionally, the guidebook prescribes several principles for integrating and managing temporal dimensions. One such principle is "Test and observe", which emphasized the importance of organizing temporary experimental implementations to learn from and adapt to changing circumstances. Another principle is "Represent without fixing", which underscored the need for graphical and cognitive expressions that allowed ongoing projects to evolve and adapt over time.

TVK's focus on the concept of scripting does not appear to have been fully concluded after this mission. In 2021, following the APGP mission, TVK independently published a paper entitled "Open Future: From Planning to Scripting" (Futur ouvert : de la planification à la scénarisation)[6]. The paper presents the key insights gained from the concept of scripting in urban planning, accompanied by four carefully selected images. Among these images, two are from the American series "The Wire". The article establishes a parallel between two images [Fig. 1]: a photograph depicting planners of a 'Ville nouvelle' (new town) from the 1970s, and a screenshot from the drama series showcasing four African American boys from a suburban neighborhood who serve as the primary storytellers of future narratives. The second image [Fig. 2] portrays the cover of the 'bible', a text containing the fundamental ideas of the future project, which can be perceived as either 'a piece of evidence' or 'a sacred object' depending on the reader's perspective. The document's construction strategy aims to strengthen the message derived from the analogy as an instigator of cognitive shifts by feeding the narrative with cases and illustrations on the other side of the analogy that can demonstrate their relevance to urban design issues.

The conceptual gap between planning and storytelling makes the analogy disorienting but intriguing and inspiring. It calls for a creative endeavour and interest to translate one's own interpretation into tangible actions within the realm of urban planning.

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5 The second phase involved conducting case studies on several hubs of the Grand Paris Express (GPE) and translating the findings into design principles. The third phase was dedicated to refining the final drafting and structure of the guidebook.

6 A part of this development was previously presented at a conference in 2017 at ENSA de Marseille. However, the publication was made available for a wider accessibility on Metropolitiques, an online media platform known for its open and hybrid nature, including papers of researchers and also of practitioners.
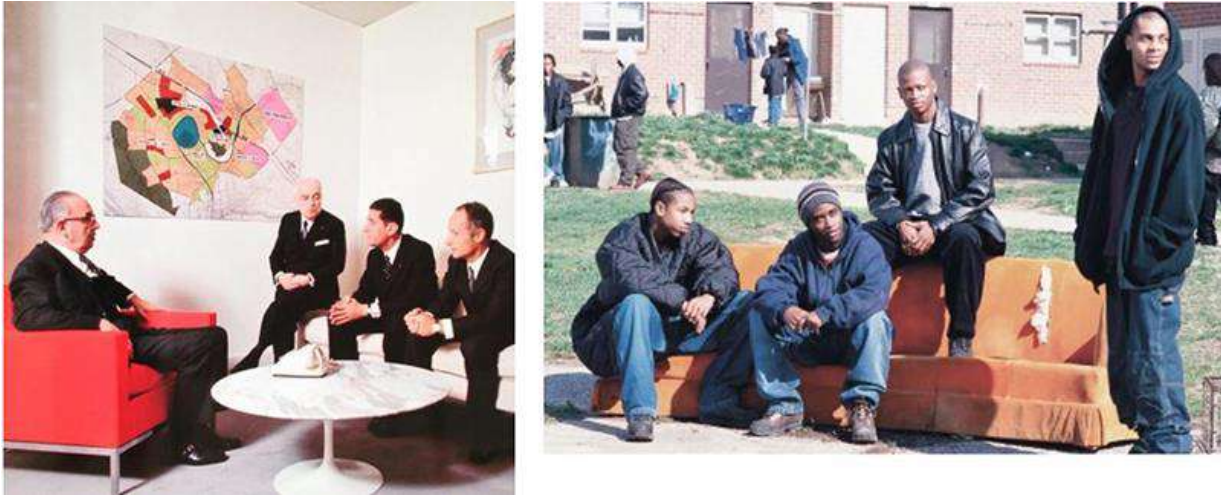
[Fig. 1] The culture of planning vs the culture of scripting: the actors of the planning of Cergy–Pontoise (left), the actors of the first season of The Wire (Viger-Kohler. et al, 2021)
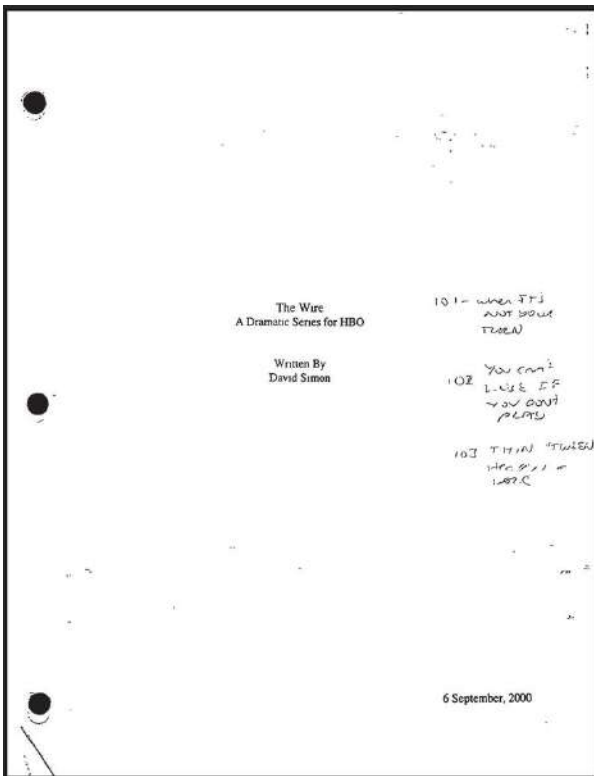
[Fig. 2] Cover of the "bible" of The Wire, David Simon, 6 september 2000 (Viger-Kohler. et al, 2021)

'Case law' (jurisprudence) as a tool for promoting urban experimentations

Over the past 10 years, there has been a growing social consensus regarding the negative effects and contradictions arising from the abundance of standards and regulations in architecture and urbanism[7]. This consensus has led to successive legislations starting from 2016, including the LCAP law, the ELAN law, and the ESSOC law[8]. Of particular importance is Article 88 of the LCAP law, known as the 'Permit to do (permis de faire)', which aims to evaluate and regulate urban and architectural experiments based on their achievements rather than on their means strictly constrained by standards and norms. It provides a certain degree of freedom to adopt non-standard methods, with the condition that their effects are assessed in subsequent stages. However, the original intent of the law has quickly become more rigid in its subsequent development through concrete legislative decrees.

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7 This is the main finding of the Information Report on architectural creation, authored by Patrick Bloch in July 2014.

8 law on Liberté Création à l'Architecture et au Patrimoine (Freedom of Creation, Architecture and Heritage), law on Evolution du Logement, de l'Aménagement et du Numérique (Developments in Housing, Planning and the Digital Economy) and law on État au Service d'une Société de Confiance (State at the Service of a Trusted Society)

Patrick Bouchain, an architect-scenographer, played a significant role in the development of the 'Permit to do' article. He is a famous French figure known for his architectural and social experiments through various projects, as well as his extensive networks in the realms of politics, art, and architecture[9]. Recognizing the gradual dilution of the original intent behind the 'Permit to do' legislation, Bouchain chose to pursue his own path of experimentation independently of these measures.

In 2018, he obtained financial support from two French ministries[10] to establish an initiative called 'La Preuve par 7' (Proof by 7). This project advocates for the right to experiment in architecture and urbanism across seven different scales of French territories, primarily by means of 'architectural permanence'.

'Architectural permanence' aims to establish a space for experimentation by utilizing abandoned buildings[11] that have been neglected due to economic, technical, or legislative factors, despite their urban and architectural potential. It aims to explore modeste but creative forms of occupation and programs by involving civic stakeholders. The goal is to promote the revitalization and rehabilitation of these spaces through collective experimentation in space utilization, ultimately leading to the identification of necessary architectural interventions.

La Preuve par 7 is organized into two distinct periods. Season 1 (2018-2021) was dedicated to searching for opportunities and establishing 'architectural permanences' across eleven sites of seven urban scales in France, encompassing both metropolitan and overseas territories. Season 2 (2021-2023) is currently underway and emphasizes the development of a collaborative online platform. This platform documents past and ongoing experimental cases, particularly highlighting tools and experiences that have helped overcome administrative, legal, technical, and normative obstacles. It encompasses initiatives triggered by actors within Bouchain's network as well as other contributors. The aim is to establish a precedent and disseminate these kinds of urban practices on a larger scale.

The notion of case law became prominent in Bouchain's discourse following the enactment of the LCAP law, and its significance grew further with the release of the initial set of application decrees on fire safety in May 2017. Bouchain argues that these decrees undermined the original spirit of the 'Permit to do'. He emphasizes that all laws inherently contain a certain degree of interpretive flexibility to avoid becoming overly coercive[12]. Many of Bouchain's previous projects were also a result of persistent exploration within this interpretative latitude, allowing for a certain level of freedom and fostering a relationship of trust among stakeholders in reaching a mutual understanding based on a "common sense" (du "bon sens") (Bouchain, 2018).

Similar to the concept of scripting, the analogy of 'case law' is not concerned with the physical form of urban or architectural elements but rather with the approach and methodology employed. The term 'case law' is used here in a broader sense, not specifically referring to court decisions but encompassing a wider range of urban experimentations that serve as precedents and are worthy of dissemination.

Unlike 'scripting', the concept of 'case law' closely relates to the objects or cases it refers to. In fact, the main message of la Preuve par 7 is the strong connection between certain cases and the notion of 'case law', as these cases have the potential to set precedents and influence future developments.

In Season 2, the notion of case law becomes more prominent through the documentation available on the Internet platform called 'L'école du terrain' (The field school)[13]. The platform is organized in three main branches: Projects, Ways of doing (Manières de faire), and Laboratory, which show how the analogy is translated into reflections and tangible actions related to urban experimentation.

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9 Patrick Bouchain has built up a singular career in various fields: political consultancy, teaching at a design school and architectural practice. His approach to architecture and urban projects has often departed from conventional frameworks, with a more marginal character. However, his work finally received institutional recognition when he was awarded the Grand Prix d'urbanisme in 2019.
10 The Ministry of the ecological transition and the Ministry of the Culture
11 It can also involve finding a location and resources to incubate a program, like a school or social housing project, in response to local needs and limited resources elsewhere.
12 'Le permis de faire, l'esprit plus que la lettre', https://www.espazium.ch/fr/actualites/le-permis-de-faire-lesprit-plus-que-la-lettre#:~:text=Patrick%20Bouchain%3A%20Le%20permis%20de,que%20nous%20risquons%20de%20perdre, accessed on 01/06/2023
13 https://lecoleduterrain.fr/, accessed on 01/06/2023

Under the Projects section, each case is presented, showcasing how it managed to overcome or navigate conventional obstacles and establish alternative frameworks for stakeholder collaboration. Key documents such as the initial call for proposals, contracts between main stakeholders, documentation tools, and relevant external resource documents are included for each case.

The Methods section delves into methodologies and reflections organized by themes. While the concept of case law serves as a philosophical background for this section, it also features two themes directly related to legal issues written by domain experts.

The Laboratory section comprises thematic audio-visual documents, including interviews and conferences. Within this section, there is a subsection entitled 'case law', which includes interviews with experts in various legal domains related to urban experimentation, such as notaries specializing in public property transactions, lawyers specializing in transitory urban occupations, and experts in public law.

Finally, the concept of case law allowed to produce information-rich stories (Schön, 1979) and relative knowledge and therefore works as a frame for inquiry.

Discussion: on the nature of the generativity of analogy for a collective action

The analogies being studied encompass two distinct dimensions: as instigator of cognitive frame shifts and as framework for inquiry. Rather than being incompatible, these dimensions appear to be complementary aspects of a generative analogy. Meanwhile, certain aspects can be further developed or, on the contrary, be constrained depending on the context in which it is deployed. This includes considering the relevance of the conceptual structure revealed by the analogy in relation to the nature of the organization being undertaken and the strategies employed by its protagonists.

The "innovative[14]" aspect of the analogy of 'scripting' lies in its ability to evoke the popular imagination of drama series, which can provide rich illustrations for the target audience (both urban practitioners and the general public). The consistency of these illustrations offers ample material for a cognitive frame shift and prepares the generation of a new perspective on urban planning through the lens of 'scripting'. The underlying message that urban planning should embrace a long-term vision that allows for the organization of different temporalities, akin to coherent seasons with relative independence, resonates with the audience and serves as a counterbalance to the deterministic representation inherent in the phasing of the GPE subway network.

Beyond this philosophical stance, the APGP mission had a practical objective of producing a guidebook with operational design principles on diverse dimensions and issues engaged in a public place design. The conceptual skeleton of 'scripting' ('bible' and 'seasons') has structured the collective investigations of the TVK group in the first phase. It also has served as a frame of investigation to engage collaborations with practitioners out of TVK group for the principle 'Test and observe' related to the transitory implementation design. But it had no longer the same validity on diverse issues and the concept of scripting becomes rather symbolique than analogique in the absence of clear conceptual isomorphisme between two spheres related by the analogy. Consequently, the concept worked as a primary generator (Dark, 1979) for the APGP mission.

Meanwhile, TVK continues their own investigation to enrich the narrative surrounding the realm of storytelling, demonstrating its relevance to urban design issues. In that sens, the analogy works as a frame for inquiry for their own practice inspiring and guiding their exploration. They also aim to manifest its pertinence through public medias to inspire others.

For the 'case law' concept within the PP7, rooted in the common understanding of the term and its social implications, the concept presents a simple conceptual framework where a specific case can have a similar impact as a law. The analogy between the two spheres, while not triggering a significant cognitive shift, manifests the underlying philosophy of the initiative. The concept is primarily employed to explore projects and cases in relation to their ability to set a precedent within their respective contexts. It serves as a framework for investigation on emerging practices. Simultaneously,

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14 Two of the interviewed participants of TVK group considered the analogy innovative in this point of view.

it acts as a mediator, bringing together actors who share a common vision and interests, thereby laying the foundation for future collaborations.

The contributive dimension of the initiative without strict goals and deadlines facilitates the emergence of these conditions. Moreover, by establishing a framework of inquiry, the actors involved in the PP7 actively engage other individuals who possess interest and expertise in various domains related to the urban practices advocated by the initiative. This fosters the formation of a community of practice (Wenger, 2005) and enables the establishment of alliances with selected actors. Through these opportunities for discussion, the participants refine the concept and identify new avenues for their research.

The accumulation of project cases through these processes forms a foundation of information-rich stories. These illustrations create the conditions necessary for a cognitive shift among the actors engaged in this community of practice and, in the long term, for the broader general public as well[15].

Conclusion

Our cases extend the research axis put forth by Schön (1979) regarding the favorable conditions for a generative analogy driving collective action. The case study demonstrates the relevance of aligning the conceptual framework of the analogy with the direction of collective action. Furthermore, it emphasizes the significance of illustrative materials (information-rich stories, as per Schön) in initiating or fostering collective action. These conditions provide a foundation for understanding and creatively appropriating by the actors involved, enabling them to undertake effective actions.

We also observe that both analogies operate on the methodological dimension. On one hand, they facilitate collaborations among multiple stakeholders by providing a structured framework for investigation. On the other hand, they serve to disseminate experimental practices by sharing reflections on methodological obstacles.

Meanwhile, the final productions of both cases, namely the guidebook and the online platform, do not necessarily follow the structure of the analogy. Instead, they adopt a conventional category system that aligns with the cultural and practical expectations of their intended audience. This approach aims to enhance accessibility and comprehensibility of the contents.

Finally, the hybrid nature of these analogies, combining pedagogical and reflexive elements beyond the scope of spatial design, calls for further reflection. This is particularly important in terms of its impact on the evolution of the architectural profession and the broader sphere of architectural practice.

The first issue involves exploring and designing the realm of fiction to enhance its relevance to current urban design issues. In the case of TVK, this approach becomes one of the agency's design strategies, utilizing fiction and history as a valuable resource to draw inspiration and make cultural contributions that inspire other urban practitioners. This kind of reflection, regarded as research, sparks a different type of discussion that diverges from the discussions found in literature on "research by project". It is important to consider the nature of the knowledge that is generated through this approach and the criteria that are relevant for assessing its impact.

In the case of the PP7, it is important to pay attention to the diversification of the architect's role in the process of urban development. Creativity and ability to comprehend various subjects can play a crucial role in engaging in community organizing, addressing technical and constructive issues, and shaping the initial project brief. This calls for a reflection on the pedagogical programs in architectural schools and how to enhance collaborative capacities to meet the expanded competences required in urban design.

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15 However, the dual nature of the platform, serving both as an instrument to expand the alliance and as a tool to disseminate specific forms of urban practices, introduces a certain ambiguity in the clarity and quality of its contents. Given that the platform is still in its early stages (launched in October 2022), it requires further observation to assess its ongoing evolution and development.

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Rich, Poor and Mechanism of sharings in Hyderabad City, India.

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Abstract

Public space, accessibility, and the ability to move in space are vital for the socio-economic well-being of the poor, destitute, and especially those in the lower strata such as slum dwellers and informal workers. Albeit the enforcement mechanism of informal economy is pervasive in India, the question of informal workers and their access to public space has tended to be neglected. Furthermore, slums are perpetually circumvented in the urban planning and governance processes. This is only exacerbating with the nuances of India's national urban schemes and smart city mission despite the contestation to cater the infrastructure. Moreover, this research attempts to lodge the phenomenon of co-location in the limelight, "the actual spatial proximities between affluent and poor at living spaces and public spaces" in Hyderabad city. Ergo, this study gazes into the spatial proximity and spaces of encounters between rich and poor to better design and plan the public spaces to stimulate the informal economy and accommodate the needs of informal workers and their capacity to move in space in Hyderabad city. The empirical study will be conducted as a proof of concept to locate spaces of encounters between rich and poor by digital methods using a smartphone app and GPS trackers.

Questions

To support my claim based on my life experience as a burgess of Hyderabad city, a literature review, and empirical study, the following are the questions narrated through my thesis:

How do social injustices produce and shape spatial injustices viz. dichotomies of slums and affluent localities and contestation of governance planning process in it, including the role of planners and architects?

How the notion of actual spatial proximity and spaces of encounters between urban elite and urban poor at living spaces and public spaces be understood, captured, synthesized, and mapped systematically with its intricacy at multiple dimensions interms of urban experience?

How can the local knowledge and spaces of encounters be used to better design and plan the public spaces to stimulate the informal economy for the well-being of home-based workers and street vendors? Meanwhile, accommodating the needs of informal workers and their capacity to access and navigate in space?

Introduction

Poverty is as old a subject for Indian thinker's as the idea of India itself (Karen Coelho and Anant Maringanti,2012:1). Understanding of poverty has always been shaped by the dominant ideological currents of the day (Karen Coelho and Anant Maringanti,2012:1). According to Damien and Rafi, poverty in India is visible to the naked eye of anyone who tries to understand it. Furthermore, Urbanization is perceived to be tied with urban poverty manifested through several ways like the explosion of slums, a swift expansion of the informal sector, the casualization and underdevelopment of labor, and enormous pressure on infrastructure (Satpal Singh 2006:2).

Socio-economic inequalities created the spaces of resistance called slums also known as Indian Bastis. Yet again it is explicit that "The underlying cause of urban slumming appears to lie not in urban poverty but in urban affluent (Verma, 2002:2)." Plus, the fact remains that most of the poor people live in slums and most of the slum-dwellers are poor (Victor S. D'souza, 1979:3). In the words of Gautam Bhan "The Bastis Images of the slum need little introduction. Temporary, fragile, and vulnerable housing materials, the absence of sanitation, waste, and sewage services, the poverty of the residents, and the overwhelming density of the "slum" can be conjured up by even those that have never actually been to one". As well they transcend and challenge conventional

understandings of the dichotomies of planned-unplanned, formal-informal, and legal-illegal (Gautam Bhan,2013:4).

So far most of the literature on poverty emphasizes an inverse relationship between poverty and economic growth (Kulkarni, Varsha S and Raghav Gaiha, 2018:5). Additionally, Incidence of poverty in India has been highlighted by several economists a few of them consist of Prof. Amartya Sen, Jeanedreze, Suresh Tendulkar, and N.C. Saxena to quote a few (Ankuran Alok, 2020:6). Nobel laureate Amartya Sen has described economic growth as a crucial means for expanding the substantive freedoms that people value(DFID,2008:7). Urban form today is fundamentally governed by the economic forces at play in a city.

Slum contestations in space: Informal Economy, Informal worker and Issues

In most developed countries, there is only one economy. But in India, there are two (Jim Yardley, 2011:7). Since many of the jobless are poor and the fact that poor cannot afford to remain unemployed, the jobs are created by poor themselves (ATM Nurul Amin,2016:9). The informal sector in India becoming increasingly crucial as it begins to offer millions of people choices for productive employment. (R. Ratnam, S. Thirunavukarasu,2012:10). Of the informal sector labour force, about 60% live in slum and squatter settlements and of the slum and squatter population, 70% are working in the informal sector (ATM Nurul Amin,2016:9). This new judicial language regarding slum dwellers is saturated with the rhetoric of illegality (Usha Ramanathan, 2004:11).

The informal economy exists largely outside government oversight as is in the case of slums like Dharavi, without government help or encouragement (Jim Yardley,2011:8). Ananya Roy (2005:12) argues that urban informality is not, in fact, a "bounded" space or sector at all, but a type of governance. In her words, this is a "new spatial vocabulary of control, governance, and territorial flexibility" (Ananya Roy 2003:13), a mode of the production of space and It is a technique of rule; what Ananya Roy calls a "a spatial mode of governance". Again space and time are not only objects of contestation but also part and parcel of political strategy (Helga Leitner, Anant Marimganti at el 2007:14). Informal and illegal settlements occupied land that did not belong to them, and hence were most vulnerable and marginalized when it came to accessing urban basic services (Ayona Datta, 2012:15) Now placed both in a space of exception and state of exception, they are perpetual target of state violence (Giorgio Agamben, Homo Sacer 2005:16,17). As Arundhati Roy openly debates "Ergo: those who cannot consume do not matter" for government sight (Arundhati Roy,2009:18).

Informal workers, especially street vendors, and home-based workers, confront a wide variety of challenges arising out of the laws and plans that govern their activity (Mathew Idiculla 2022:19). According to Arundhati Roy Informal workers like street vendors are "shadow people who live in the cracks that run between schemes and institutions (Arundhati Roy, 2011:20)". Unruly working and living conditions of informal sector workers have been reported in the majority of urban studies. Their access to basic amenities is extremely poor (Amitabh Kundu 1999:21). The differences in wealth, power, and inefficient allocation of resources are, after all, strongly correlated (Kulkarni, Varsha S and Raghav Gaiha, 2018:5)

The surveys of micro-level studies found that the main challenges facing the Informal Sector are low productivity, reduced employment rates, underemployed workers, working conditions, life circumstances, and lack of vocational training, etc. (Amitabh Kundu 1999:21). The success of informal enterprises, therefore, may not be contingent on the availability of credit alone.

Despite this burgeoning literature on urban planning and informality, it does not engage much with questions related to informal workers and their livelihoods (Mathew Idiculla,2022:19). Urban planning institutions and processes should be examined to better understand how informal workers, for example, can live, work, and navigate cities (Mathew Idiculla,2022:19). Urban planning and governance processes that allow for access to public space are vital for informal workers' livelihoods (Mathew Idiculla,2022:19). However, the academic literature on urban planning and public space has tended to neglect the question of informal workers and their livelihoods (Mathew

Idiculla,2022:19). New methodologies of planning need to be considered in order to meet the needs of different occupational groups in the informal economy (Mathew Idiculla,2022:19). Instead of imposing exclusionary master plans, any effort to shape the future of informal economic spaces requires new methodologies (Rajagopal 2015:19). And The role of an urban planner is to "assume a role that ensures equitable distribution of resources among various groups in informal economies" (Rajagopal 2015:19). Zoning categorization, in concert with the planning process, is crucial for the livelihoods of informal workers. While zonal categorizations might be pertinent for home-based workers, it is access to public space that is particularly important for informal workers like street vendors (Mathew Idiculla,2022:19). Therefore, there is a need to gaze into the concept of spatial proximity and spaces of encounters in public space between different social groups.

Central Argument
Power of Space: Public space, Spaces of Encounters and Spatial Proximity
There is a relationship between space and social divisions, and that contact between rich and poor people can change understandings of poverty. Space will be seen as not just a place for social phenomena, it is an active factor contributing to their production and interacting with societal and economic factors (Alfredo Mela, Alessia Toldo,2019:22).

Public space
Public spaces go beyond the typical definition of being an open space (P. Deore, S. Lathia, 2019:23). Most people associate open space with parks, plazas, courtyards, playgrounds, and maidans. However, one of the most significant, yet frequently overlooked. Open public spaces in Indian cities, towns, and villages has always been the street - the space where people interact, celebrate, and assemble. (Nicholas R Fyfe, ed,1998:24). Streets are the public urban paths along which one moves, observes, waits, eats, and interacts (Uday Kumar Vagale 2004, Sneha Mandhan,2014:26). Among all public spaces, streets emerge as the most public (P. Deore, S. Lathia,2019:23). The only open space in the city that effectively belongs to the people (Appadurai, 1987:26). On its streets, India eats, works, sleeps, moves, celebrates, and worships (Appadurai, 1987:26). Streets in India have traditionally been public spaces (Sneha Mandhan,2014:26). Streets are engines of economic activities, social hubs, and platforms for civic engagement. They break socio-economic divides and foster social cohesion (P. Deore, S. Lathia,2019:23). In the words of Arjun Appadurai, "Streets, and their culture, lie at the heart of public life in contemporary India. "Streets are many things: thoroughfares, bazaars, theatres, exhibitions, restaurants. " Streets are 'cohabited spaces', 'life worlds'. These public places become hubs for daily activities, almost close to rituals, where sellers of fruits, vegetables, flowers, food, and household products position their carts at strategic locations along the streets and arrange their stock in the most efficient and pleasing manner possible (Sneha Mandhan,2014:26).

Spaces of encounters
The fact that study of socio-economic encounters in public space between urban elite and urban poor is circumvented in the structural analysis of poverty of the urban experience of poor, hence is the important dimension that need to be reintegrated in new pathways to alleviate urban poverty. Public places enable people to gather in planned and unplanned ways on nominally neutral ground, to engage with others within the contours of the entire community, and to help foster social cohesiveness (Caroline Holland, Andrew Clark, Jeanne Katz and Sheila Peace, 2007:27). Furthermore, many researchers have given several parameters of social interaction on the basis of their study in public open space. Abbasia et al. (2016); Hajmirsadeghi et al. (2013); Bahmanyar and Cheshmehghassabani (2017); Williams (2005) are some of them studied the social interaction in public open space. Daneshpour and Charkhchian (2007) mentioned invitation, security, utility and activity as the attributes of spatial quality in Public open space. The literature on the geography of encounter has critically highlighted various kinds that such contact might take, ranging from momentary instances of interaction between strangers at bus stops, cafés, or at the school gate to the more routine coexistence of coworkers and neighbors. (Amin, 2002; Hemming, 2011; Matejskova and Leitner, 2011; Valentine, 2008:28). Such encounters happen within neighbourly

streets, parks, local services (e.g. shops) or public transport, but they also transcend the neighbourhood boundaries. These spaces symbolises sites of sociability and social interaction, thus, their quality is used to quantity the degree of sociability in public open space (Mehan, 2016:29).

Spatial proximity
This research attempts to lodge the phenomenon of co-location in limelight, "the actual spatial proximities between affluent and poor at living spaces and public spaces" in Hyderabad city. This unveiled into the unique mosaic urban fabric of the wealthy neighborhoods and pockets of slums, in juxtaposition to most western megacities, whereas seclusion between these two parties is rather explicit. It is apparent that despite the colossal indifferences between the affluent and poor, there is no ghettoization atleast spatially. This generates incentives for poor to locate in close physical proximity to affluent colonies as sources of labor and services (Sircar,2021:30). In other words, acts as an enforcement mechanism. Thereafter, manifestation of this socio-spatial dialectic is epitomizing the narrative of "mechanism of sharing" between informal workers such as street vendors and the bourgeoisie in the city.

Indeed, many scholars have observed that the cities of the Global South are markedly different from their Western counterparts, often with permanent and wealthy colonies within close proximity to makeshift or poorer settlements (Sircar,2021:30)—but much of this literature is not read in local context; But the spatial organization of most Indian cities does not seem to respond in the same manner, even less there is not much literature available on this phenomenon in Indian context nor written by Indian authors. This enigma generates incentives for poorer residential clusters, as the sources of labor and service, to locate in close physical proximity to wealthy residential clusters, in simple terms, spatial proximity between the provider of labor and the consumer of labor acts as an enforcement mechanism in a universe of largely informal contrasts, causing the poor to settle near the wealthy in Indian cities (often in the core of the city) (Sircar,2021:30). I argue that the structure of economic transactions between wealthy and poor citizens in Indian cities generate incentives for spatial co-location between wealthy and poor citizens. However, given the variegated spatial nature of the city, it can be understood that very different social groups live in closer spatial proximity, a reality forged by economic interactions between diverse parts of the urban demography. The co-location of very different quality of infrastructure in closer proximity is not uncommon in a mixed space such as Delhi (Sircar, 2021:30) or in Indian cities.

Methods
Prerogative to support my assertion based on life experience as a burgess of Hyderabad city, field research, and a literature review, methods are synthesized into theoretical investigation, mapping at macro and meso scale, empirical study to identify the 'Actual and potential space share' by performing a smartphone app-based digital test of real-time tracking and design recommendation to better design and plan the public spaces as a means to stimulate informal economy.

Theoretical investigation: The theoretical approach of the study is made through the theory of capitals of social, spatial (Pierre Bourdieu, 1986:31; Edward Soja's 2009:32), Kaufmann's theory of Motility(Kaufmann,2004:33), and Digital technologies. This prism of social, spatial, and digital capitals formulates the theoretical framework of the study. Theoretical investigations gaze into the Socio-spatial fragmentation state of the art and critical look at planification of the last decade in Hyderabad city.
This theory primarily highlights the central argument of the study: Spaces of encounters and Spatial proximity. And this narrative is supported by Socio-spatial injustices, slums, informal economy, spaces of encounters, and mechanism of sharings published by numerous Indian and world's Nobel laureates.

Empirical study: The intent of empirical study is to identify the 'Actual and potential space share' plus 'Informal worker capacity to move in space' by manual surveys and digital survey by performing a smartphone app-based digital test of real-time tracking by using GPS tracker devices. Using the snowball sampling technique, 50 residents will be curated for this study that includes the focus groups of 25 informal workers (Street vendors and Home based workers) and 25 affluent

(upper middle class and rich) based on their spatial and occupational value at meso scale study area of Jubilee hills in Hyderabad city.
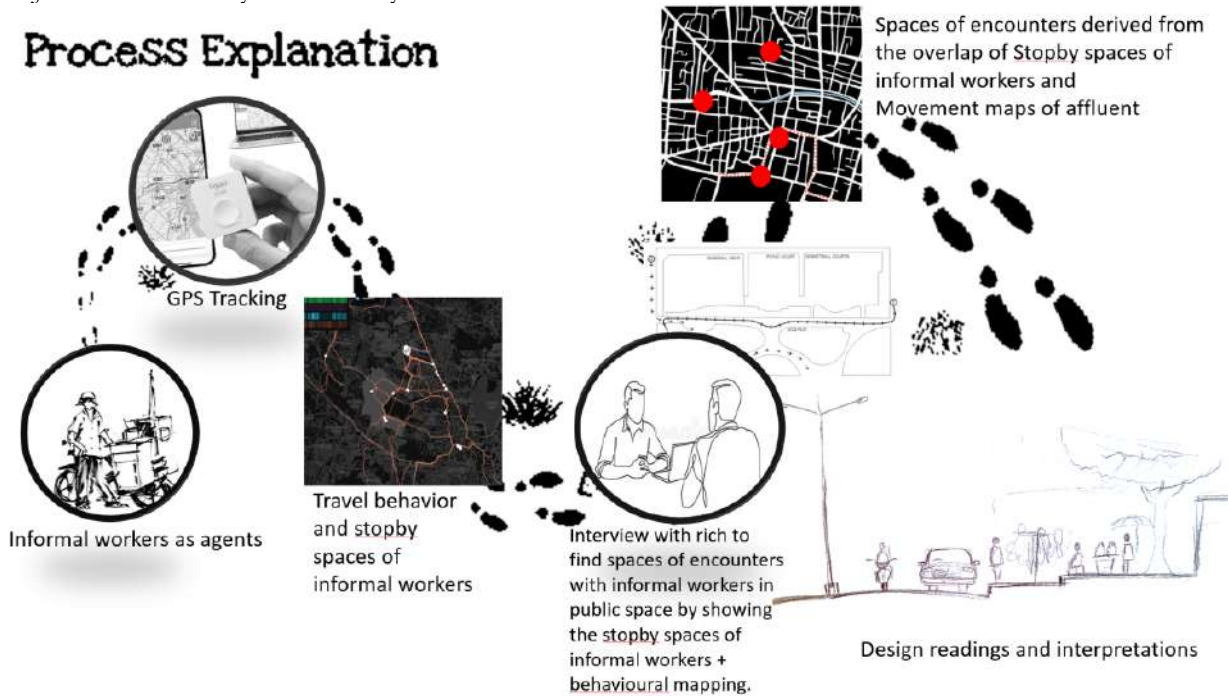
Fig1: Process explanation of the empirical study in the study site of Hyderabad City, India.

1. **Informal workers as agents:** 25 informal workers such as street vendors and home-based workers (hereafter agents) will be selected using the snowball sampling technique in the meso scale study site of Jubilee Hills locality in Hyderabad city.

2. **GPS Tracking of agents:** GPS tracking devices will be supplied to the selected 25 agents to monitor their travel behavior and stop by public spaces for a period of one week.

3. **Mapping the stop-by spaces of agents**: Synthesizing the stop-by spaces and travel routes of 25 agents at the meso scale map.

4. **Interviewing the rich:** The result of the by-space spaces and travel route map of 25 agents will be presented to the 25 rich individuals in the study site and asked to mark the spaces they ever crossed or stopped by. Additionally, manual survey methods such as semi-direct interviews, movement maps, behavioral mapping, and transect walks will be conducted with 25 rich participants to reinforce the precision of the stop-by or crossing spaces.

5. **Mapping the Spaces of Encounters:** Spaces derived from both digital surveys and manual surveys will be analyzed to locate the spaces of encounters between the sample of 25 informal workers(agents) and 25 rich individuals.

6. **Readings by design and interpretations:** The Spaces of Encounter will be read through design at the micro-scale and design recommendations to better design and plan the public spaces as a means to stimulate the informal economy.

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Social Relations and Landscape Transformations: Settling practices of Garhwali community

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The paper focuses on the interconnectedness of nature and culture in Himalayan settlements which has traditionally guided landscape transformation in the region. It employs the approach of 'relational landscapes' to argue that landscapes reflect and are constituted social processes. It presents a landscape analysis by studying 'practices of landscape transformation' within the village, the agricultural and the forest landscapes which together constitute a Himalayan settlement. The study is situated in Massau village cluster of Dudhatoli region in Uttarakhand, India. From the case-study, local ways of landscape making are foregrounded to discuss the broader entanglements of forest, agriculture, and settlement in the Himalayan context. The paper argues for a reconceptualization of nature-culture understanding as a necessary step for transition towards resilience and sustainable future for the region.

Introduction

In Dudhatoli region of Himalaya, the steep mountain slopes have been transformed into agriculture terraces. Rising from the valleys, these terraces traverse the complex geography of the Garhwal spurs, in winding contours, to reach the forested peaks. The landscape is a vertical forest and agriculture mosaic which has been constructed through generations of (social) labour of the Garhwali community [fig. 1]. The Garhwalis cross the forest and agriculture landscapes daily through subsistence practices of agriculture, forest lopping, grazing, seasonal foraging/gathering. These practices are intergenerational and through repetition blur the distinction between forest and agriculture, village and wilderness, extending the social domain across the landscape. As such the landscape and settling within it, is characterized by an interplay of ecological as well as socio-cultural processes.

Figure 1: The village of Massau located in the valley interlinked with agricultural and forest landscapes on the mountain slopes. Source: Photo by author.

In post-dualist tradition of nature-culture studies, this socio-ecological interplay is understood as 'relationality' (Escobar, 2018). Phillippe Descola, Bruno Latour, Arturo Escobar among others have shed

light not only on the interconnectedness of the natural and cultural worlds for communities across the world but also the possibility of coexistence of multiple worlds. Escobar refers to these multiple worlds as the 'pluriverse' that involves multiple ways of being, doing and knowing (Escobar, 2018). Descola, on the other hand, recognizes two conceptions of the world– *"the one that sees nature as an animate twin of society, the other conceives it as the set of phenomenon occurring outside the realm of human action"*(Descola, 1994). Descola points out that the mutually exclusive nature of these worldviews can be problematic as that rarely occurs in practice on the ground. This is particularly the case for Garhwali people whose world relies on both worldviews – a case of 'shifting ontologies' (Escobar, 2018). While on one hand they engage in 'socialization of nature' by shaping it through their socio-cultural practices, on the other hand they limit human action/engagement through 'divination of nature.' In both cases however 'relationality' is at the basis of settling with nature, where either process of socialization or divination do not consider nature as a discrete object but rather subject in a social relationship. We question if and how this conceptualization of nature can help in building a specific understanding of spatiality in Himalayan contexts. Works of Gadgil, Guha and Rangan, focus on ecological ingenuity linked with material and social practices of the Himalayan communities (Guha, 2000)(Gadgil and Guha, 1993)(Rangan, 2000). Rangan's work contextualises forest dependencies in Garhwal within relationships of ecological change, socio-economic processes, and power structures. She highlights how Garhwal has been transformed both by ecological processes and human activity. Recent works of Radhika Govindrajan on 'multispecies entanglements' in Himalayan societies provide us a (re)fresh lens to look at how humans as well as more-than human elements are included in their environments and co-construct it (Govindrajan, 2018).

The paper contributes to this discourse by studying the intersection of social production of nature and landscape transformations. Through the notion of 'relational landscapes' it attempts to highlight that the construction of Himalayan landscape is not only physical but has a social aspect which are not limited to relatedness amongst the humans. To this end, different settling practices are studied arguing that landscape reflects and is constituted by social relations. This will show us that for the Garhwali community nature and society exist as an outcome of their mutual interaction. This understanding is necessary to guide the transformation for addressing the contemporary social and ecological challenges of the region. The paper presents a landscape analysis of a site that lies in a micro watershed of eastern Nayaar river (which consists of 6 villages/settlements) in Dudhatoli region. The analysis draws on fieldwork, participative observation, followed by interpretative mapping and drawing. The first part of the paper discusses the physical and social aspect of agricultural, forest and the village landscape. In the second part, the evolution of the nature-culture relations. It highlights emerging practices and relationality that impacts settling. The paper concludes with ideas on reconceptualization of nature-culture approach to address future spatial and ecological challenges.

Practices of landscape transformation

Garhwal region in Uttarakhand, located in the central Himalaya, is a mosaic of varied ecological landscapes (with elevations ranging from 300m to 8000m approximately)– the Bhabhar, Siwaliks and Doons, the Middle/Lesser Himalaya, the Greater Himalaya. These ecologies have supported (and simultaneously limited) human occupation as they have for more-than-human and extra-human(divine) ones. Unique modes of subsistence and settling exist in sync with the physiological and ecological conditions (Shankar, 2014). The geography of the middle Himalayas in Garhwal (1000m to 3500m) – deep river gorges, steep slopes, complex spurs – allowed for remote settlements dispersed in a valley and ridge system. These settlements primarily rely on the mixed broadleaf forests for their subsistence needs. Traditionally, the settlement is in the middle of the mountain slopes with cultivation shifting seasonally between the valley and the slopes, while the ridge remains forested. Larger valleys may even contain two settlements on the slope, one lower in the valley usually considered the mainstay - *Talla* and other closer to the forest – *Malla*, to shelter seasonal herders and livestock who travel to the forest pastures on higher peaks. The village, the agriculture terraces and the forest together form the typical Himalayan settlement in Garhwal. The following section analyses these three landscapes, the physical and social aspect of the subsistence practices that impact them.

Site

The site is a wide valley dotted with settlements surrounded by the vast biodiverse expanse of the Dudhatoli Forests. The study will focus on the villages of Massaau *Gram Sabha* (GS)[1] which are embedded in one watershed. The GS has 6 villages/settlments, namely Dhara Massau, Pajiyana, Rajbatta, Massaau, Sassau and Jandariya [fig. 2]. The GS has a total population of approximately 1300 people. The site is mainly inhabited by Brahmin, Rajput and Harijan castes which are all primarily cultivators. In case of Massau GS, the prevailing questions of urbanisation in Himalaya concerning large infrastructural development, tourism, economic and spatial expansion are not directly present. However, like in many other Himalayan context, the expansion of rural roads has provided access to transport and market, influencing people to embrace lifestyles and habits of urban consumption. Growth of paratransit networks and service provisions, such as financial/market provision in Jagatpuri or administrative services in Bungidhar (3km and 10km away from site, respectively), are indicative of emerging urbanities in the region, which do not necessarily operate within traditional frameworks. The consequent social mobility, changes in lifestyle and shifting power relationships influence Massau GS as well and provide it a place in the emerging urbanisation within the region. As traditional frameworks find themselves in new circumstances, the emerging practices and shifts in the landscape can also be understood as 'urbanism' within the purview of relational production of space (Negi, Thakur and Ali, 2016).
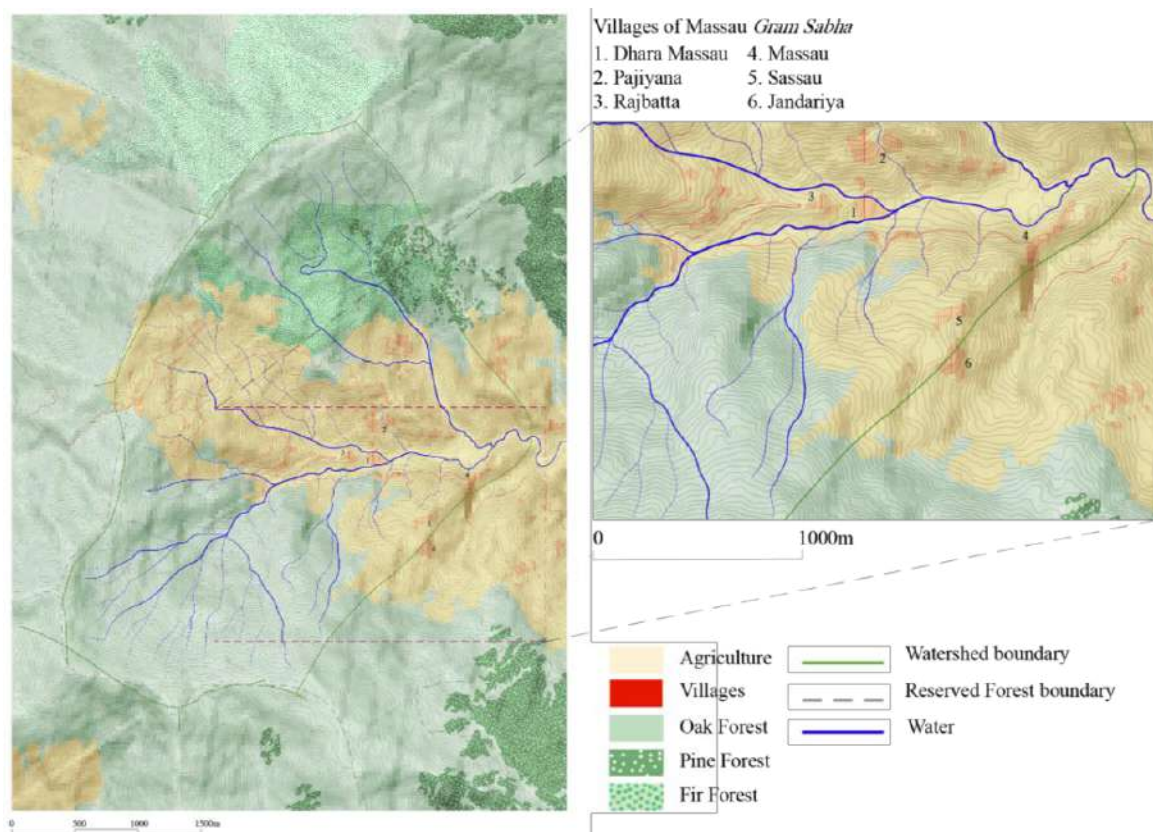
Figure 2: The villages of Massau rely on the ecological richness of the Oak forests of dudhatoli which provide forest produce and water for susbsistence. Source: Elaborated by author from Google Earth Pro satellite image.

Subsistence Agriculture

Forest based subsistence agriculture is the dominant form of subsistence and settling. As the availability of arable land and productivity is low, a form of mixed cropping and fallow system is utilized. Under intense cultivation, soil fertility and productivity are maintained via use of leaf manure - forest leaves (mainly from oak) composted with cattle dung and urine. The traditional mid-slope settlements are linked with forests on the ridges, with organic and nutrient matter flowing down to the agricultural terraces below. The

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[1] *Gram Sabha* refers to a legal general assembly of all adult people living in a village or a group of villages. Here it is used to indicate the spatial cluster of the six villages in the general assembly of Massau.

exchanges carried out between the forest and agricultural landscape, via the farmer or the cattle, makes the mountain slopes into an agro-ecosystem.

While these landscapes are interlinked in practice, they are segregated into simplified land-use categories of forest land and agricultural land for development and planning purposes. However, agriculture goes beyond use and transformation of land. The Garhwali community often expresses an indebtedness to the dieties, '*prakriti*' or the natural balance, and ancestral spirits who embody the landscape and ensure cultivation of the land. This way, agriculture in Garhwal has a social/mythological relation beyond the relation of physical appropriation. Through fieldwork, we observed that the practice of subsistence agriculture signifies local relations and social order as reflected in the traditional definitions of the agricultural landscape in contrast to the single land-use/consumption classification of 'agricultural land'. In the analysis, 30 different types of definitions were identified [tab. 1] [fig. 3].

	Landscape	Literal translation	Spatial characteristic
1	*Dhabreda*	Shifting land	Steep slopes with loose and rocky top soil
2	*Simar*	Swampy area	Agricultural terraces with seasonal water sprouts that create swampy areas, usually used by cattle for resting
3	*Rikhdu*	Bear slope	Slopes frequented by bears in the past
4	*Kaakdhal*	Uncle's slope	Terraces on slope associated with a specific ancestor
5	*Mali sain*	Upper open area	upper fields of the valley, with shallow slopes and wider expanse
6	*Tali sain*	Lower open area	lower fields of the valley, with shallow slopes and wider expanse
7	*Auji Dhang*	Rocky slope	Slopes closer to the water spring in the valley with massive rocks
8	*Khal Dhang*	Grass slope	Slopes where 'khal' a local grass species grows
9	*Sheela*	Cold place	Slopes under shadow, hence colder and less productive
10	*Kandua*	With thorn	Fields with a local shrub species with thorns
11	*Pasrua*	(unavailable)	(unavailable)
12	*Banela*	Near Banela – water source (Also S*era*)	Irrigated fields, lower in the valley close to a water source
13	*Dipthala*	Place where gods land or dance	Wider fields with gradual slope
14	*Timla Faini*	Ficus Auriculata (tree) stairs	Terraces where a Timli tree is located. The tree has medicinal and nutritional values for the community and is considered auspicious
15	*Gaumundi*	Cows' seat	Shaded terraces close to the spring in the valley
16	*Dumkhai*	Valley of the low caste *Doms*	Low lying fields in the Valley, cold and unproductive
17	*Phakrela*	(unavailable)	(unavailable)
18	*Gaunli Chauri*	Village temple	Where village '*Chauri*' or temple is located
19	*Bedu*	Ficus palmata Forssk (Bedu tree)	Fields with *Bedu* trees
20	*Lohitu*	(unavailable)	Fields with specific soil, used for smearing wall surfaces
21	*Dankoi*	(unavailable)	Fields near the market
22	*Baghjiba*	Of leopard	Slopes frequented by leopards
23	*Bhangdu*	Cannabis/hemp slope	Slopes where cannabis grows, on high altitudes and ample sunlight
24	*Malgadu*	(unavailable)	Terraces on high altitudes, less productive
25	*Phabela*	(unavailable) (Also *Ukhir*)	non irrigated
26	*Sautithan*	Abandoned fields	(unavailable)
27	*Dandu*	(Fields near) Pastures	Terraces closer to the forest fringe and forest pastures, cultivated seasonally
28	*Malal Ghat*	Cremation grounds	(unavailable)
29	*Faini Dhar*	Stepped stream	Steep terraces near a water stream
30	*Ragrwat*	(unavailable)	(unavailable)
31	*Ransal*	(unavailable)	(unavailable)

Table 1: Local definitions of the agricultural landscape which the community uses to identify and associate with the landscape. The agricultural terraces locally called '*pungda*' are known by these names. For the community the landscape is defined by its physical, ecological aspect as well as by collective memory of events, ancestors, social association, religious significance. This makes the process of landscape transformation a socio-ecological process. Source: Elaborated by author
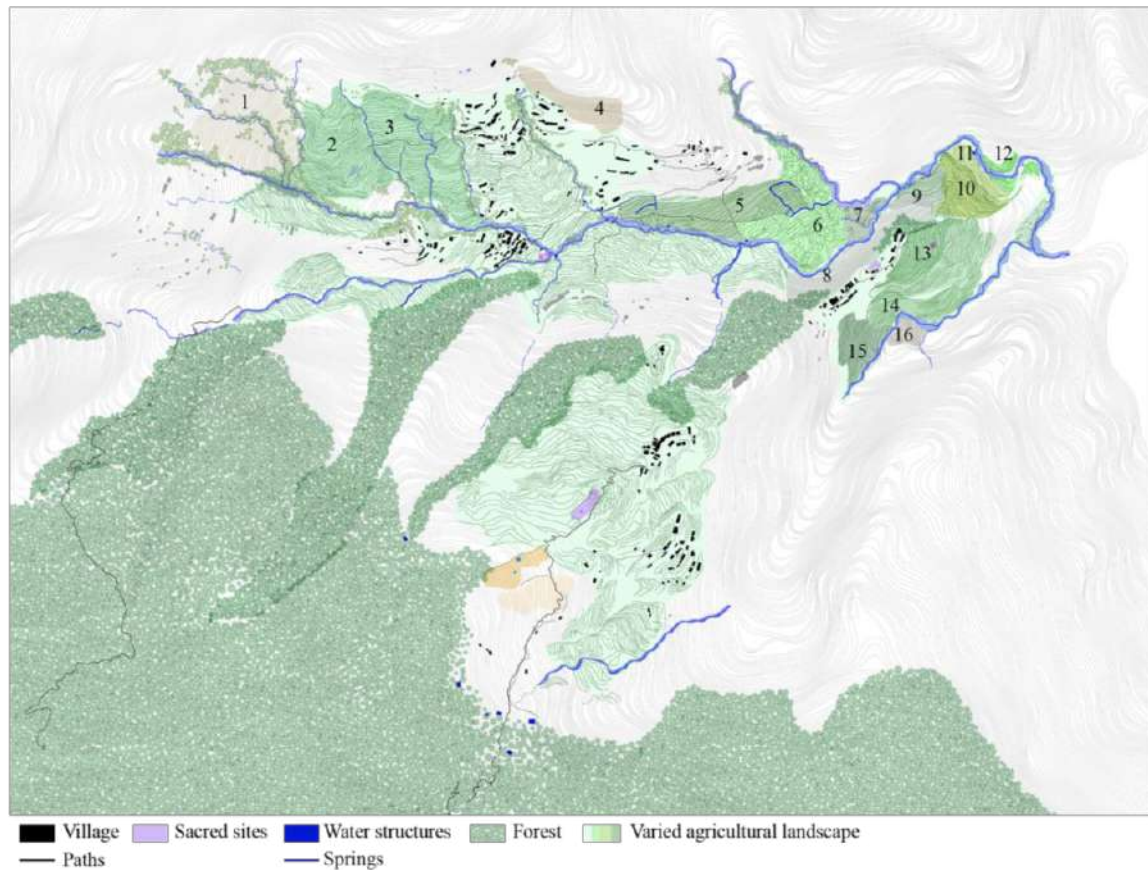
Figure 3: The mosaic of village, agriculture, and forest landscape. The agricultural landscape is embedded with varied meanings established through social relations. Source: Elaborated by author.

Some of these definitions are based on geological and ecological attributes of the landscape (such as *Sheela*, *Khal Dhang, Baghjiba*) which are crucial for adapting or manipulating it for subsistence. The terrain, slopes and orientation, sunlight and climate, soil suitability, water are all deciding factors for occupation in the mountains. Most households in the community cultivate terraces in the valley (*Sain*) or on the higher slopes close to the forest (*Dandu*) or also have irrigated (*Banela*) or non-irrigated (*Phabela*) fields, in order to utilize the seasonally varying quailities of the landscape. As it creates a fragmented pattern of the terraces, households must negotiate access to the resources and the terraces themselves. The making and upkeep of the terrace requires cooperation between neighbouring cultivators which may occupy the lower, upper or adjacent terrace; for example, the maintenance and repair of the retaining wall of a terrace is a concern of the household that cultivates the upper terrace. In this way labor and responsibility are spread out over the landscape and each inhabitant find themselves engaging with the landscape as a socio-ecological system rather than just a piece of land.

Other definitions such as, *Dipthala* (terraces where gods dance) or *Dumkhai* (terraces of the low caste community *Dom*) indicate the reciprocal effect of the nature-culture relationship in the Garhwali way of occupying the land. While the practice of agriculture transforms the land based on ecological logics and creates a social order in its process. The defintions of *Dipthala* or *Dumkhai* show us how social structures are used to gain/limit locational assets and resources. *Dipthala* terraces in Massau village, are large open terraces. Their location on the ridge of a low spur is highly coveted due to ample sunlight, closeness to the water springs of the valley, and gradual slope. By associating the location with gods, it is claimed by the higher caste inhabitants. Similarly, the lower caste *Doms* of the community are restricted to the shadowed, cold and unproductive slopes of the *Dumkhai*. The climate and geology of these slopes supports a local species of bamboo – *ringal* which the *Doms* craft into baskets used for carrying manure. In the region, the lower caste communities are called '*shilpkars*' or craftsmen engaging in different crafts such as basket making, smelting and ironing, stonework etc. indicating their limited access to cultivable land and also their assumed history of hunting/gathering as aborgines. The limitations on forest practices have perpetuated their dependency on (higher caste) cultivators for subsistence. The collective experience of socially

constructing the agricultural landscape is shared across generations and results in sense of obligation and care towards the landscape. Stengers describes this sense of obligation as 'belonging' functioning in a particular syntax, in case of Garhwalis, the social structures define actions of different practitioners and their own way of relating to the landscape (Stengers, 2005).

Forest

In the state of Uttarakhand, almost 95% of forest land is state owned as Reserved forests (69.86%) and Protected forests (26.01%) which also include the community forests as per Indian State of Forest Report 2019. The community forests are harvested for subsistence needs and managed by the community under surveillance/support of the forest department. The six villages in the study have access to two types of community forests – each village has a *civil* forest[2] and a shared forest called the *Van Panchayat*[3] forest. The shared Van Panchayat Forest is open for use throughout the year and is the primary source of green leafy fodder, fuelwood. The village forest however is open for harvesting only in spring and is preserved or saved for crisis or emergencies. The different administrative categories of forest thus govern different rules of behaviour. The nearby Reserved Forest of Dudhatoli and its pastures are accessible seasonally for the traditional herders of the region. Additionally, each household also maintains a 'pet forest' close to their homes to fulfill fodder and timber needs. These forest landscapes are linked with notions of owning/belonging, based on shared values and practices on one hand (Pfaff-Czarnecka and Toffin, 2011) while on the other hand they are results of exploitative state impositions of territorial and resource control (Haeuber, 1993).

Lopping and Grazing

Forest lopping is a daily practice, except for winter when the livestock relies on dried grass reserves. In summer and spring months, the monolithic and seemingly amorphous forest is approached each morning by the women of Massau GS. Within the forest, women – sometimes accompanied by few cows and goats, tend to mutually agreed upon parts. They climb the trees with help of a rope and hack away the oak branches to the ground. The process of piling up oak branches, segregating into leafy fodder and wood and tying up to be carried back eventually clears up the forest ground and creates recognizable terraces. Within the season the practice is rotated over different parts and shifted altitudinally creating contoured definitions within the forest mass. The practice of lopping morphologically and ecologically transforms the forest landscape [fig. 4]. As the women spend 4-5 hours lopping in the forest, they often engage in loud chit-chat across the trees, laughs, and even singing. As such the forest has a twin-side of a social space for the women more than just a resource gathering place.

Water

There's a variety of traditional hydrological structures employed by Himalayan communities, such as ponds, tanks, locally called '*chappris/chaals*', which harvest underground water seepage (*naulas*), springs (*dharas*), and rainwater (Rawat, A.S. and Sah, R., 2009) [fig. 5]. As in other Himalayan contexts, most of these traditional structures in Massau GS are being replaced by the modern systems of water distribution. For example, in Sassau the traditional *chals* lie defunct at the forest fringe, while long lines of metal pipes now bring the water from the forest springs into a concrete water tank from where it is distributed to the households. Each village in Massau GS, has built their own tanks to tap water source from within their village forest. Apart from consumption, springs and mountain streams are also considered important for religious worship and emotional well-being of the community as the traditional water structures were often linked with temples (Chauhan 2010). Divination was a way to safeguard resources and to associate with the landscape. Constructing and upkeep of these water landscape was a common affair making them integral part of the settlement. The contemporary concrete tanks, constructed by immigrant masons of the plains however are purely utilitarian and have nothing sacred about them. As opposed to the traditional water landscapes with social importance, the contemporary water landscapes are desolate spaces [fig. 5].

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[2] Civil forest - civil forest. They were also called *Soyam* as they were areas of poorest soil quality and considered 'wastelands' where nothing grows.
[3] *Van panchayat*

Figure 4: Lopping of the Oak trees in the spring season impacts the forest ecologically and morphologically. As lopping is done by women, this impact is gendered, the interpersonal relationships of women guide this transformation. Source: Photo by author.

Traditional Structres

Water tank in Massau

Figure 5: Traditional water structures of Garhwal versus contemporary structures.

Sacred Groves

Religion is highly important in defining Garhwali identity and in making of the landscape, as settling in a particular site is often religiously sanctioned by the deities. In Massau GS, for example the ancestors had identified the places where gods had landed and settled their village. In local belief, the ancestors were

guided by the deities in the process of settling – which begins with setting up of a temple for housing a village/local deity, followed by siting the settlement and the agricultural terraces. For Garhwalis, religious beliefs and practices are fundamental ways of engaging with the environment. The landscape is sprinkled with several small shrines. Some shrines are powerful domains of the deities while others mark historical events, ancestral linkages, important peaks, water sources, trees or hold other local meanings. The religious aspect of the landscape is thus intertwined with the physical and the social aspect.

The *Ma Kalinka* shrine in Sassau is of regional importance, every six years a ceremonial animal sacrifice is performed for the prosperity and stability of the region. The site consists of an altar under an ancient oak tree and relatively wider terraces around it, located on the ridge of the Sassau village. Together with the ancient shrine of the spring (which lies to its west), the *Kalinka* shrine forms a sacred landscape between the forest and the settlement [fig. 6]. It is an intermediate landscape of patches of forest and agricultural terraces, shared between gods and humans. Similarly in the valley village of Massau, the temple of local deity (*Sapteshwar Mahadev*), located at the confluence of two water streams, serves as a threshold between the human and natural elements (in this case water).
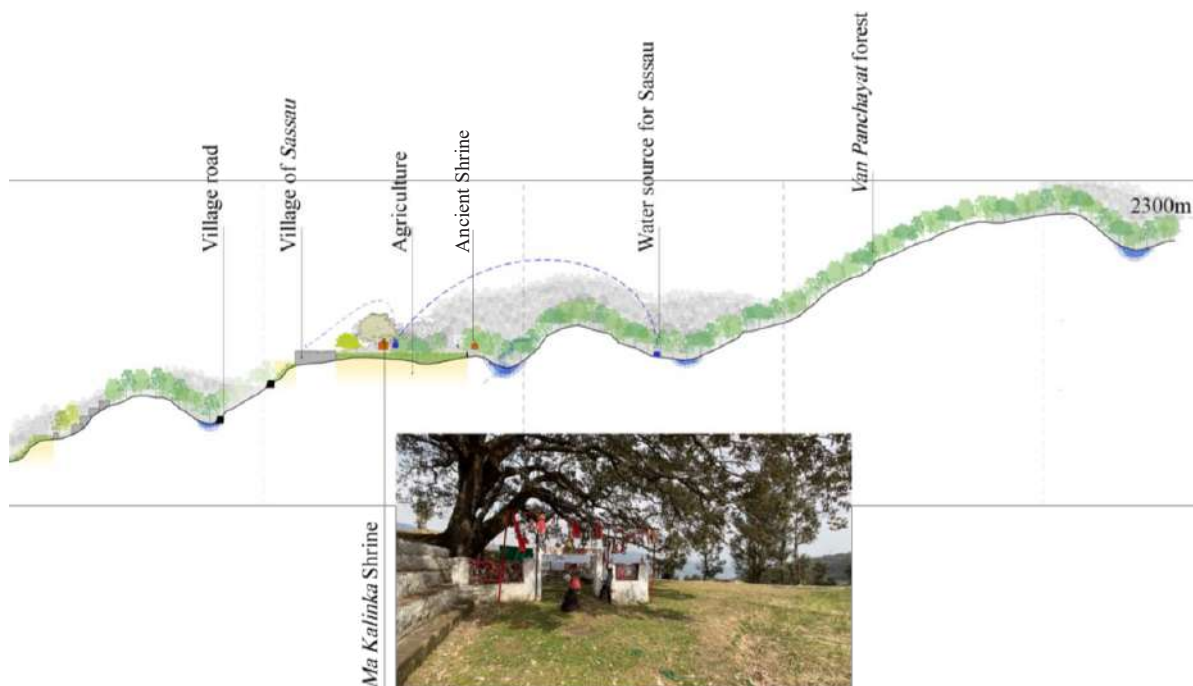
Figure 6: The religious landscape serves as an intermediate landscape between the village of Sassau and the forest. Source: Elaborated by author.

The Village
In the GS, there are four typical settlement typologies associated with the physical aspects of the landscape– the ridge settlement (Massau and Sassau), the valley settlement (Dhara Massau), and the mid-slope settlements (Pajiyana, Rajbatta on southern slope and Jandariya on northern slope) [fig. 6,7].

Massau is the oldest settlement in the GS. It is located on a narrow ridge of a small spur. Despite being on the northern slopes, it receives ample sunlight and has two water streams surrounding it. The agricultural terraces of the settlement are located on the southern slopes of the watershed. Due to the limited space on the ridge, Massau has expanded on some of these agricultural terraces in the valley. This cluster is now known as the village of Dhara Massau. For similar reasons, the ridge settlement of Sassau is now expanding at the roadside (at the break of slope) away from the original settlement. While Dhara Massau utilizes the abundance of water and soil fertility of the valley, the expansion of Sassau hopes to utilize the growing traffic and material flows on the valley road that connects the towns of Pithsain and Bungidhar and is further connected to National Highways 309 and 109. The expansion of Sassau consists of a primary school that serves the six villages of the GS and three convenience shops which also serve as (adhoc) taxi/bus stop

for the growing para-transit services. The convenience shops are supplied with goods from Ramnagar, a city in the foothills located 160km away from the site.

These new operations while tied to logics beyond the local conditions and relations, are emerging factors in guiding local social and spatial transformation. The road itself becomes the parking point for the taxis in the early morning hours, a playground at noon and reverts to being a parking for the returning taxis at night. The simple acts of using privatized transport or buying products from the convenience store are indicators of higher social status. They reflect the communities' aspirations for an urban lifestyle. De Lauwe shows us that emerging aspirations often seek to crystallize into images before being realized in life (de Lauwe, 1964). In case of Massau GS, the association of buying manufactured goods or using taxis serves a symbolic purpose and in line with the myth of roads as 'urbanization' prevalent in the region. This spatial transformation also impacts social mobility. For example, one of the new convenience shops of Sassau are owned by a *Bhandari* family, upper caste but not the highest caste of *Brahmans*, who have gained power through capital accumulation and changed their social status by engaging in commercial operations.
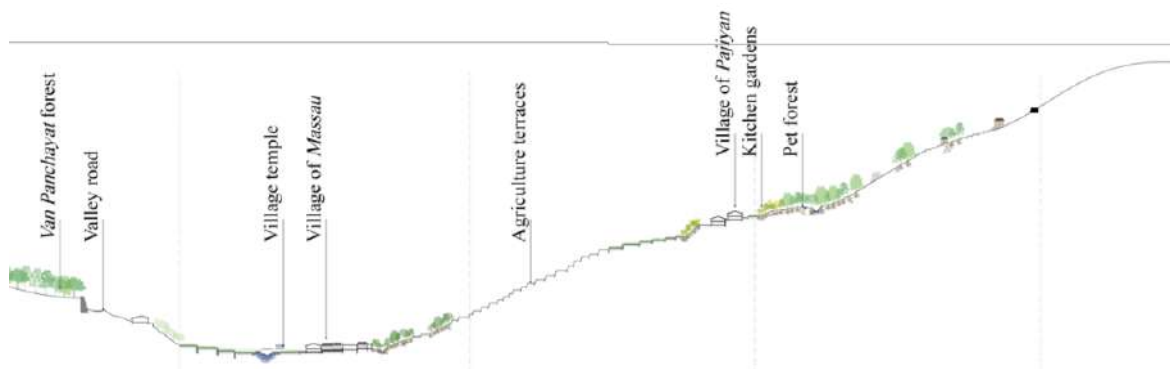
Figure 7: Settlement configuration of Massau (valley settlement) and Pajiyana (mid-slope settlement). Source: Elaborated by author.

Changing relations with the landscape

For the Garhwali community, the social meaning of the landscape established through practice is equally important as its physical aspects. Typical of indigenous land-based practices, the collaborative management and occupation of the landscape and its natural resources inculcates a sense of attachment and care that persists through time and space. The sense of attachment plays out at different scales:
- At personal level, for example in case of the 'pet forests' or 'pet trees' which are taken care of by households across generations.
- At interpersonal level, for example in the case of women the forest becomes a gendered space of social expression.
- At level of the community, for example in case of the agricultural landscape which is socially constructed through collaborative effort.
- for the society at large, for example in consecration of the forest and shrines which are of regional importance.

These multiple scales of attachment, show multiple ways in which landscape is socially constructed through practice. In line with place-making theories, the practices of landscape transformation thus can be seen as a socio-cultural activity of settling. Landscapes constructed with attachment and care, inculcate a sense of patrimony or stewardship, an important factor for the persistence of these practices. The sense of patrimony can be further understood in the description of forest as '*dharohar*' or heritage by the community, in the practice of 'pet forests' and 'pet trees' as inheritance. As attachments go together with autonomy (Latour,

1999), local systems of governance/institutions (e.g., *panchayati*[4] system or the forest *chowkidar*[5] system) are established through persistence of these practices, to minimize conflict and ensure optimum resource use are used to minimize conflict and ensure optimum resource use. This makes the process of physical use of the landscape dynamic and iterative process based on internal relationality of the community.

When reflecting on their relationship with the forest, the community shared socio-cultural and religious practices to communicate the importance of forests in their lives, but at the same time they used administrative distinctions of Civil Forest, *Van Panchayat* Forest and Reserved Forest. While the community conserves their own village forest and uses it with strict restriction and limitations, they don't show a similar conservationist attitude towards the *Van Panchayat* Forest or the Reserved Forest. This indicates a process of detachment from the landscape/forest produced because of colonial expropriation and territorialisation.

The colonial land settlement strategies for the first time imposed legal ownership for the purpose of revenue collection suppressing the collective and shared use of resources. The focus on incentivised agricultural expansion, commodity production for export by East India Company contorted the social means of production for subsistence into means of capital. The East India Company blatantly disregarded the traditional forest dependencies and restricted local access and use in favour of commercial forest exploitation. This was later followed by the Imperial Forest department who continued to expand territorial control over Himalayan forests and its resources. The restrictions on movement within the landscape under colonialisation translated into disruption of the social constitution of landscape. In the village forests, which were allowed to be managed by the communities themselves, the limited autonomy contributed to the continuation of relational ways of practice. As such the village forests became '*hamara jungle*' or our forest as opposed to the Reserved forests which became '*janglad ka jungle*' or forests of the (forest) department where the traditional practices were banned. These distinctions, the sense of attachment and detachment, persist even today and play an important role in landscape transformation and occupation. An example is the development of public works, such as the high school of Massau or construction of the rural roads, for which the community prefers to divert state forest land rather than their own agricultural or village forest lands. In this case, the landscape or the forest does not only have an ecological dimension but also a socio-political one embedded within it, and which if disrupted can cause the sense of stewardship to degrade.

The contemporary development in the region is increasingly influenced by growing markets and capital flows. The traditional ways of being through practice are now transforming into ways of being through production and consumption, which in turn transforms the community's relation with the landscape and with nature. In Massau, a new practice of landscape making has emerged – boundary wall construction. It is a building and construction activity under the employment guarantee scheme of MGNREGA, which a scheme to ensure minimum living wages and employment in the rural areas of India. Due to limited opportunities of employment, most of the employment under MGNREG is directed in building and rebuilding boundary walls between forest lands and revenue lands. Under the scheme, the traditional practices of landscape making, such as building village paths, temples or water structures formerly constructed collaboratively by the community, are now converted into paid employment. As the physical boundaries are made more visible within the landscape, the historical segregation and limitation on movement and occupation within the landscape are ideologically re-enforced. The act itself, does not allow for personal, interpersonal, or communal relations and reduces the landscape to its physical dimension. Despite efforts for livelihood improvement, schemes like MGNREGA fail to confront the contingent socio-spatial challenges. It separates the process of landscape construction, from settling by making it an exogenous means of earning daily wages.

Conclusion
In Garhwal settlements and landscape reflects social relations entangled with historical, local, and regional contexts. Through the notion of relationality, the paper identified different interpersonal and collective ways the community interacts with their environment. By identifying local definitions of the landscape, the paper pushes for a nuanced reading of the landscape. It highlights the multifunctionality and dynamism of

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[4] *Panchayati Raj* – a system of local rural governance, historically based on customary norms and beliefs of the community, later exploited by the British to impose new legislations on revenue and land-use.

[5] Forest *chowkidar* or forest guard is selected by the village for surveillance of the village forest. This guard is either a volunteer or proposed by the forest council, who is paid by each household either with monetary compensation or with grains.

settling within the landscape through sociability, which has been historically suppressed through simplified and rigid administrative understanding of the landscape as employed by the contemporary land-use and planning tools. As remote rural regions like Dudhatoli become increasingly intermingled with national or global networks of power and capital, the settlements suffer from speculative development. In lack of any specific urban visions, such a process is guided by negotiations between community, local governance and beaurocrats, making relational readings of landscapes necessary for understanding the community's evolving relation with nature and avoiding its essentialization.

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Countering the Ongoing Metropolization Process and Neoliberal Logics : Experiences of Dwelling and Cohabitation in the New Neighborhoods of Ain El Aouda, Morocco.

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Abstract

This communication stems from a doctoral thesis conducted since November 2018 in collaboration between the Sasha Laboratory (Architecture and Human Sciences) at ULBruxelles and the National Institute of Planning and Urbanism in Rabat, Morocco. Using four scales of analysis (domestic space, neighborhood (block), district, and city), its objectives are to understand how the peri-urban neighborhoods of Ain El Aouda (a former rural municipality located 30km south of the capital Rabat) are experienced by its residents, particularly their experiences of living together and their relationships with the city and the metropolis of Rabat.

This article will primarily focus on one of the four case studies, specifically the socio-spatial experience of the residents (their relationships with the neighborhoods) and their spatial appropriations of domestic space. The research methodology involved a series of comprehensive interviews (Kaufmann, 2014) (between 15 and 18 per neighborhood), an in-situ observation protocol, as well as a commented inhabited architectural survey describing the material transformations carried out by the residents.

Local Context : Urban Mega-Projects in Rabat and the Ongoing Process of Metropolization

Administrative capital of the Kingdom, Rabat has been an emerging metropolis focused on the international stage since the early 2000s, marking the ascension to the throne of King Mohammed VI. The aim was to change its image as a purely "administrative" city by initiating a process of modernizing its infrastructure and implementing large-scale urban development and economic projects.

A process of metropolization has been set in motion, resulting in a growing transformation of its urban and social landscape. This includes the launch of major urban development and beautification projects, depopulation of central areas, and an increase in the speed and frequency of movements of former slum dwellers, among others. Additionally, there has been a reconfiguration of its economic functions, with a growing focus on the tertiary sector of the local economy. Most significantly, there are emerging dynamics of social and spatial fragmentation, evident through the proliferation of urban expansion projects and the establishment of new towns. These fragmentary processes are particularly observed in the new urban fringes of the Rabat-Salé-Témara conurbation.

Due to the rise in real estate prices in the city center, these peripheral territories attract an increasingly significant population and host facilities with significant urban nuisances that have been relocated from the central areas of the capital, such as wholesale markets, slaughterhouses, and transportation facilities, among others. Located about thirty kilometers away and containing large public land reserves, these metropolitan peripheries are the receptacles of large-scale social housing projects, primarily targeting vulnerable populations with limited financial resources (transferred slum populations, low-income households in search of more affordable housing, etc.) (Harroud , Belkebir in Abdelhak & De Miras 2022).

[Fig.1] Mohamed VI tower, the tallest tower in Africa, from « Besix.com ».

[Fig.2] Zaha Hadid's Grand theatre , from « akt-uk.com ».

Study Area : The municipality of Ain El Aouda

[Fig.3] Map of Skhirat-Témara prefecture, from « Nkhili,H » ,2023.

Located 30km south of the administrative capital Rabat, Ain El Aouda is a former rural municipality created in the 1930s by the colonial power. It falls under the jurisdiction of the Skhirat Témara prefecture. Since the early 1970s, it has experienced a massive influx of populations, primarily from rural areas due to drought waves affecting Morocco. However, since 2004, with the ease of mobilizing state-owned lands, migrations mainly come from cities such as Rabat, Témara, Salé, as part of the "Programme Villes Sans Bidonvilles" (Cities Without Slums Program). Additionally, people from other cities in Morocco are also drawn to Ain El Aouda, highlighting differentiated residential trajectories of residents who come for employment opportunities, property ownership, or seeking a better living environment close to nature (Ain El Aouda also benefits from a microclimate).

[Fig.4] The survey sites in Ain El Aouda, « elaborated by the author », 2023.

The neighborhood that will be the focus of this communication is the Sidi Larbi, a residential development located in the southern part of Ain El Aouda.

Relationships with neighborhoods and spatial appropriations of « home » : A case study of the Sidi Larbi neighborhood

The analysis of the collected materials was based on a protocol that combined variables related to both social and spatial aspects : 1) settlement logics (Chamboredon, Lemaire 1970 ; Grafmeyer, Authier 2015 ; Cayouette-Remblière 2020), 2) residential trajectories (Authier & al. 2010 ; Bacqué & al. 2010 ; Lelévrier 2007), and 3) materialities (spatial position, typomorphology, access to public amenities/proximity and basic social services).

The failure of the equalization project : The end of the myth of social mixing

The Sidi Larbi New Urbanization Zone (ZUN) is considered the largest resettlement operation in Ain El Aouda. The housing development was launched in 2006 by the public operator Al Omrane as part of the national program "Villes Sans Bidonvilles" (Cities Without Slums). Located in the south of Ain El Aouda, it is bordered by the Zaer road to the east and the Annassr housing development to the south. It was integrated into the sectoral development plan of the municipality in 2007.

Spanning nearly 128 hectares, the integrated hub of Sidi Larbi was designed to accommodate 3,366 lots : 2,250 R+1 lots for the resettlement program (67%), 787 lots for social housing and equalization (33%), as well as nearly 37 facilities. The initial plan aimed to create a place of social mixity, bringing together middle-class households, economically vulnerable populations from neighboring rural douars (Chtab, Al Fokra, and Chmicha), and a range of public facilities, basic social services, and commercial spaces to ensure economic viability.

However, the sale of lots intended for equalization did not succeed, undermining the myth of cohabitation and social mixing. As a result, the population composition of the development shifted towards individual and collective household preferences, in addition to the existing resettlement program.

[Fig.5] The programming of Sidi Larbi operation, From Al Omrane

[Fig.6] The planning phase of the operation Sidi Larbi, from « Al Omrane, 2015 »

The settlement of the neighborhood began gradually in 2007 with the influx of residents from neighboring rural douars: Chtab, Al Foqra, Chmicha. These residents were allocated 60m2 plots of land that they purchased from Al Omrane and had to self-construct with the assistance of an architect. The Sidi Larbi operation has also experienced some slippage and diversion, as demonstrated by other relocation/resettlement projects in Morocco (Hauw 2004). Some households in this category either purchased an apartment in buildings constructed by private developers or acquired plots from previous beneficiaries of the resettlement program. `

[Fig.7] Plots constructed by former residents of the douars Chtab and Al Foqra, « from the author », 2019.

[Fig.8] Plots Housing lots for new residents (outside of the douars) « from the author », 2021.

The analysis of the conducted interviews reveals indicators that allow for the identification of certains patterns. The first highlight is the trajectory of category 1 : the former residents of the douars Chtab, Al Foqra, and Chmicha, not all of whom were born in these slums. The majority of interviewed household heads explain that at some point in their residential trajectory, they decided to become homeowners by buying a shack in these douars. The burden of high rent also motivated this choice. Whether former tenants in Rabat or residents of neighboring rural communities near Ain El Aouda (Rommani, Zhiligua), acquiring a shack is the first step towards a certain "stability," albeit relative, that guarantees access to more decent housing at a certain point within the resettlement/relocation programs launched by the state. Family dynamics (marriage, family conflicts) also influence the residential trajectories of residents in this category.

> Mr. M, 50 years old, is originally from the south of Morocco but lived in Rabat before coming to the douar Chtab. He state, « My name is Mr. M.S, I am a merchant, but I used to work in the construction sector. I came to Ain El Aouda in 2000 and lived in the douar Chtab for 9 years before being resettled. I am originally from Kelaat Mgouna, the city of roses. I left my home at the age of 12 to work. Before that, I lived in the J5, Massira 2, and Taqqaddoum neighborhoods. My last residence was in Témara (Massira 2), but I couldn't afford the rent anymore, which is why I bought a shack in the douar Chtab » (M, 50 years old, merchant, 2020).

The other categories of residents came to the Sidi Larbi neighborhood primarily from Rabat and other cities in Morocco for various reasons: socio-professional reasons, such as working in Ain El Aouda in

industrial, educational, or entrepreneurial sectors. However, the choice of Ain El Aouda was motivated by the presence of a network of family and friends in the region. For households coming from neighboring rural municipalities (Zhiliga, Rommani, Brachoua, Nkhila, etc.), the decision to move was driven by the desire to be closer to the city and provide their children with better educational opportunities, as many rural municipalities lack middle schools and high schools. However, the choice of Sidi Larbi was also influenced by financial constraints, as the cost per square meter in the neighborhood is relatively low compared to other areas in Ain El Aouda.

Lastly, some residential trajectories in the neighborhood were the result of chance and the desire of certain households to live in a city with a microclimate.

> Former resident in Salé, Fatéma followed her sister to Sidi Larbi : « I am F, I am 34 years old, and I am married with two children. I have been in the neighborhood for 7 years. Before, I worked at a daycare center in Salé (Al qarya), and here, I am the director of a daycare center and I have the ambition to open another one in the Annassim neighborhood. I am also the director of the "Al Jayl Al Jadid" association and the "Manara" association, which work for the benefit of autistic children [...] I came here thanks to my family. My sister is a homeowner here, so I came to settle down and start my project » (F, 34 years old, daycare director, 2022).

Moving to the neighborhood: between uncertainties, socio-economic constraints, and the challenge of acclimatization

The settlement in the Sidi Larbi housing development for category 1 residents (coming from the douars of Chtab, Chmicha, and Al Foqra) took place in several stages : a lottery operation distributing the lots purchased from Al Omrane. The municipality provided a standard plan, and the self-construction of 60m2 lots began. However, since the authorities did not wait for the completion of the construction work before demolishing the douars, the residents had to either rent in other neighborhoods of Ain El Aouda or rebuild a shack next to their plot of land. This situation caused several effects, including fear, uncertainty, early responsibility of children during the construction phase, and instances of aggression.

> « I had to build a shack there, and I was afraid because there was no electricity or anything. You come next to your plot to set up a shack, and you find yourself searching for water when there are few people around. Some people fled elsewhere to rent while gradually building their homes. So you find shacks here and there, and there's this fear just before moving in [...] many people were attacked because their shacks were left unattended ». - S, 35 years old, phone repairer, 2022

For residents from other categories (not originating from the douars of Chtab and Al Foqra), living in the Sidi Larbi housing development is perceived as a disillusionment. They were taken aback by what it meant to live in a neighborhood inhabited by a "lower-class" social group, which, furthermore, was considered unsafe.

> « Here, the poor people are in need and face a lot of problems. The majority of them got married and had children without a marriage certificate. It means that I haven't progressed by coming to live next to people who are beneath me ; it's like I have taken a step back ». K, 49 years old, seamstress, 2022.

A marginalized and under-equipped neighborhood

The initial project for the Sidi Larbi housing development had planned for 37 facilities, but only a health center, a women's shelter, a mosque, a daycare center, a youth center, and a primary school have been completed (see figure). Sidi Larbi also has a few local shops, two cafes, and saw the construction of the first public space in the neighborhood in 2021.

[Fig.9] Facilities in the Sidi Larbi neighborhood « elaborated by the author », 2021.

Sidi Larbi remains one of the least developed neighborhoods in Ain El Aouda, and the fact that it has only one primary school forces the children and youth of the neighborhood to attend schools, middle schools, and high schools in other neighborhoods of Ain El Aouda. As a result, they have to travel long distances due to the neighborhood's peripheral location in relation to Ain El Aouda. This issue impacts the education of the young people, who are also not closely supervised by their parents.

The neighborhood does not have a public bath (hamam), green spaces, and it is far from public transportation facilities due to its relatively peripheral spatial position in relation to Ain El Aouda. Residents have to take triporters to reach the transportation station located in the center of the city (across from Doukkala commercial avenue), which represents additional financial costs for populations that are already socio-economically vulnerable.

S. speaks of Ain El Aouda as if he doesn't really belong to it, as if the isolation of his neighborhood doesn't make him feel like part of the city. He says, "If you want to buy something or reach the main avenue, you don't think that you are in Ain El Aouda. Instead, you think about taking transportation to reach Ain El Aouda because what is available in the center is not found in this neighborhood."

On the other hand, regarding other facilities and basic social services in the neighborhood, the presence of the health center does not guarantee adequate healthcare services for the population of Sidi Larbi. Furthermore, despite the presence of the youth center, which has been closed since 2020 due to the arrival of Covid, according to Abdeali, "Cultural activities are almost nonexistent in the neighborhood. We have a youth center, but it is closed. It's something that hurts because you see that the National Initiative for Human Development (INDH) has spent a lot of money on this facility, but it is not open. The young people in the neighborhood used to frequent it, and I also saw some friends who had studied with me go there" (A, 28 years old, building technician, 2022).

Whether they are originally from the douars or from elsewhere, these residents want to leave Sidi Larbi by any means possible, but many cannot, so they stay because they have no other choice, relying on other resources such as family and neighbors for integration.

Sidi Larbi is not recommended for those looking to settle in Ain El Aouda. F., who came from Salé to settle in Sidi Larbi and open her daycare, recounts, "Everyone has the same idea here. When you take the bus, wait at a station, or go to an administrative office, you often hear that people from Sidi Larbi are difficult and that the neighborhood should be avoided. Once, a woman wanted to rent a place and was directed to Sidi Larbi, but as soon as she arrived here, everyone tried to dissuade her. In fact, my neighbor

decided to rent her apartment and move to Taqaddoum with her children. In the beginning, you could be peacefully settled at home and hear loud banging on the door, sometimes with stones, but since the COVID pandemic, it has gotten a little better".

Residents' appropriation of their homes & portrait of Khadija :
The appropriation of the new housing in the Sidi Larbi neighborhood highlights a first dichotomous reality : that of former residents of douars (category 1) who are relieved not to live in shanties anymore but who struggle to take ownership of their new homes. They explain this by the impossibility for some, who do not have sufficient economic means, to complete the self-construction of their houses. These houses remain for several years in a state of bareness and dilapidation: lack of doors and windows, unfinished plastering, no paint, and sometimes even posing a safety threat to residents as some houses do not have handrails on the staircase. D, a former resident of douar Chtab, expresses her opinion:

> "It's really complicated to build a whole house. I have constructed it, but there is no renovation inside or outside. Just the plastering, the bricks, and then you add the doors and windows." (D, 56 years old, unemployed)

The second point that makes the appropriation difficult in the Sidi Larbi neighborhood is the size of the lots granted to households, which is around 60m2. According to the residents, it does not meet their space needs and is too narrow to accommodate all members of the extended family.

> "The family consists of several members, and 60m2 is not sufficient. It's not like other neighborhoods, we feel that we have been shortchanged because Ain El Aouda is huge, so the plot of land could have easily exceeded 60m2, do you understand what I mean?" (A, 28 years old, civil engineering technician, 2022).

[Fig.10, 11, 12 13] Interiors of homes belonging to residents from the douars « elaborated by the author », 2021.

As you can see in the photos above, the interior condition of the houses reflects the socio-economic difficulties of some households and also influences their ability to fully appropriate their homes in Sidi Larbi. Images 2, 3, and 4 show the arrangements made by residents within their domestic space to accommodate changes in the family unit. This particular house belongs to Khadija's neighbor, whom I will profile later, and during the visit, she explained that they had to reconfigure the entire floor to accommodate one of their children who got married. Moving out was not an option for them as they couldn't afford to buy or rent elsewhere.

For residents in the other categories (non-douar inhabitants), the appropriation of their homes is not as much of a problem since they have completed the construction of their houses. Some rent out a floor

while others face other issues such as the stability of the ground on which their house was built. However, this category primarily struggles with integrating into the neighborhood, as we discussed earlier.

The facades of the houses above belong to this category and one can notice a clear difference compared to the first category : the houses are completed and the materials used are of higher quality (paint and cladding, wrought iron enclosures)

[Fig.14] Houses built by the new residents
« elaborated by the author », 2021.

Profile of k.

K. arrived in the Sidi Larbi neighborhood of Douar Chtab in 2010. Married and a mother of three children, she belongs to the category of vulnerable residents who make up the majority of the neighborhood. The interview took place in the living room, which was open to the sitting area where her bedridden husband sat. She had placed mint tea, pastries, bread, and olive oil on the table before her neighbors joined us. Even before I started asking her questions, she began the interview by saying :

> "Dear sister, I'll be honest with you, the bank is making us sick, it's jeopardizing our future because they want to sell our house. They have listed it on the judicial sales website because my husband is sick. Everyone you see here is poor [...]. Just tell me, where will we go if it gets sold? We have suffered for many years in this shack [berraqa], like bananas in a greenhouse. We bought it in 1999, but I am originally from Massira 2 (Témara). We used to rent there and we didn't have our own place, so we bought it, but we have suffered a lot." (K, 49 years old, unemployed, 2020).

[Fig.15] The sales location for cleaning product at khadija's. « elaborated by the author », 2021.

She primarily relies on donations from the neighborhood after her husband's work accident on a construction site, which occurred nearly two years ago. To help herself, she also sells cleaning products displayed on the open window of a room overlooking one of the main streets of Sidi Larbi.

Like many former residents of Douars Chtab, Al Foqra, and Chmicha, K is facing the threat of eviction. She says, "The bank still holds the title [...], all our documents are still with them, we have nothing, only God. They are waiting for us to finish repaying the loan before issuing us the title." Her neighbor sitting right beside her adds, "It was my father who paid off my loan at the bank, he partnered with me and had a 50% share. But when he passed away, my brothers and sisters demanded their shares [...]. Now the court has made its decision and they are asking me to leave my home, otherwise they will forcefully remove me."

A few minutes later, another neighbor enters, and K. says, "She is the woman who takes care of my husband at the neighborhood health center, the truth is if any of us need medication, she doesn't hesitate to bring it to them." Discussions continue with Khadija and her neighbors about what is lacking in Ain El Aouda, according to them, there is a need for specialist doctors, dermatologists, psychiatrists, and health centers that provide medication, not to mention the transportation issues.

According to these women, meeting spaces are becoming scarce in the neighborhood. The women's qualification center supported by the National Initiative for Human Development (INDH), where they used to attend literacy classes, has been non-operational for a year. The youth center has also closed its doors since the beginning of the Covid pandemic. One of them states, "There are no gardens, so we gather outside our doors. Even the mosque is closed." Finally, these neighbors spoke to me about the strong bond that connects them and the solidarity that helps them cope with the difficult living conditions in Sidi Larbi. Khadija adds :

> "I was away from my house for two months, and it was my neighbors who were there. I don't know how I could ever thank them. They were the ones who did the laundry, cooked meals for my children. The kindness I found in my neighbors, I did not find it in my own family." (K, unemployed, interview, 2020)

After her neighbors left, I stayed alone to talk with Khadija about the interior organization of her house and the modifications she had made. She told me that she had not followed the plan authorized by the municipality and provided by Al Omrane.
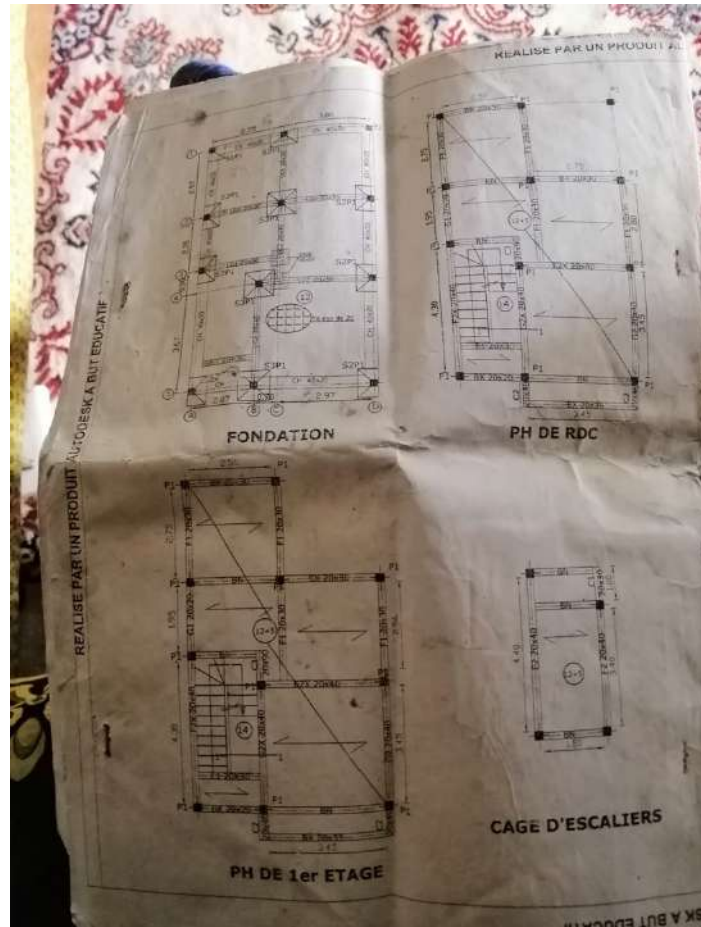
[Fig.16] Typical floor plan pf Khadija's house,'From Al Omrane' 2021.

Based on the plan provided by Al Omrane for self-construction purposes, I reconstructed the original plan and attempted to understand, based on K's account, the material transformations she made when building her home.

By changing the arrangement of the stairs, K. was able to create a space underneath for a toilet and a shower. Additionally, the original plan had the living room at the entrance, but Khadija decided to turn it into a sales area for cleaning products. Instead of a bathroom, "Bit El glass" (a sitting room) was created. She tells me, "You know, where we are sitting right now, that's where the shower was supposed to be." This space is the most used in the house; it's where she receives the neighbors, watches television, and shares meals with her family. However, it was omitted from the initial plans provided by Al Omrane.

In the new spatial arrangement, the former bedroom has become the living room, now positioned opposite the sitting room. The current bedroom has taken the place of the kitchen in the original plans. As for the kitchen, it has found its place in the courtyard, which Khadija had to cover with corrugated sheet metal. While the courtyard was originally conceived in the initial plans by Al Omrane as a source of light and ventilation due to the adjoining plots, this element was "sacrificed" by Khadija to gain more space.

[Fig.17] Ground floor plan approved by the municipality, « Elaborated by the author », 2021
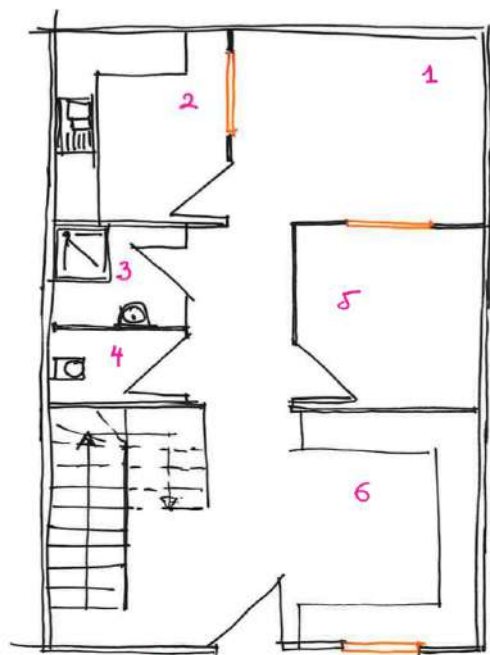
Légende:
1 Cour
2 Cuisine
3 SDB
4 WC
5 ch. à coucher
6 SALON

Légende: ↑ Entrée   TROTTOIR
          !...! COUR [Douwaya]
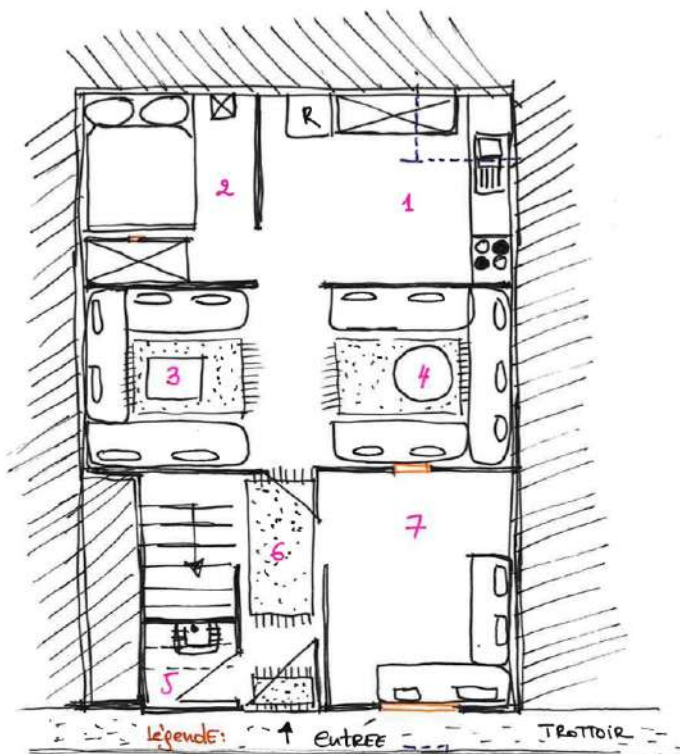
1 CUISINE
2 ch. à coucher
3 SÉJOUR [Bit Lglass]
4 SALON
5 W.C
6 Hall [WEST EDDAR]
7 local de vente
// Mitoyen

[Fig.18] Ground floor plan modified by Kh., « Elaborated by the author », 2021

[Fig.19] Underneath the staircase, K. has positioned the toilets, as her house does not have a shower « Elaborated by the author » 2021.

[Fig.20] The new kitchen, which has talekn the place of the courtyard « Elaborated by the author » 2021.

The new kitchen better meets K's needs. It is more spacious and provides additional storage space for utensils. This premise reinforces the importance of the kitchen in the interior organization of the domestic space among the residents of the Sidi Larbi neighborhood. However, this new interior rearrangement deprives the bedroom and the living room of natural light. To compensate for this, a small opening has been placed in the middle of the wall facing the room that overlooks the street. The need for natural ventilation and lighting is evident, which is why the residents leave the front door open during the day. The issue of privacy inside the house is also questioned due to the absence of doors and partitions between rooms. Moreover, the living room is shared by the children and the parents and also serves as a sleeping area. In this case, K's husband sleeps in the living room with their three children while she stays in the bedroom.

[Fig.21] The new living room is illuminated by a small opening that overlooks the space where cleaning products are sold, « Elaborated by the author » 2021.

[Fig.22] The new bedroom does not have natural lighting. Separated from the kitchen by a curtain, it benefits from the lighting coming from the courtyard, « Elaborated by the author » 2021.

[Fig.23] The front door remains open troughout the day to provide lighting and ventilation to the house, « Elaborated by the author » 2021.

[Fig.24] K's unfinished house reflects the precariousness of a majority of households coming from the douar's, « Elaborated by the author » 2021.

Ks house is not finished, like nearly 70% of the lots in Sidi Larbi. Only one floor out of two is completed, and the exterior facade, as shown in the photo below, is generally not painted. Sometimes, as is the case here, even the plaster is not applied. In terms of interior design, the absence of openings (doors and windows) and handrails on the stairs is very common, especially among former slum dwellers.

In addition to posing a danger in terms of use, this situation complicates the spatial appropriation of "home" in Sidi Larbi for the population living in these precarious conditions. It is therefore quite relative because, on one hand, by deviating from the initial plan, the domestic space is transformed to better meet the daily needs of the residents. But on the other hand, the households' economic insolvency, leading to the non-repayment of credit expenses to the bank, results in them being dispossessed of their assets, which are put up for judicial sale. Ultimately, these residents are threatened with eviction at any time, and "home" becomes the "property of the bank," as affirmed by a majority of the respondents from the Douars Chtab and Al Foqra.

However, despite the aforementioned conditions, observations in Sidi Larbi demonstrate that it is constantly evolving and that residents continue to reshape their homes, albeit without adhering to spatial and architectural norms. Each person does it in their own way, based on their current financial means, personal tastes, and preferences, and within a timeline that allows for noticeable distinctions in Sidi Larbi neighborhood (image X) between those coming from the Douars and those coming from outside Ain El Aouda.

Conclusion

We have seen how the failure of the equalization project in the Sidi Larbi settlement limited the settlement of other population categories and ultimately confined the neighborhood to the resettlement of the Chtab, Al Foqra, and Chmicha rural areas. However, the reality on the ground has shown that other categories of households, with multiple individual and collective logics, have joined the neighborhood in recent years for professional, family, and socio-economic reasons.

Regarding the residential trajectories of Category 1 (coming from the rural areas), although households perceive the transition from the rural areas to the settlement as a form of upward social mobility, this experience is not without constraints, making the appropriation of the neighborhood by these households quite controversial. As I demonstrated earlier, settling in the Sidi Larbi neighborhood has weakened their socio-economic situation because they now have to pay for additional expenses that they did not have in the rural areas: water and electricity bills, as well as monthly bank loans for a large segment of the population working in the informal sector. The dream of becoming homeowners has been doomed to failure for a majority of residents who are threatened with eviction by banks. For other categories coming

from areas other than slums (outside the rural areas), "shock" and "surprise" characterized some of their perceptions of their residential trajectories when they settled in the settlement, making their adaptation quite complicated and leading some to regret their choice of the neighborhood. These perceptions are fueled by the stigmatization of the neighborhood and the negative image conveyed by both residents and non-residents of the neighborhood.

The image of the Sidi Larbi settlement is also constructed based on a material reality, which is its marginal spatial position in Ain El Aouda, far from central areas and public transportation, the absence of public facilities and amenities, leisure spaces, and the failure of services, particularly the health center and the neighborhood mosque. This situation has led some households to leave the neighborhood and return to their former place of residence because living in the neighborhood was seen as a real decline, both for themselves and for their loved ones, whom they wished to see progress in a better environment. For others, staying in the neighborhood is not a choice but an obligation because they cannot go back.

Finally, the analysis of the case study has demonstrated, on the one hand, the residents' ability to adapt and modify their domestic space. These new arrangements better meet their daily needs. However, their precarious socio-economic situations make it almost impossible for these households to complete their homes. These houses remain in a semi-finished state for several years, also posing a threat to the residents' safety (lack of handrails for the staircase, uncovered reinforcement of the structure). Can we then say that this precarious and poorly inhabited situation that characterized them when they lived in slums continues to perpetuate in these new homes in Ain El Aouda ?

Bibiography

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III.a

Between soils and sub-soils : Mining landscapes

Towards desealing as a widespread situated practice

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This contribution aims to critically examine the assumptions and conceptions about de-sealing actions according to the main European strategies on soil care in the context of the ecological transition.

It will be argued that desealing is not a matter of quantity, but rather a tool to improve the environmental quality of desealed soils, enhance sealed surfaces functioning and activate social inclusion processes. In this sense desealing should be always conceived as a situated and spatial action, that varies depending on the contexts. In order to explore this potential aspect of de-sealing this contribution focuses on two case studies of policies, Ontharding Program in Flanders, with a special regard to GreenWithGrey systemic project, and Dessert Program in France, both investigating de-sealing actions as a tool to fertilise soils enhancing and experimenting new relations between different soils and the bodies that inhabit them: in few words a tool for coexistence.

Transition: a matter of soil politics

In a famous article for the magazine Casabella in 1986, Bernardo Secchi reflected on urban design, proposing to shift attention "from the building to the ground, to the surface area between buildings that cannot be denied or reduced to a technical space" (Secchi 1986 p. 136). Secchi reflected on the need to articulate open space in order to qualify it and thus make it available to perform several functions, several activities, to act as a support. The Italian urbanist pointed out the *soil project* above all as a strategy of modifying the existing. Secchi's proposal is now more relevant than ever, not only concerning the spatial relevance but also according to its intrinsic ecological value. Indeed, soil is a complex ecological system living in its thickness, in its dialogue with the subterranean and atmospheric envelope. Soil is an environmental resource which need to be regenerated and fertilised as far as possible, since plants and animals' life depend on it, thanks to the reabsorption of solar radiation, the storage of carbon, the containment of the overheating of the earth's average temperature and the water cycle regulation capacities (Pavia 2019).

In the context of climate change, human beings are forced to make a systemic transition with the main objective of reducing carbon emissions, thereby containing the global temperature rise whose impacts are well known, while limiting and containing the social inequalities produced by the current production system of unlimited growth (Krähmer, Cristiano 2022). These efforts affect every aspect of our daily lives: mobility, manufacturing, technology, energy production, the food system, waste management and others, all intertwined and inseparable. In this perspective soil plays a fundamental role, as it lies at the intersection of all these aspects (Mantziaras, Viganò 2016).

Along this trajectory, political unions, states and metropolises have developed visions and strategies, to foster ecological transition and imagine new futures, in which soil is a central focus. The results are tangible in the numerous policies and programmes implemented in recent years. These operations make clear the relevance and at the same time the need to rethink urban and territorial design through soils (Barcelloni Corte, Boivin 2022).

Conceptions of de-sealing in European strategies about soil

In recent decades, within the European Union, there has been a proliferation of programmes and policies that focus on soil and its protection, such as the No Net Land Take by 2050 (European Commission 2016) or the Guidelines to best practice to limit, mitigate, compensate soil sealing (European Commission 2012). They lay the foundation for limiting soil consumption, defined as "the loss of agricultural, forestry and other semi-natural and natural land to urban development and other artificial land. This includes areas sealed by construction and urban infrastructure, as well as urban green areas and sports and recreational facilities" (European Commission 2006).

The mentioned programs have the merit of looking at soil as a non-renewable fragile resource that needs care and a key player in the health of ecosystems: there will be no transition without including soil in any future planification (European Commission 2021). At the same time, however, they place the human-soil relationship within a conservative and protective dimension, in which man and his

activities, especially urbanisation, are inhibited or stigmatised, exasperating the dichotomy between culture and nature. Moreover, this perspective places the focus predominantly on natural and agricultural soils, to the exclusion or neglect of urban sealed soil. Thus, the infinite number of roads, squares, roundabouts, pavements, car parks, that occupy the space we inhabit daily is trivialised into irreversibly consumed soil.

Certainly, the extensive use of sealing materials, of which asphalt is the protagonist, poses non-negligible ecological problems: soil sealing and the consequent modification of the water cycle, decreased infiltration capacity, more frequent flooding risks, increased heat island phenomenon, reduced carbon sequestration capacity, decreased fertility. Soil sealing diminishes or negates the relationships, interactions and qualities that characterise living soil. For these reasons, asphalt is today a stigmatised and rejected material, the embodiment of urbanisation's ills (Ambrosio and Metta 2019). At the same time, impermeable surfaces have a fundamental value for humans, as they allow everyday life to take place, from the transportation of vehicles and goods to recreational and leisure activities. Considering asphalt, as well as all impermeable materials, an integral and active part of the soil is an indispensable step in order to rehabilitate them and to imagine new ways of coexisting and interacting with these materials (Zardini 2003).

Among the strategies proposed by policies and programs to contrast soil consumption, desealing is gaining relevance. Desealing consists in the removal of sealing surfaces and the possible strategies of fertilisation of sealed soil, with the objective of enhancing both in a perspective of co-existence between apparently distant and irreconcilable elements. The desealing action is able to restore an effective connection to the subsoil, alleviate flooding, encourage vegetation and contain heat islands, and make spaces initially conceived as monofunctional available for a variety of urban practices. Furthermore, desealing, instead of being conceived as a mere practice of compensation, should be understood as an action of valorisation that does not end with the removal technique but continues in the practices of care and fertilisation of the de-sealed soil: man becomes an actor in the creation and formation of soils (Richter 2019), within a multi-species community made up of inter-dependent relationships, in which he is recognised as a capacity for care. The value that de-sealing can bring lies in its ability to induce processes of transformation from mono-functional sealed soil to soil as a community (Puig de la Bellacasa 2017). This contribution aims to present two case studies of regional strategies that propose de-sealing as an operational tool to improve spatial, ecological and social qualities of urban spaces respectively in Flanders and France.

The *proeftuinen ontharding*: how to address de-sealing on a regional scale level

Flanders *ontharding* is a movement launched by the Flemish government in 2018 following an initial desealing forum. This was followed by two calls - September 2018 and April 2019 - for project proposals on de-sealing that should contribute to a better spatial quality of our environment. In order to start these projects, Flanders is investing over 10 million euros in 44 *Proeftuinen Ontharding*, which were selected together from 450 project proposals from both calls by an expert team [fig.1]. These 44 pioneering projects or pilot gardens for water management are now all active for desealing the space in Flanders (Departement Omgeving 2020). The pilot projects are not only motivated to move towards realisation, but are also supported by a multidisciplinary group of experts on design, legal and financial issues and communication. Because while remove sealing materials may seem simple at first glance, in reality the opposite is true. De-sealing is part of a necessary transformation of built-up space. Therefore, it is often related to strategies of densification, reuse, interweaving, which are worked out in conjunction with demolition of vacant buildings, deletion of residential expansion areas (Stas, Van Maecke 2022). This makes desealing a complex task for which the simple solutions usually do not fit. Therefore, desealing requires the development of a new practice on site. In this way, the Living Labs contribute to reducing the rate of sealing in Flanders and making our region more climate-robust through concrete softening on the ground, but also through joint knowledge building and sharing on how to make softening possible and how we can realise and support new desealing activities (ibid.).

Although the de-sealing of impermeable surfaces is not yet an established transformation practice to reactivate soil as an environmental infrastructure, the projects of the Ontharding programme in Flanders describe a systemic approach oriented towards its dissemination on a regional scale. Ontharding is a transitional programme, defined as a fundamental change in structures, culture and

practices (Grin et al. 2010 p. 109 citing Loorbach and Rotmans 2006) and which needs the participation of public and private actors and percolating between levels, disciplines and roles in order to be realised (Departement Omgeving 2020).
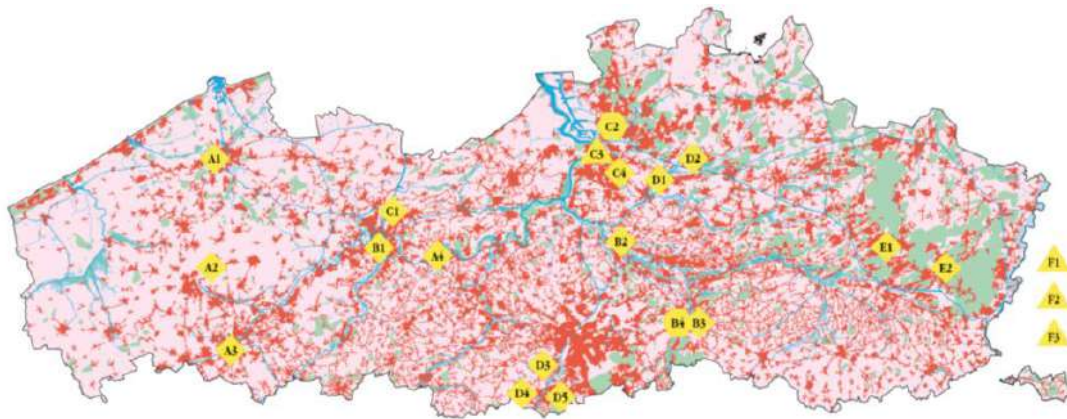
[fig.1] The first *Proeftuinen Onthardings* generation in 2018: 22 projects, from Departement Omgeving

GreenWithGrey: a multi-level and systemic de-sealing project

GreenWithGrey, one of the systemic projects of the Ontharding programme, explores whether and how desealing industrial areas without affecting production can reduce hydraulic risk and improve Flanders' water cycle. Industrial platforms are an economic resource for Flanders, but due to the extent of their paved surfaces, they generate an enormous amount of surface runoff and their extension fragments the territory, negatively affecting the continuity of ecological networks. The project, coordinated by LATITUDE Platform in consortium with two local universities UCLouvain and KULeuven, brings a systemic reflection and explores both potential physical transformations of existing industrial platforms and hypothetical forms of coalition between local and regional actors.

To do so, GreenWithGrey considers the polycentric and multi-scalar composition of actors involved in water management in the region (Knieper and Pahl-Wostl 2016). In ideally following the flow of water, which, generated by yards and roads covered with asphalt, concrete, and other sealing pavements, flows to sewage systems, and from industrial platforms to draining water bodies, a multitude of stakeholders are intercepted: industrialists, private platform administrators, public and private building contractors, sewage and drinking water agencies, surface water managers, and public institutions (municipal, provincial, and regional). The GreenWithGrey project is developed in the form of a collaborative design process between the research team, various government agencies and local and regional actors. It is a tool for negotiation and learning between local actors who are in a position to realise the transformation and provincial and regional actors who, by dealing with the legislative level, are in a position to trigger it. As a living laboratory, GreenWithGrey conducted three main collaborative actions.

First, a ten-day action workshop involving GreenWithGrey researchers, an international group of male and female students, some industrialists, public technicians and experts. Working in the field - an industrial platform in Vilvoorde, a municipality adjoining the Brussels Capital Region - they designed minute interventions as a translation of broader reflections at the scale of the plot, the platform and the sub-basin, and to test pavement tools, material resistance to tools, their consistency and the workforce required. This collaborative and transformative moment also allowed GreenWithGrey to become known, to clarify possible strategies, and was an opportunity to bring together some possible transformation actors.

The information gathered in the field was used to guide the analysis and design of a series of spatial desealing configurations oriented towards the separate management of rainwater at the scale of the

industrial plot, its timing and its reuse where possible [fig.2]. Finally, a concluding round table discussion with a number of institutional figures from Flanders - representatives of public land management and development agencies and water networks - provided an opportunity to present and debate the updated configurations of the various considerations gathered during the bilateral meetings, tested in two hypothetical projects for two different platforms in Flanders, one on infiltrating soil, the other on soil with low infiltration capacity, and accompanied by assessments of the impacts of the hypothesised desealing on the regional water cycle.

In order to stimulate change on different levels simultaneously, the outcomes of the systemic project have been collected in a series of online pamphlets, each imagined to return a specific aspect of the project and to communicate to a specific arena of actors.

The project takes a strategic posture to define new competences, new management and governance configurations. In GreenWithGrey, the project endeavours to outline new intersectoral coalitions and connectivities, to propose alternative spatial organisations of the existing reinterpreted in its most recurrent elements, to encourage and support the social production of cooperative places for the de-pollution of industrial areas or decisive portions of them with respect to water management and the qualification of open space.
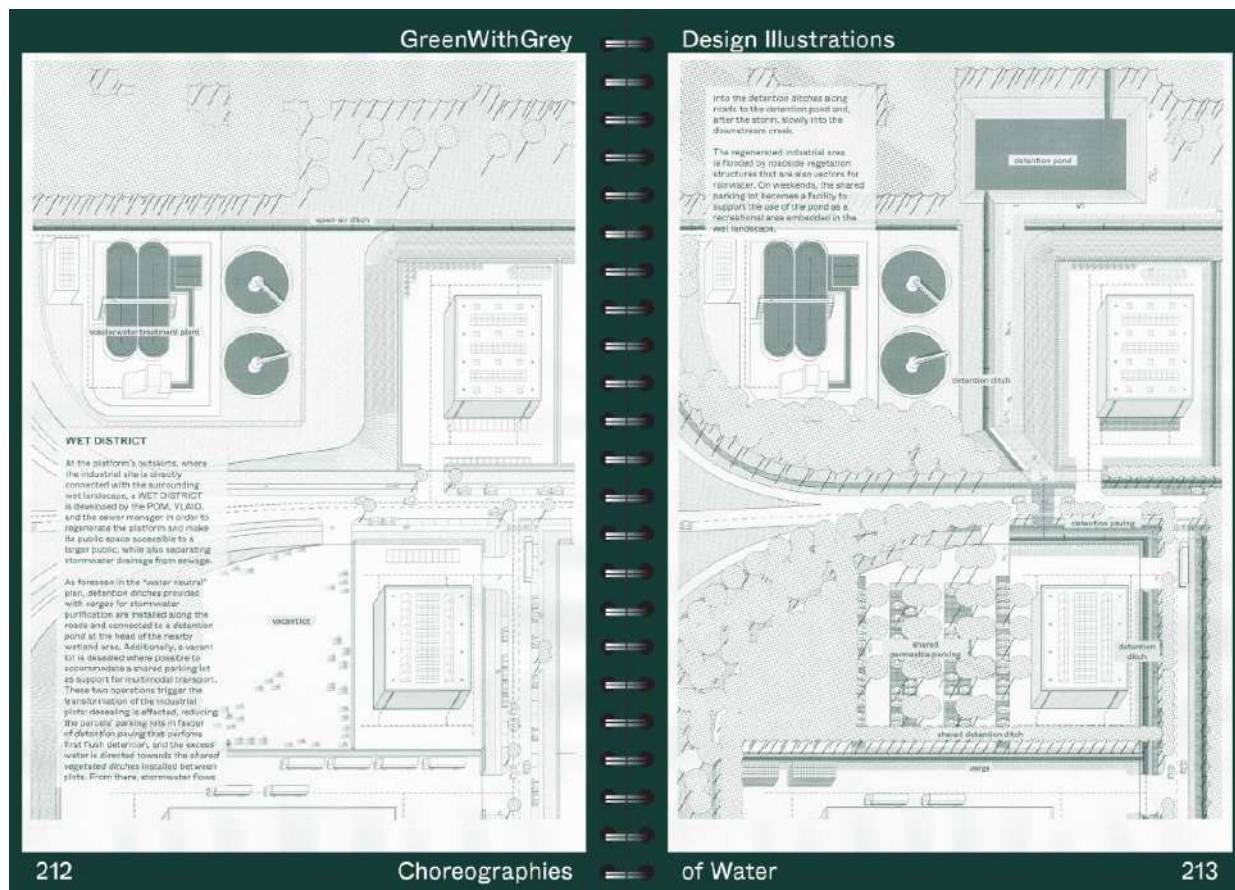
[fig.2] GreenWithGrey: spatial configuration of desealing intervention on an hypothetical industrial platform, from Latitude Platfrom for Urban Design and Research

Dessert project: starting from the context, thinking about the process

The Dessert project, that stands for DEsimperméabilisation des Sols, Services Ecosystémiques et Résilience des Territoires, is a project started in 2021 and funded from ADEME in the context of the call for proposals MODEVALURBA. It is coordinated by University of Lorraine/INRAE – LSE Laboratoire Sols et Environnement and includes the following partners: Agrocampus Ouest-EPHor-BAGAP, AMU (Institut d'Urbanisme et d'Aménagement Régional) – UMR Telemme, SCE, Wagon Landscaping, D&L Enromat, Plante & Cité. Dessert has five main objectives: analyse characteristics, functions and services provided by urban soils, making a comparative state of the art for sealed and desealed soils; defining a set of desealing methods that try to encompass the most of the possibilities; assessing the effectiveness of desealing in terms of urban renaturation, based on feedback from desealing projects; implementation and monitoring of laboratory experiments to optimise desealing processes; implementation and monitoring of pilot sites over time; development of a multi-attribute tool to assist in the design of urban soil desealing projects. The project starts its enquiries from the awareness that the consequences of sealing on soil properties are well known, but conversely very little work has yet been done to assess the potential for re-functionalisation of soils, in particular through their desealing. The objective of the Dessert project is to better understand these issues and to develop operational tools for the actors involved in these processes and projects by producing an operational guide, which makes use of existing situated projects as the various intervention of Wagon Landscaping (Wagon Landscaping 2022) as Asphalt Jungle, Jardins des Joyeux and others [fig.3].

Although the project is still in full development, it is interesting to note the comprehensive approach to urban soils that includes sealed surfaces: in this sense, knowledge of sealed soils and their compositions and behaviours is crucial. Secondly, the project clearly focuses on the effects of desealing. The Dessert project does not consider desealing as a mere technical action as an end in itself, but by focusing on the previous condition and afterward effects of the action, it understands desealing as an intrinsic process of transformation of the existing.

[fig.3] Desealing project Boerenhol [Park]ing in Courtrai, form Wagon Landscaping.

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An Interdisciplinary Framework for Evaluating Urban Soil Transformation

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In the field of urbanism, the question of the soil is being recognised over the last years as a key to the transition toward more resilient cities. This paper presents a methodology to analyse the impacts and constraints of soil transformation, by classifying soils according to their unsealing constraints and to the improvement of the water cycle potentially achieved by their transformations. This methodology calls upon different disciplines, such as urbanism, hydrogeology and pedology, to allow a decompartmentalised and 'hybrid' analysis of soils in the urban system.

Urban soils are analysed as a three-dimensional system, composed of different strata: (a) the soil cover, defining if the soil is sealed, built-up or unsealed ; (b) the soil itself, the stratum filling the function of hosting life if this function is not threatened by human activity; (c) the subsoil, the hydrogeological structure and its role in many urban functions. Based on the existing literature, the interactions between these strata are then studied to highlight different categories of urban soils, according to the constraints and impacts of their transformation.

The case of the Brussels-Capital Region is studied, as this region is facing multiple challenges related to its soil: from pollution inherited from its industrial past to major water dysfunctions resulting from urbanisation and increasingly revealed by climate change. Soil remediation, projects of green spaces and soil unsealing are also multiplying in Brussels, but generally without any monitoring of their environmental benefits and often at a high environmental cost: using energy intensive remediation technic, requiring the reconstruction of artificial soils (technosols), generating exports of polluted soil…

The purpose of this paper is to explore a classification of Brussels' urban soils, based on a three-dimensional approach, to favour transformations based on soil assessment. Thus, this work aims to draw attention to repercussions of urban soil transformation, both from an operational point of view and from an environmental perspective.

Introduction

The question of soils in urbanism is a growing field, as shown by the numerous publications on this subject [fig. 1]. This interest stems from a better understanding of the nonrenewable nature of soils – at least on a human time scale – and of the many crucial ecosystem functions performed by soil (European Commission and European Soil Bureau, 2005; Hazelton, Murphy, and CSIRO Publishing Staff, 2009; Cavalieri, 2019; Vialle, 2021; Viganò and Guenat, 2022). These functions are strongly threatened by soil consumption which remains important: the artificialisation of soil represents 711km2 on average per year in Europe, between 2012 and 2018 (European Environment Agency, 2019).

A better understanding and consideration of urban soils therefore seem essential to address environmental issues and enable cities to cope with ongoing climate change. To address the complexity of urban soils, a hybrid approach between several disciplines – such as pedology, hydrology, life sciences, etc. – is necessary. This paper proposes to further explore these interdisciplinary links, with the aim of better understanding the interactions between the soil, the soil cover and the underlying geological strata.

This interdisciplinary understanding of urban soils aims to address the gap in the assessment of the positive and negative impacts of soil transformation at a district and city scale. The presented evaluation framework is designed to promote a more comprehensive consideration of soil in urbanism and urban projects, in line with the vision of a city adapting to nature, and not controlling it (McHarg, 1969; Barles, 2010). The need for such an approach is grounded in the analysis of the existing literature.

Within the structure of a PhD thesis, this article is an exploration of the existing literature ('Hybrid Approach of Soil') and an attempt to highlight the contributions of the various disciplines to the question of urban soils ('At the Crossroad of Different Disciplines'). This paper also goes further by trying to represent through mapping these disciplinary contributions, and their interrelations, in the Brussels-Capital Region Territory ('A Complex and Interrelated System').

The research presented in this paper was conducted within the context of the 3Dcit-is research project, funded by Innoviris. The PhD thesis is therefore taking this research as a starting point to further explore urban soil and underground questions.

Hybrid Approach of Soils

The need for a better consideration of the complexity of the soil system in urban projects has recently a particular echo in the face of environmental concerns. Understanding urban soils, and their complexity, requires a hybrid approach, gathering knowledge from various fields. This chapter aims to examine the existing literature in urbanism related to soil and to position this article within the current knowledge base. To achieve this, we have conducted a review of publications on this topic and categorised them into seven themes or approaches, which we will elaborate on in the following sections.

Review and categorization of relevant urbanism literature on soils

Aligned with Bernardo Secchi's observations (Secchi, 1983), the disconnection between soil and the city has been highlighted more recently by Dehaene and Vandermaelen (2022). There is therefore an urgent need to valorise urban soils and to adapt urban projects – and architecture – to the soil (Meulemans and Labat, 2016; Viganò and Guenat, 2022). This approach is in line with the concept of a nature-based urbanism, working with nature and not against it (McHarg, 1969; Barles, 2010). An increased emphasis on soil can also lead to the reestablishment of links between elements of the fragmented city (Secchi, 1983) through the continuity in soil and in green infrastructure (Galí-Izard *et al.*, 2022).

This disconnection between cities and their soils is especially problematic in the face of climate change and our entry into the Anthropocene (Mantziaras, 2016). The ecosystem functions (or services) of urban soil and the consequences of their dysfunction on the city are the basis of the work of many authors [fig. 1]. Cities are now compelled to rethink their approaches to soil functions, such as vegetal production, climate regulation, carbon storage, water management and biodiversity preservation (Havlicek, 2016; Cavalieri, 2019). The soil's crucial function of regulating the water cycle and storing rainwater through infiltration is particularly significant in dealing with extreme weather events that are becoming more frequent with global warming (De Bondt and Claeys, 2008; Kuzniecow Bacchin and Recubenis Sanchis, 2022). The concept of living soil – soil that can support life and fulfil its ecosystem functions – is therefore becoming increasingly important in urbanism (Barcelloni Corte and Boivin, 2022).

Many of these ecosystem functions of soil are currently being relegated outside cities (Dehaene and Vandermaelen, 2022). Food and plant production are being pushed outside of urban areas, as is the function of the soil as a recreational space. This renders the city heavily reliant on its hinterland for soil functions as well as soil itself, as soil fluxes to and from the city are significant. To enhance urban resilience, it is therefore necessary to rethink these relationships and to envision a more circular system (Meulemans and Labat, 2016). This analysis raises important questions about urban development models. 'Inward urbanisation', which aims to build the city on itself to avoid urban sprawl, has the side effect of increasing the pressure on urban soils which are not yet urbanised (Vialle, 2021; Barcelloni Corte and Boivin, 2022; Dehaene and Vandermaelen, 2022; Viganò and Guenat, 2022). Therefore, the externalisation of soil functions (food production, carbon sequestration, water infiltration, …) outside the city increases, endangering the urban ecosystem. The compact city model is therefore criticised for its lack of consideration for urban soils.

Preserving the living soils that still exist in cities and rehabilitating dysfunctional soils through unsealing is seen as a solution by many authors [fig. 1]. Unsealing does not necessarily require major intervention to rebuild artificial soils (technosols) as life can reinvest soils autonomously (Bee and Clément, 2022). However, unsealing cannot replace soil preservation, as natural soils are the result of a very long process of pedogenesis (Mantziaras and Viganò, 2016). The European no net land take policy, which aim to end soil consumption in Europe by 2050 (European Commission, 2011, 2021), is in line with this goal, as are the '*Stop Béton*' and '*Bouwshift*' movements at the Belgian level (Labo XX+I, 2021).

The preservation of living soil goes hand in hand with soil care, as soil is a dynamic element in perpetual transformation (Vialle, 2022). Soil care practises – as well as soil care actors, such as farmers – have been overlooked in cities. Giving more importance to the voice and expertise of soil care actors in urbanism therefore enables a better consideration for living soils (Dehaene and Vandermaelen, 2022). Soil care could also consist of a minimal intervention, emphasising care rather than control of the soil, allowing for a more autonomous natural development (Bee and Clément, 2022). This approach is in line with the criticism of the priority given to heavy technological solutions (Barles, 2010), which often lead to side effects, requiring in turn another technological response. This effect is perfectly illustrated in water management, where *"plus de tuyaux signifie donc plus de tuyaux"* [more pipes means consequently more pipes] (Barles, 2010). The relationship to soil is a complex issue of "social relations and regulations" (Raffestin, 1989). Projects such as Super Terram (BRAL, ULB and 51N4E, 2023) investigate this relationship by exploring urban soil management and

governance practices through participatory experiments. Such initiatives have the potential to provide insights into effective soil care practises and to promote sustainable soil management in urban areas.

Finally, soil also serves as a valuable historical archive of the city by preserving traces of past constructions and land uses, while revealing the continuity between these historical elements and the contemporary city (Pinon, 2016). The study of the evolution and transformation of urban soils (Barles, 1993; Ripoll, 2016; Vialle, 2021) allows a better understanding of the impact of human activities on soils, which in turn can be used to improve soil management strategies.

Positioning the current study within the existing literature

This paper aims to address the gap in the assessment of the positive and negative impacts of soil transformation at a larger scale, the scale of the Brussels-Capital Region. This objective is derived from the literature review presented above. Thus, ecosystem functions, especially the role of soil in water management, are studied in an attempt to identify where unsealing would have the most significant impact. This approach is also inspired by McHarg's vision that "the distribution of open space [as well as urban planning in general] must respond to natural process" (McHarg, 1969, p. 65). This author also highlights the work performed by nature for humans, pioneering the concept of ecosystem services (McHarg, 1969, p. 55). In regard to unsealing, the approach of a limited intervention in the transformation of soils is preferred, to avoid environmental side effects that may result from overly intrusive and technical transformation. This choice is also based on the need to rethink the interactions between the city and nature: moving away from a strategy based on the control of nature with the help of technology, which has shown its limits (Barles, 2010). This approach is also in line with the objective of circularity and the aim to minimise the dependence and impact of the city on its hinterland.

With the emphasis on the interdisciplinary nature of the soil issue, we will now move beyond urbanism literature to explore what other disciplines can contribute to the understanding of soils.

Urban metabolism, city dependency to hinterland and circularity

Ecosystemic functions or services and climat change

Questioning the compact city, the pressure of inward urbanisation on urban soils

History, soil as an archive, as a anthropic construction

Disconnection between city and soil and the critic of the fragmented city

Soil regeneration, no net land take and soil unsealing

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[fig. 1] Mapping of the literature, elaborated by the author.

At the Crossroad of Different Disciplines

To evaluate more concretely the constraints and benefits of soil transformations enabling the increase of living soil in the city, this study seeks a better understanding of soils in various disciplines. The objective is therefore very concrete: to develop an analysis which will help with the development of soil-sensitive urban projects and urban planning, while not denying the needs of the city (in terms of housing, productive spaces, etc.) and the constraints which soil transformation represents.

Disciplinary terms

Soil is an ambiguous term (Havlicek, 2016; Vialle, 2021). Its meaning differs depending on the discipline or profession: for example, the farmer considers the soil as a source of nutrients for crops, the engineer considers it as an element of support or stability (European Commission and European Soil Bureau, 2005) and the ethnologist will study the cultural representations associated with the soil (Vialle, 2021). We will focus here on the main disciplines studying soil in order to understand the different vocabularies used and attempt to highlight the interrelations between the different approaches.

Pedology, which is the science of soils, is more specifically interested in the process of soil formation – pedogenesis – , soil functioning and soil classification (Blake et al., 2008; Séré et al., 2010; Vialle, 2021; IUSS Working Group WRB, 2022). In this discipline, soil is considered as an accumulation of layers, called horizons, resulting from the interaction between the atmosphere, the biosphere and the geosphere (European Commission and European Soil Bureau, 2005). Soil horizons are used to define soil classifications and, although the definitions of horizons may vary in different parts of the world [see fig. 2], the World Reference Base for Soil Resources (WRB) (IUSS Working Group WRB, 2022) provides a globally standardised soil classification.

Geologists are mainly interested in the parent materials, i.e. the consolidated strata beneath the soil [fig. 2]. The classification used by geologists is based on the age of the different strata – chronostratigraphy – which are thus classified according to their era, epoch, age, etc. (Cohen, Harper and Gibbard, 2022). A lithologic classification – based on the nature of the rocks – also provides information about the structure of the strata (Devleeschouwer et al., 2018): strata could be formed by clay or by sand, for example. These lithologic properties have an important impact on the groundwater system, as sand strata are generally permeable, allowing a better water circulation than clay strata (De Bondt and Claeys, 2008).

The links between these strata and groundwater are studied by a branch of geology: hydrogeology. This branch provides a classification of geological strata according to their permeability: (1) aquifers, permeable geological layers where water can therefore circulate easily, (2) aquitards, low-permeability strata where water circulation is difficult, and (3) aquicludes, which describes impermeable strata (Sethi and Di Molfetta, 2019; Bruxelles Environnement, 2020b). The position of groundwater in the superposition of geological strata is also analysed: groundwater could be confined, i.e. located between two impermeable strata and therefore cannot be recharged on site by rainwater, or, conversely, unconfined (Peeters, 2010; Nakić et al., 2017).

The study of urban soils requires a hybrid approach between these disciplines. Indeed, concepts such as soil composition (pedology) or groundwater cycle (hydrogeology) cannot be dissociated in an urban environment from the issue of land use (urbanism).

Soil cover impact

Soil sealing is described as one of the main threats to soil in Europe (Commission of the European Communities, 2002) as well as in Brussels (Centre d'Ecologie Urbaine et al., 2020) and its impacts are transversal to the disciplines mentioned above. Soil sealing leads to irreversible soil degradation and dysfunction (Groupement d'intérêt scientifique sur les sols, 2011; Cavalieri, 2019). The water cycle is critically altered by soil sealing, leading to flood risks and pollution of surface and groundwater (Labo XX+I, 2021), as well as heat island phenomena (Poelmans, Van Rompaey and Batelaan, 2010).

The hydro(geo)logical balance is destabilised as sealed soils increase runoff and prevent infiltration, consequently affecting the recharge of aquifers [fig. 4, top]. The groundwater system is also impacted in the opposite direction by the decrease of evapotranspiration, and thus the lowering of water extraction from the underground by vegetation (Poelmans, Van Rompaey and Batelaan, 2010; Ungaro et al., 2014). The buffer function of the soil of absorbing water during heavy rains and releasing it during drier periods is therefore compromised.

Urbanism

LAND USE / USAGE DU SOL

ZONNING / AFFECTATION DU SOL

LAND COVER / COUVERTURE DU SOL

UNDERGROUND CONSTRUCTIONS / CONSTRUCTIONS SOUTERRAINES

Pedology

TOPSOIL / SOL DE SURFACE

O horizon [1,2,3,4,6] : dominance of undecomposed or partially decomposed organic materials, not saturated with water for long periods

A horizon [1,2,3,4,5,6,7] : mineral horizon with accumulation of decomposed organic matter. Generally darker.

E horizon [3,4,5,6,7] : intensly leached horizon. Generally lighter than the B horizon.

SUBSOIL / HORIZON PROFOND

B horizon [1,2,3,4,5,6,7] : mineral horizon with finer texture (clay) and brighter colour. Absence of the structure of the parent material

PARENT MATERIAL (BEDROCK) / MATÉRIAU PARENTAL (ROCHE-MÈRE) [5]

C horizon [2,3,4,5,6,7] : mineral horizon little affected by pedogenesis processes

R horizon [2,3,4,7] : rocks (granite, basalt, quartzite, ...)

Other horizons are also defined according to reference litterature:
H[3,4] or P[3,5] horizons: same as horizon O but saturated with water during long periods
I, L, W horizons [3,4]: respectively ice, subaqueous sediment, water
L, F, H[6,7], EB[7] horizons: respectively fresh litter, fermentation layer, humification layer, transition horizon between E and B

LAND / TERRAIN

SOIL (SOLUM) / SOL (SOLUM)

PARENT MATERIAL / MATÉRIAU PARENTAL

Geology [8]

QUATERNARY / QUATERNAIRE
Holocene
Pleistocene

NEOGENE / NÉOGÈNE
Pliocene
Miocene

PALEOGENE / PALÉOGÈNE
Oligocene
Eocene
Paleocene

CRETACEOUS / CRÉTACÉ
Upper
Lower

Jurassic, Triassic, Permian, Carboniferous, Devonian, Silurian, Ordovician periods

CAMBRIAN / CAMBRIEN
Furongien
Miaolingien
Series 2
Terreneuvien

Proterozoic, Archean, Hadean

Hydrogeology [9,10,11]

AQUIFER / AQUIFÈRE
permeable hydrogeological unit

AQUITARD / AQUITARD
low permeability hydrogeological unit

AQUICLUDE / AQUICLUDE
impermeable hydrogeological unit

AQUIFER / AQUIFÈRE

Perched water table: located above the water table. Low volume

Water table : can be recharged by rainwater

Unconfined system : can be recharged by rainwater

Confined groundwater : cannot be recharged on site as it is located under an aquiclude (but could be recharged upstream as geological strata aren't horizontal)

Confined system : cannot be recharged by rainwater

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[fig. 2] Glossary of disciplinary terms. Terms used in pedology, geology, hydrogeology and urbanism are described and illustrated here in a schematic and simplified way. The order, thickness and horizontality of the different strata are only for ease of understanding: in real situations, not all layers are present nor horizontal. Elaborated by the author.

Urban Soils

Urban soils are highly anthropised. These anthroposols, which are composed of varying thickness of artificial backfill, cover all cities that are several centuries old (Barles, 1993, p. 49). The importance of the transformation of these soils, as well as past soil uses, can be the cause of contamination (Région Bruxelles-Capitale, 2020). The state of soil pollution and the suspicion of contamination are documented in Brussels (Bruxelles Environnement, 2020c). Depending on the parcels' contamination, different studies and treatment processes are required (Bruxelles Environnement, 2010, 2021).
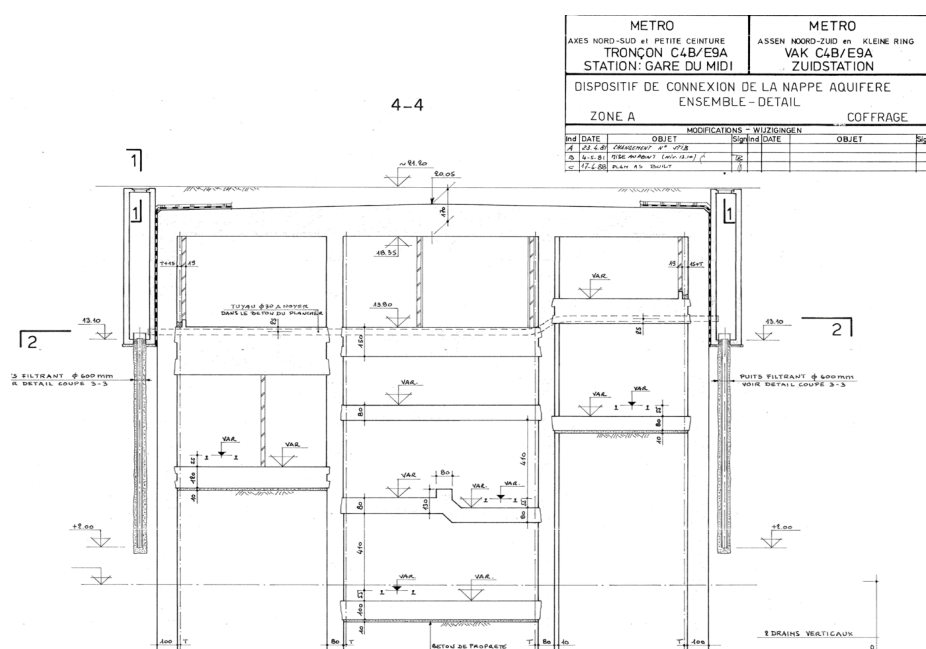
Influence of geological strata

Urban soils are supported by geological strata, which structure influences the rainwater infiltration and retention capacity (Brito et al., 2006; De Bondt and Claeys, 2008). Indeed, an impermeable clay stratum close to the soil surface represents a barrier to water infiltration [fig. 4, center]. The presence of a shallow water table is also an obstacle to infiltration, as water saturated strata cannot absorb additional rainwater (D'Aniello et al., 2019).

Aquifer vulnerability study – a branch of hydrogeology investigating the risk of contamination of aquifers by surface pollution (Foster, Hirata and Andreo, 2013) – highlights the influence of soil cover and geological strata permeability on the dispersion of contaminants (Palmer and Lewis, 1998). The risk of groundwater contamination and pollutants dispersion increases in parallel with the water recharge capabilities of aquifers, i.e. the more permeable soil cover, soil itself and geological strata are, the higher the dispersion risk is (Machiwal et al., 2018). The geological structure therefore plays a role in the risk of pollutant dispersion [fig. 4, center]. Low permeability clay strata (aquicludes) tend to block the vertical dispersion of pollutants, while permeable strata (aquifers) facilitate the transport and dispersion of contaminants (Santi, Mccray and Martens, 2006).
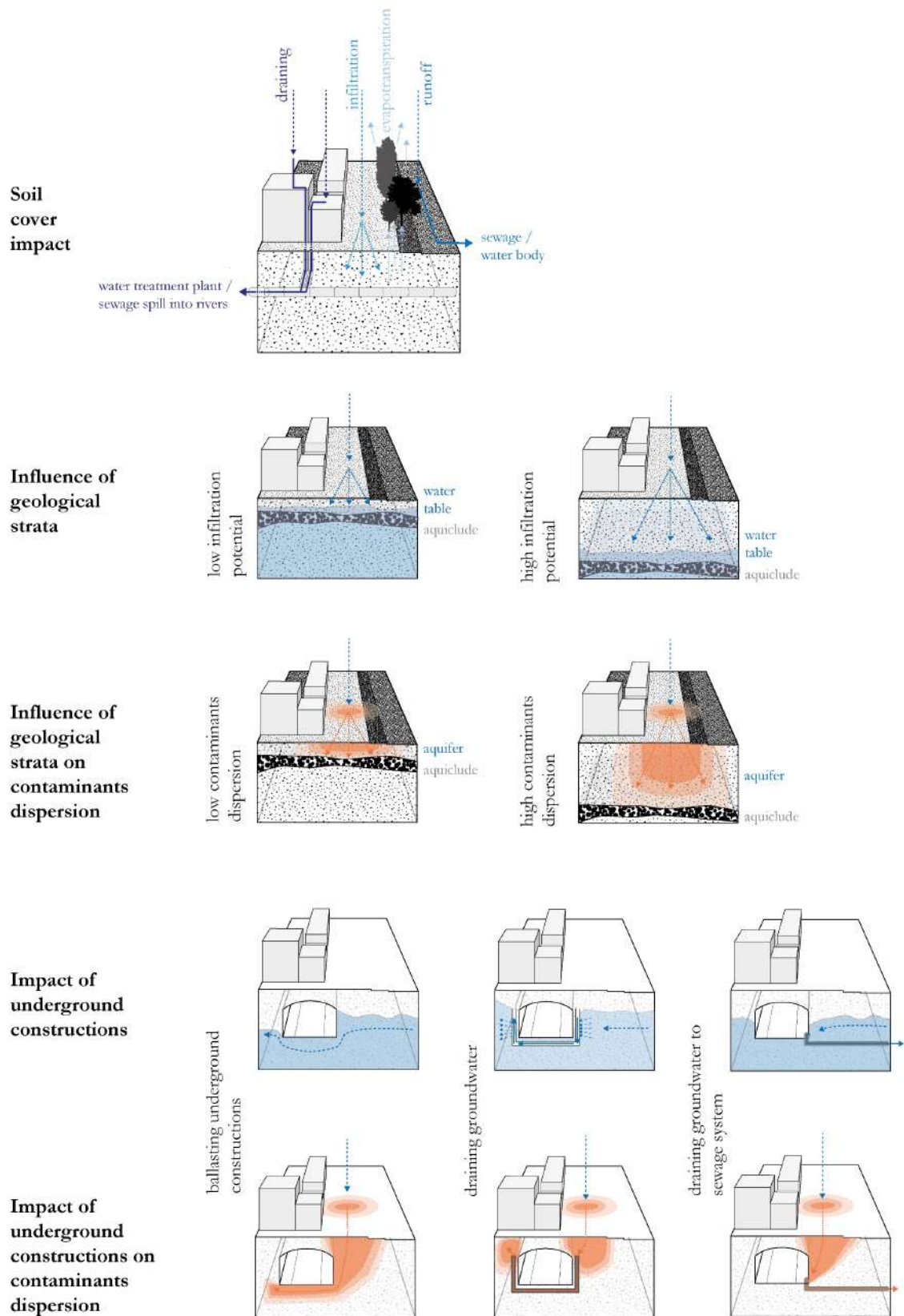
Underground constructions impacts

This hydrogeological system becomes more complex in urban areas due to the presence of many underground constructions. These constructions represent obstacles to infiltration and groundwater flows (Attard et al., 2017). Underground constructions are equipped with different technical solutions to deal with risks of flooding and pressure from groundwater [fig. 4, bottom], as the ballasting and waterproofing of underground structures or the draining of groundwater to avoid pressure (Attard et al., 2016). The Brussels metro is thus equipped with groundwater draining systems allowing groundwater to cross the constructions [fig. 3]. These technical solutions can alter groundwater levels, and also impact groundwater quality and temperature (Attard et al., 2017).

The modification of groundwater flows by underground constructions and their technical infrastructure can also results in the dispersion of contaminants [fig. 4, bottom]. Ballasted structures tend to lead to more local dispersion of contaminants, while draining infrastructure transports contaminants over larger distances (Attard et al., 2017). In addition, the construction materials used for these underground structures can also be a source of contamination (Chae et al., 2008).

[fig. 3] Draining infrastructure of Brussels metro, from CIRB archives.

Soil cover impact

draining · infiltration · evapotranspiration · runoff

sewage / water body

water treatment plant / sewage spill into rivers

Influence of geological strata

low infiltration potential — water table — aquiclude

high infiltration potential — water table — aquiclude

Influence of geological strata on contaminants dispersion

low contaminants dispersion — aquifer — aquiclude

high contaminants dispersion — aquifer — aquiclude

Impact of underground constructions

ballasting underground constructions — draining groundwater — draining groundwater to sewage system

Impact of underground constructions on contaminants dispersion

[fig. 4] Diagrams describing disciplinary contributions, elaborated by the author.

385

A complex and interrelated system

Based on the literature, a methodology to map the different interactions presented above has been constructed. The process presented in this chapter aims, in a first phase, to build different layers – a delayering of the system – and, in a second phase, to assemble these layers to highlight their interrelations as a three-dimensional system.

Delayering of the system
A. Soil cover

To identify unsealed soils, high-resolution data (2 m) from the vegetation map produced by Brussels Environment (Bruxelles Environnement, 2022b) is used. This data was constructed using infrared aerial imagery (NDVI) and provides information on the presence of vegetation rather than soil cover. Therefore, additional processing was carried out to filter out buildings, whose vegetated roofs could distort the results (Massy, Martin and Wyler, 2011), and roads, to limit the excessively large vegetated area due to the tree canopy. Although there might be some remaining inaccuracies, the results [fig. 6] allow for a sufficient level of detail on a large scale.

Concerning sealed soils, an additional categorisation between built and non-built seems necessary from a urban transformation perspective. Indeed, a project aiming to transform a non-built sealed surface, such as a car park or mineral square, is different from a building transformation project. To isolate the buildings, cadastral data (SPF Finances, 2021) was used. Non-built sealed soils were identified by elimination, i.e. soils that are not unsealed, are not built on, and not covered by water.

B. Urban soil and unsealing constraints

Data on soil pollution is published by Brussels Environment (Bruxelles Environnement, 2020c) and classify parcels into 4 (+1) distinct categories: (1) Non-polluted, (2) Slightly polluted without risk, (3) Polluted without risk, (4) Polluted parcels where soil studies or treatments are ongoing. A 5th category (category 0) groups parcels where pollution is suspected, given the risk generated by past activities.

These categories have regulatory implications related to soil. In the case of water infiltration, studies may be required before infiltrating water for the parcels in categories 3, 4 and 0 (Bruxelles Environnement, 2022a). These categories also determine the possible uses, as in the case of the vegetable gardens: risks are minimal in categories 1 and 2, prohibitions may exist in categories 3 and 4, and a soil evaluation is required for category 0.

This categorisation of parcels also determines the required process regarding pollution in the case of soil transformation [fig. 5]:

1. Categories 1 and 2 (unpolluted or slightly polluted): remediation or risk management intervention is not necessary.
2. Parcels not included in the database: a soil evaluation ('*reconnaissance de l'état du sol*') is only needed if pollution is discovered or suspected. The soil evaluation is the starting point for the process described in [fig. 5].
3. Category 0 (suspected pollution): a soil evaluation is required. The same applies to category 0+1 and 0+2, as pollution is still or again suspected.
4. Categories 3 and 4 (polluted without risk or under investigation/treatment) as well as categories 0+3 and 0+4 (since in addition to the suspicion of pollution, pollution has actually been detected): a risk study ('*étude de risques*') or the intervention of the pollution expert are necessary, which may therefore lead to remediation or risk management projects.

These four points present an increasing need or likelihood for remediation or risk management, ranging from point 1, requiring no intervention, to point 4, where intervention is required. Points 2 and 3 represent a degree of probability of contamination and are not related to the extent of the pollution. For example, it is not impossible that serious pollution may be present, requiring major remediation measures, on parcels not included in the database (category 2), even if it is less likely.

In this study, the probability of soil pollution for parcels not included in the database – which are numerous in Brussels – as well as the public domain – also not covered by the database – is estimated according to the importance of the presence of artificial backfill. Data concerning the presence of backfill comes from the geotechnical maps of Brussels (Dam et al., 1990) and is determined through a comparison of the first elevation map of Brussels from 1860 with elevation data from the 1980s.

Through the study of pollution risks and the processes involved with soil pollution, this analysis of urban soils highlights the unsealing constraints related to contamination, ultimately enabling the mapping of these constraints [fig. 6].
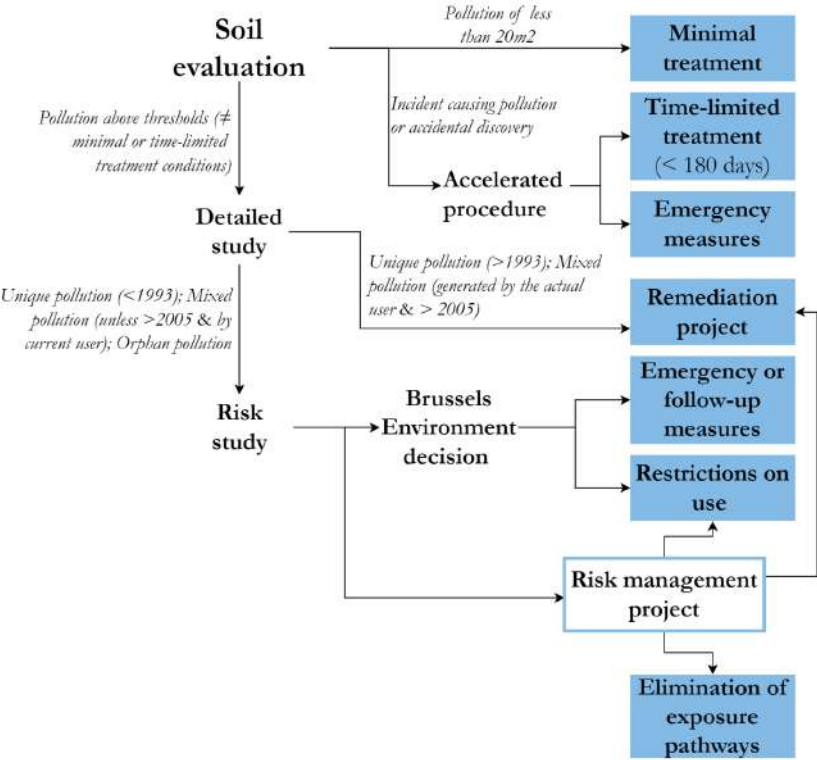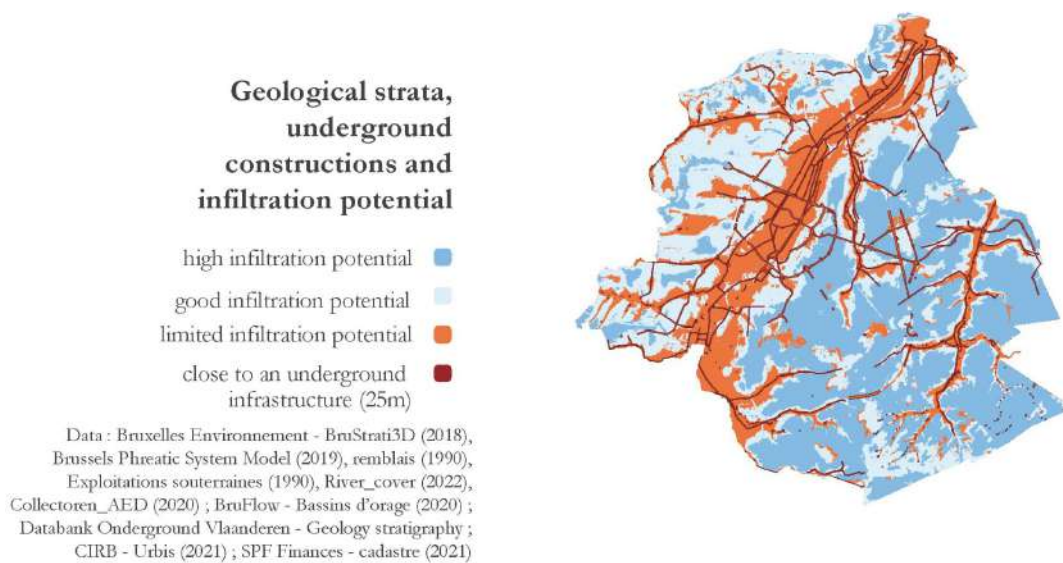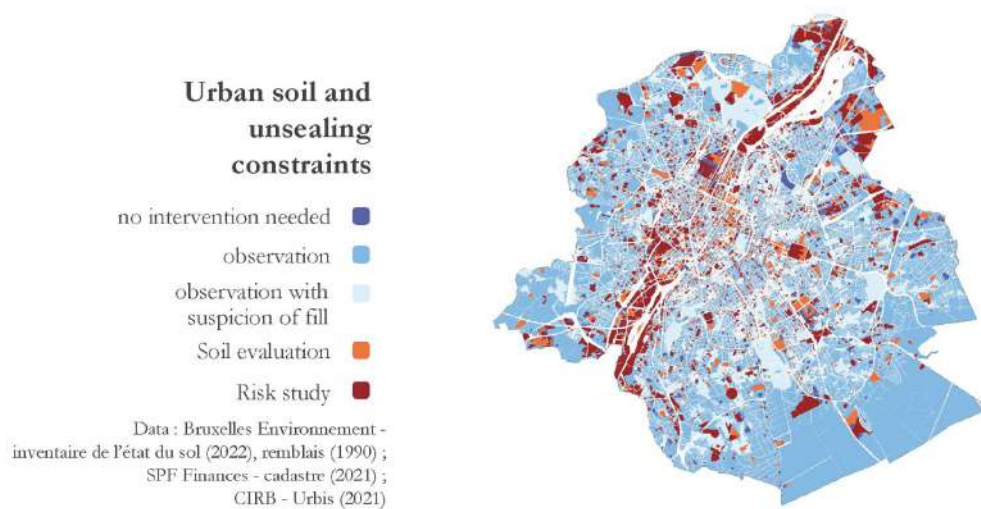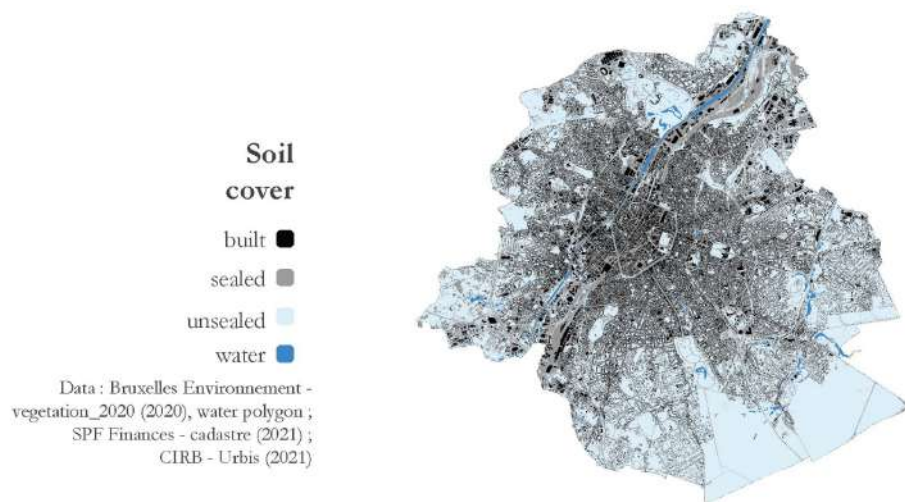

[fig. 5] Diagram showing the process for soil contamination in Brussels, elaborated by the author.

C. Geological strata, underground constructions, and infiltration potential

The analysis of the geological strata is based on the BruStrati3D hydrogeological model (Bruxelles Environnement, 2020a). A categorisation of these strata is made according to their depth and their permeability (aquifer, aquitard or aquiclude). The classification of these different hydrogeological units makes it possible to identify the depth at which the first aquiclude or aquitard is located, and therefore the first barrier to water infiltration. In addition to this data, the water table also represents a limit to infiltration. Indeed, a subsoil already saturated with water has logically reached a limit in its capacity to absorb more water. A thick permeable strata and a deep water table therefore allows a large quantity of water to infiltrate and thus acts as a reservoir (De Bondt and Claeys, 2008). Conversely, a shallow impermeable stratum or a shallow water table limits water infiltration.

Underground constructions are an obstacle to water infiltration in the subsoil. They can represent a physical barrier to infiltration and can also limit the interest of infiltrating water, as in the case where a drainage infrastructure is present and diverts infiltrated water to the sewer system. Underground constructions also alter natural groundwater flows and water levels (Attard et al., 2017). Soil unsealing near underground infrastructure must therefore be conducted with care.

An analysis of the geological structure and the underground infrastructure can therefore assess the potential for water infiltration, by highlighting the depth of the first barrier to infiltration (Bossard, Cavalieri and Ska, 2022) and the presence of underground constructions.

Soil cover

built ■
sealed ■
unsealed ■
water ■

Data : Bruxelles Environnement -
vegetation_2020 (2020), water polygon ;
SPF Finances - cadastre (2021) ;
CIRB - Urbis (2021)

Urban soil and unsealing constraints

no intervention needed ■
observation ■
observation with suspicion of fill ■
Soil evaluation ■
Risk study ■

Data : Bruxelles Environnement -
inventaire de l'état du sol (2022), remblais (1990) ;
SPF Finances - cadastre (2021) ;
CIRB - Urbis (2021)

Geological strata, underground constructions and infiltration potential

high infiltration potential ■
good infiltration potential ■
limited infiltration potential ■
close to an underground infrastructure (25m) ■

Data : Bruxelles Environnement - BruStrati3D (2018),
Brussels Phreatic System Model (2019), remblais (1990),
Exploitations souterraines (1990), River_cover (2022),
Collectoren_AED (2020) ; BruFlow - Bassins d'orage (2020) ;
Databank Onderground Vlaanderen - Geology stratigraphy ;
CIRB - Urbis (2021) ; SPF Finances - cadastre (2021)

[fig. 6] Delayering of the system, elaborated by the author.

Mapping interrelation of the three-dimensional system
A. sealed and built soil

The diagram below [fig. 7] illustrates the different possibilities of interactions between the three previously presented layers and allows for the identification of different categories. This categorisation is based on two variables: infiltration potential and transformation constraints. The degree of geological permeability is a determining factor for assessing the infiltration potential, i.e. the role that these soils, once unsealed, could play in the water cycle. The second variable – transformation constraints – considers the probability and need for intervention regarding soil contamination and, if intervention is needed, its importance. The presence of underground constructions also influences the transformation constraints and is therefore also integrated into this variable.

The ecosystem potential and transformation constraints can be visualised in the form of a two-entry table [fig. 8, top], allowing these two variables to be crossed. The cells of this table represent the different cases emerging from the analysis that we will now detail.

Firstly, non-polluted or lightly polluted soils without risk have very low transformation constraints (as no remediation would be necessary) except when they are over or near important underground infrastructure. In the latter case, a study of these underground constructions is at least necessary. Infiltration potential depends, as previously presented, on the geological capacity for water absorption and the existence of underground infrastructure. Underground constructions could also counterbalance the positive effects of unsealing, for example if a draining infrastructure diverts infiltrated water to the sewer system.

Soils with suspicion of contamination or not included in the soil database can generate transformation constraints in the event of pollution being detected. Therefore, the probability of constraints is increased, while the potential for infiltration remains unchanged from that of non-polluted soils. Finally, polluted soils always represent strong transformation constraints, as pollution management is necessary, especially if they are located on permeable geological structures with high infiltration potential, as the risk of pollutant dissemination is also higher.
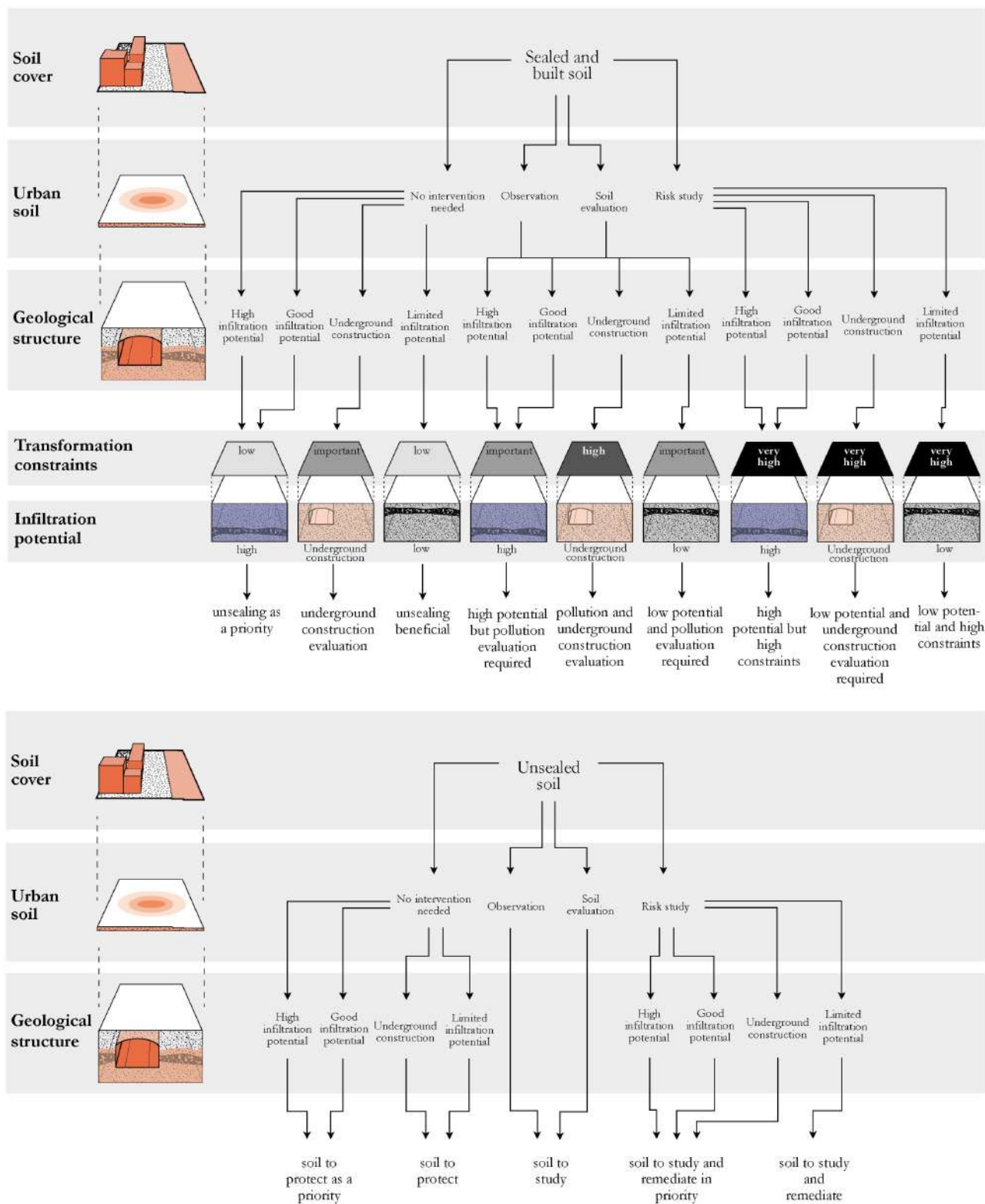
This methodology enables the elaboration of a Brussels map [fig.8, top] revealing the constraints of soil transformation, ranging from light (low constraints) to dark (high constraints), as well as the potential benefits of unsealing, ranging from red-orange (low potential) to blue (high potential).
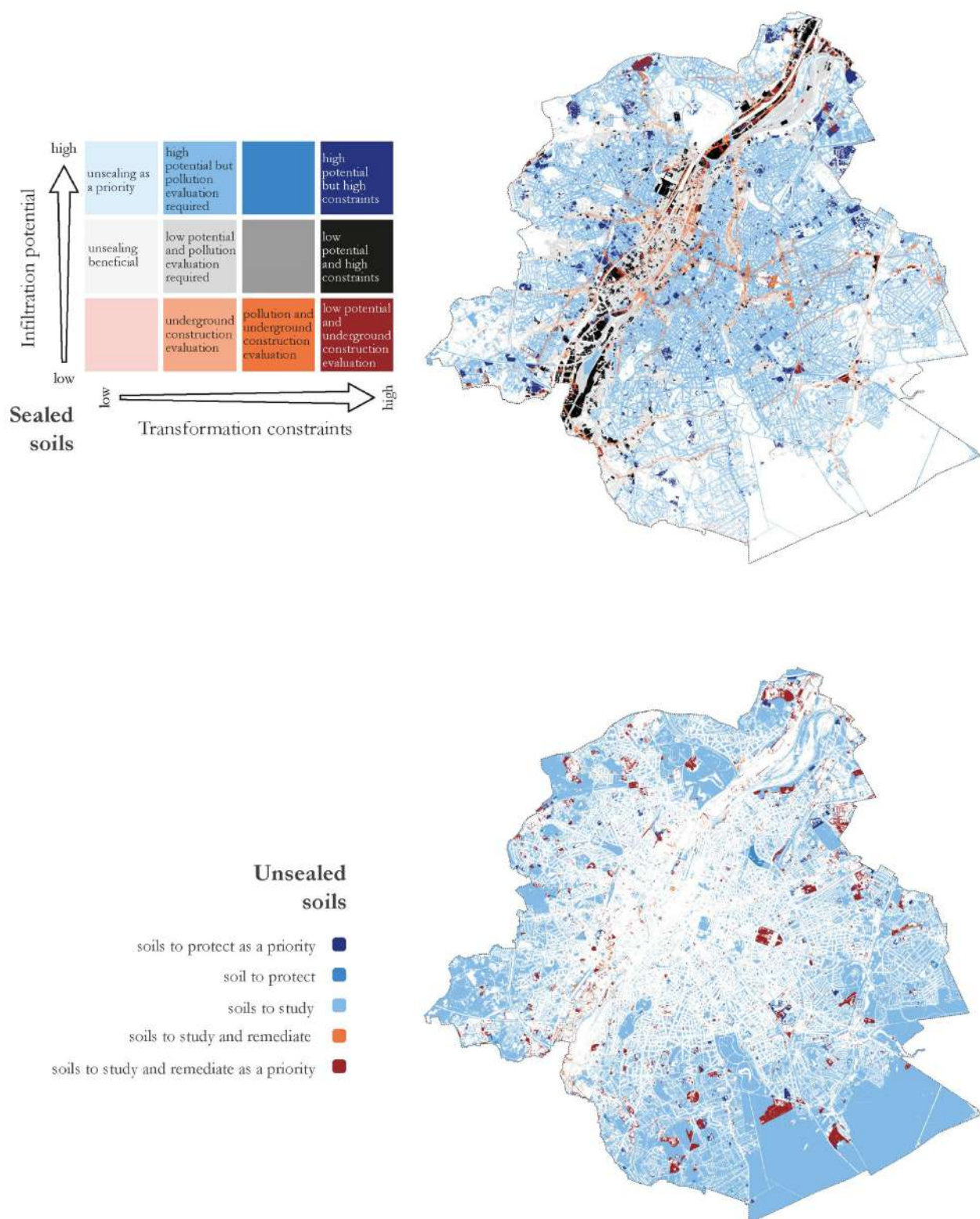

B. unsealed soil

Concerning unsealed soil, categories based on the need for intervention relative to pollution are constructed [fig. 7]. Unsealed soils where no intervention is needed (non-polluted or slightly polluted without risk) play an important role in the urban ecosystem, and their protection therefore seems necessary. When these soils are also located on a geological structure with high infiltration potential, their role in the city's water cycle seems even more crucial. Thus, these soils fall into the category of 'soils to protect as a priority'. Unsealed soils with a suspicion of pollution or not included in the soil contamination database fall into the category of soils to be studied, given the lack of information about them and the potential risk of contaminant dispersion.

Unsealed soils that are contaminated pose a significant risk of pollutant dispersion, particularly when situated above a geological formation with high infiltration potential or above underground infrastructure. This combination of unsealed soil cover, soil pollution, and permeable geological strata presents a significant risk and falls into the category of 'soils to study and remediate as a priority'. When the permeability of the subsoil is lower, the risk of pollutant dispersion is reduced (but still present). The corresponding category is therefore 'soils to study and remediate'.
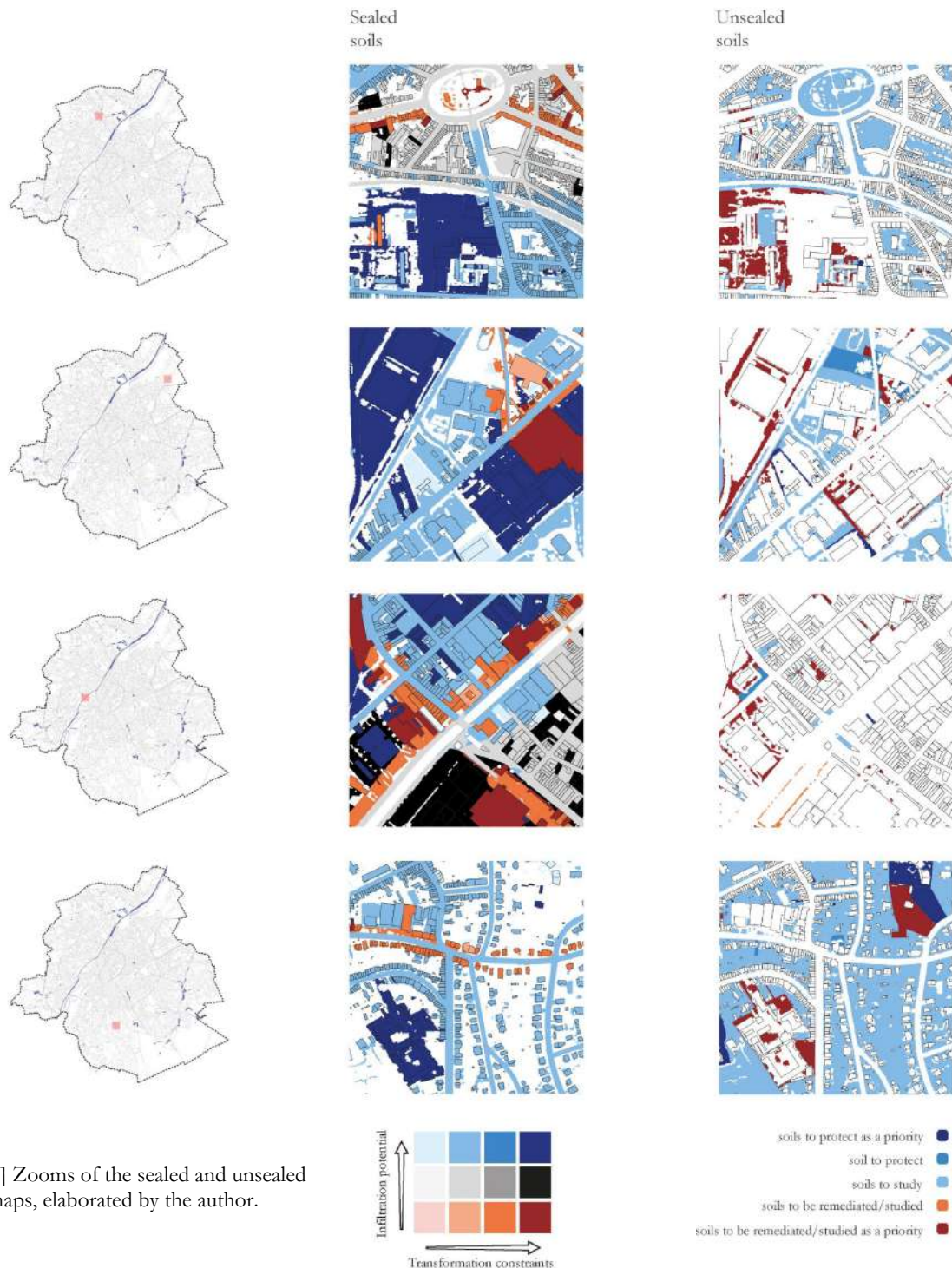
Soil cover

Sealed and built soil

Urban soil

No intervention needed — Observation — Soil evaluation — Risk study

Geological structure

High infiltration potential · Good infiltration potential · Underground construction · Limited infiltration potential · High infiltration potential · Good infiltration potential · Underground construction · Limited infiltration potential · High infiltration potential · Good infiltration potential · Underground construction · Limited infiltration potential

Transformation constraints

low · important · low · important · high · important · very high · very high · very high

Infiltration potential

high · Underground construction · low · high · Underground construction · low · high · Underground construction · low

unsealing as a priority · underground construction evaluation · unsealing beneficial · high potential but pollution evaluation required · pollution and underground construction evaluation · low potential and pollution evaluation required · high potential but high constraints · low potential and underground construction evaluation required · low potential and high constraints

Soil cover

Unsealed soil

Urban soil

No intervention needed — Observation — Soil evaluation — Risk study

Geological structure

High infiltration potential · Good infiltration potential · Underground construction · Limited infiltration potential · High infiltration potential · Good infiltration potential · Underground construction · Limited infiltration potential

soil to protect as a priority · soil to protect · soil to study · soil to study and remediate in priority · soil to study and remediate

[fig. 7] Diagram of interrelations, elaborated by the author.

The diagram legend for sealed soils shows:

Sealed soils — Infiltration potential (low to high) vs. Transformation constraints (low to high):
- unsealing as a priority
- high potential but pollution evaluation required
- high potential but high constraints
- unsealing beneficial
- low potential and pollution evaluation required
- low potential and high constraints
- underground construction evaluation
- pollution and underground construction evaluation
- low potential and underground construction evaluation

Unsealed soils
- soils to protect as a priority
- soil to protect
- soils to study
- soils to study and remediate
- soils to study and remediate as a priority

[fig. 8] Sealed soil and unsealed soil mapping, elaborated by the author.

Sealed soils   Unsealed soils

[fig. 9] Zooms of the sealed and unsealed soil maps, elaborated by the author.

Infiltration potential

Transformation constraints

soils to protect as a priority
soil to protect
soils to study
soils to be remediated/studied
soils to be remediated/studied as a priority

Conclusion

These maps [fig. 8 and 9] seek to synthesise the interrelation between soil cover, soil and geological strata, thereby facilitating a more comprehensive understanding of the complex soil system. A parallel analysis of sealed and unsealed soils offers a new perspective on urban transformation. The third zoom [fig. 9] reveals a district predominantly characterised by sealed soil, which is heavily impacted by soil contamination and traversed by underground constructions. This zoom offers a new perspective for envisioning the transformation of this district by identifying areas where an increase in unsealed living soil would be significantly beneficial without requiring disproportionately extensive remediation efforts. Conversely, unsealed soils are predominant in the area shown in the last zoom [fig. 9]. However, some of these soils are contaminated, and given the underlying permeable geological structure increasing contaminant dispersion risks, remediation appears necessary. Thus, this mapping enables a new gaze on the urban fabric, highlighting the environmental potentials and constraints of urban transformation.

This paper emphasises the importance of incorporating soil and underground dynamics, both visible and invisible, within the urban diagnostic phase, the urban planning strategy, and the decision-making process. Integrating these soil and underground dynamics into existing frameworks will contribute to a more comprehensive understanding of urban environments, enabling an urban transformation toward a more resilient city able to face the complex challenges of climate change. An approach that is sensitive to soil and underground dynamics aligns with the concept of "design with nature" (McHarg, 1969), highlighting the necessity of harmonising the city with its natural environment.

In line with this paper, explorations of various scenarios have been carried out (Bossard *et al.*, 2023, forthcoming). The focus of these scenarios is the Heyvaert District in Brussels, which serves as a case study for envisioning a transformation taking into account soil and geological strata. This study also integrates Brussels urbanism regulations and addresses the question of the practical implementation of these transformations, identifying both limits and paths toward a transformation of the soil enabling a more resilient district and city.

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Where the rain never falls and the sun never shines

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Abstract
This paper focuses on the typology of the coal mining habitat in northern France. In particular, it investigates the relationships between housing and the territory on which it is set, namely its resources and their exploitation. This living and developing ecosystems unfold as various architectural types (coherent social and spatial structures) that forge the territory's identity.
The analysis focusses on the area of Lens-Liévin situated in the centre of the coal mining strip in northern France. It traces the co-development of the mining industry and housing throughout the 19th and 20th centuries. The original cartography reveals how the inner logics of the coal mining extraction dictate the planning on territorial and urban scale, how the housing is used as a tool to assure, control and optimise the work-force.
As the territory has entered the post-carbon era, understanding the links between territory and housing can be a tool to accompany and design their transformations towards new ecosystems based on sustainable resources, engendering new architectural and territorial forms and finally offering a new socio-cultural identity. In addition, this knowledge could be a tool to address similar issues along the European coal basin.

"Like a fiend with his dope or a drunkard his wine,
A man must have lust for the lure of the mine." (Travis 1947)

This research is a central part of an ongoing PHD-thesis on the 'Constitution, evolution and future of an architectural type – the mining habitat in northern France'. In particular, it investigates the relationships between housing and the territory on which it is set, namely its resources and their exploitation. This living and developing ecosystems unfold as various architectural types (coherent social and spatial structures) that forges the territory's identity. The research aims to develop tools and data in order to understand, accompany and shape the contemporary transformations taking place in this territory which is highly exemplary for the process of deindustrialisation and decarbonisation in other regions in France and Europe.
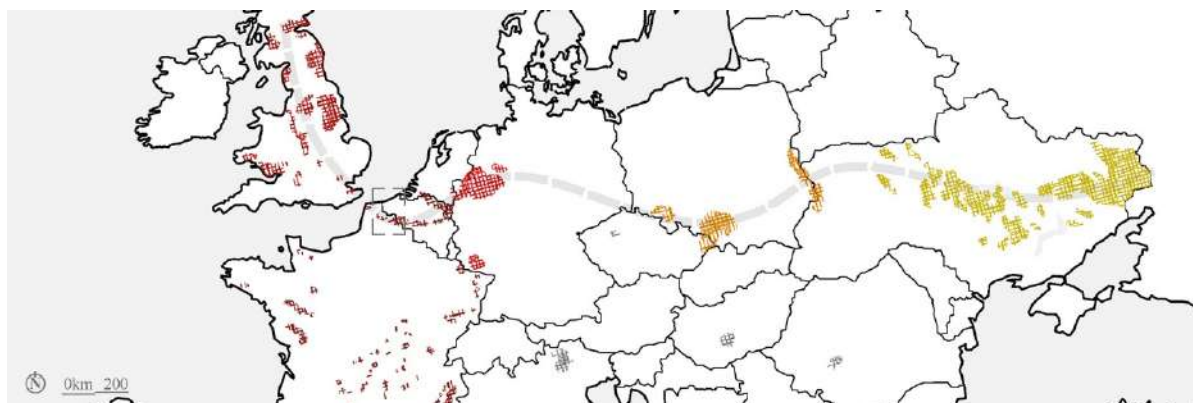
[fig. 1] Map of the main coal basins in Europe: **FR/BE UK DE PO UA**

A ribbon of coal basins spans across the European continent from the UK to Ukraine. On this geological base, the mining industry has developed according to different political, social and economic contexts. Everywhere, it shaped the territories from a social and spatial point of view. Coal extraction depending directly on labour force, miner housing became part of the necessary infrastructures along with pits, workshops and railways. These singular mining estates (*cité minière*) still shape the image and identity of these territories.
The region of northern France (official administrative title: *Bassin Minier du Nord Pas-de-Calais*) covers a curved strip with a length of about 105km from the Belgian border in the east through the cities of

Valenciennes, Douai, Lens and Bethune in the west and a width of about 8km, covering a total surface of about 1.150km². The coal is situated in under a mantel layer of 20 to 250m, with its layers going as deep as 2.000m and containing different qualities with more or less calorific value. (Bouroz 1969) The mining industry used concessions allowed by the state to a single company as authorisations for the monopoly of coal-extraction in a defined zone of the underground. On the surface, the companies owned large plots in order to build the necessary infrastructure for the industrial activity.

On this initially only sparsely populated territory, more than 120.000 dwellings grouped in 690 settlements were built between 1810 and 1960. The mining companies themselves undertook their construction in the form of autonomous estates. In terms of spaces, these projects embrace scales that range from the territorial planning, urban infrastructure to the technical and architectural building details. In terms of uses, they respond to the inner logics of the companies and their goal to optimise the coal output.

Due to external political reasons, with still half of the coal remaining in the ground, the coal extraction was gradually reduced until its full and definite ending in 1990. The process of deindustrialisation led to the closing of all related industrial sites, but the decrease of economy and population also heavily impacted the towns as a whole and the housing.
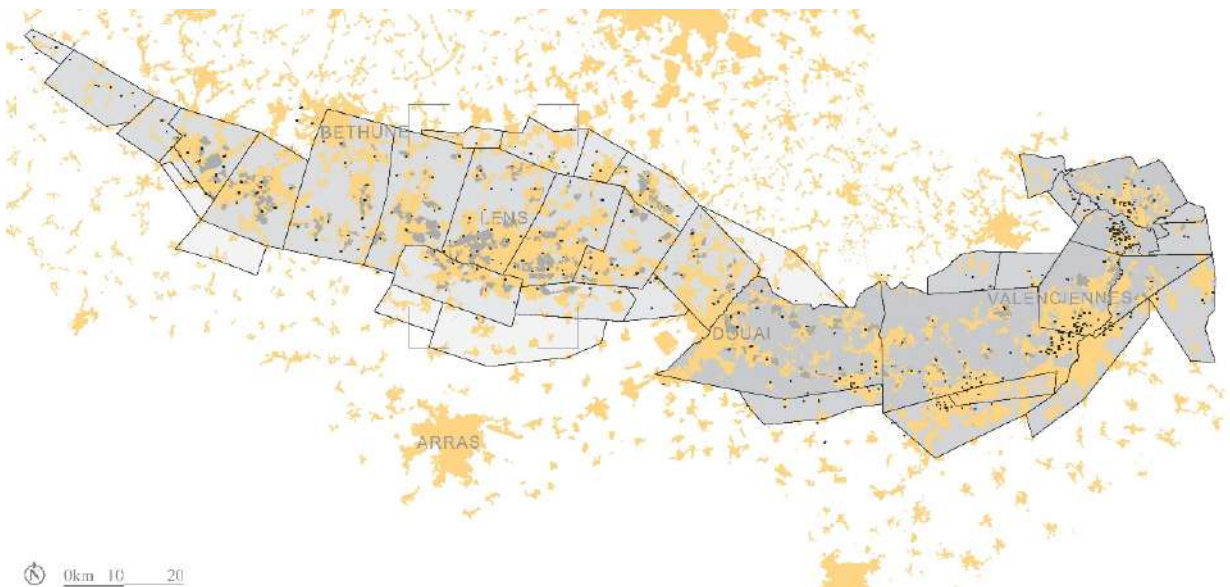
[fig. 2] The mining basin in Northern France: mining concessions, pits and housing estates
Creation date of concessions ▪ > 1793 ▪ > 1836 ▪ > 1856 ▪ > 1881 ▪ > 1911

With the beginning of the deindustrialisation and the loss of their initial function as part of an industrial activity, miners housing became a subject of scientific research. Architects and engineers working on its development were replaced by historians and conservators. The creation in 2000 of the *Mission Bassin Minier* as an intercommunal institution helped enforce the knowledge-building and aimed the registration in the UNESCO world heritage list as well as an overall vision for the development of the territory.

The principal study of the housing typology '*Du coron à la cité*' by the regional historian Yves Le Maner in 1995 presents three distinct housing types and their linear chronological development in time. The classification is based on historical and esthetical characteristics of the exterior of the houses and urban composition. In reference to the ideas of the garden city movement, and reusing the same vocabulary as the conceptors, the '*cité jardin*' is presented as the climax of the mining housing development. (Le Maner 1995) Unfortunately, the work does not include the analysis of spatial structures or the larger context of the singular examples. Based on this work, since 2006, the *Mission Bassin Minier* presents four types of miners housing complemented by the '*cité moderne*', the buildings and settlements constructed after WWII. (Mission Bassin Minier 2016)

The argumentation for the registration application established in 2012 by the same institution is largely based on these analyses for the qualification and evaluation of the proposed assets. And while the territory is presented as a 'living and evolutive cultural landscape', the further development of the

territories components focuses on the preservation and promotion of its industrial history. (Mission Bassin Minier 2012) Concerning the housing estates, restrictions to modifications are enforced at the scale of the settlements and the buildings while an ongoing program for energetic renovation serves likewise the restauration of their original image.

It seems that the investments in the habitat is more motivated by the potential development of tourism than by the real problems and needs of the habitants. Furthermore, the storytelling based on esthetical styles seems to inherently advantage the '*cité jardin*' and to discriminate the '*cité moderne*'.

Concerning the focus of this paper, the main critic of the existing research on the corpus lies in its incapacity to link the singular assets to the territory. The established classification fails to describe the specific characteristics of housing as a part of a specific territory and remains superficial regarding the links made to the mining industry.

Therefore, this paper tries to establish a new typological classification of the mining habitat in northern France: its specific architectural and urban forms can be linked to the territory through the analysis of the mining industry itself. Housing is an integral component of the system of the extraction of the territories resource.

This classification follows the development of the coal exploitation itself describing five distinct stages of the co-development of housing and industry: 'preindustrial' and 'proto-industrial' times, periods of 'industrial growth', 'climax' and finally 'decline'.

**"Then I'll look down from the door of my Heavenly home,
And pity the miner a diggin' my bones." (Travis 1947)**
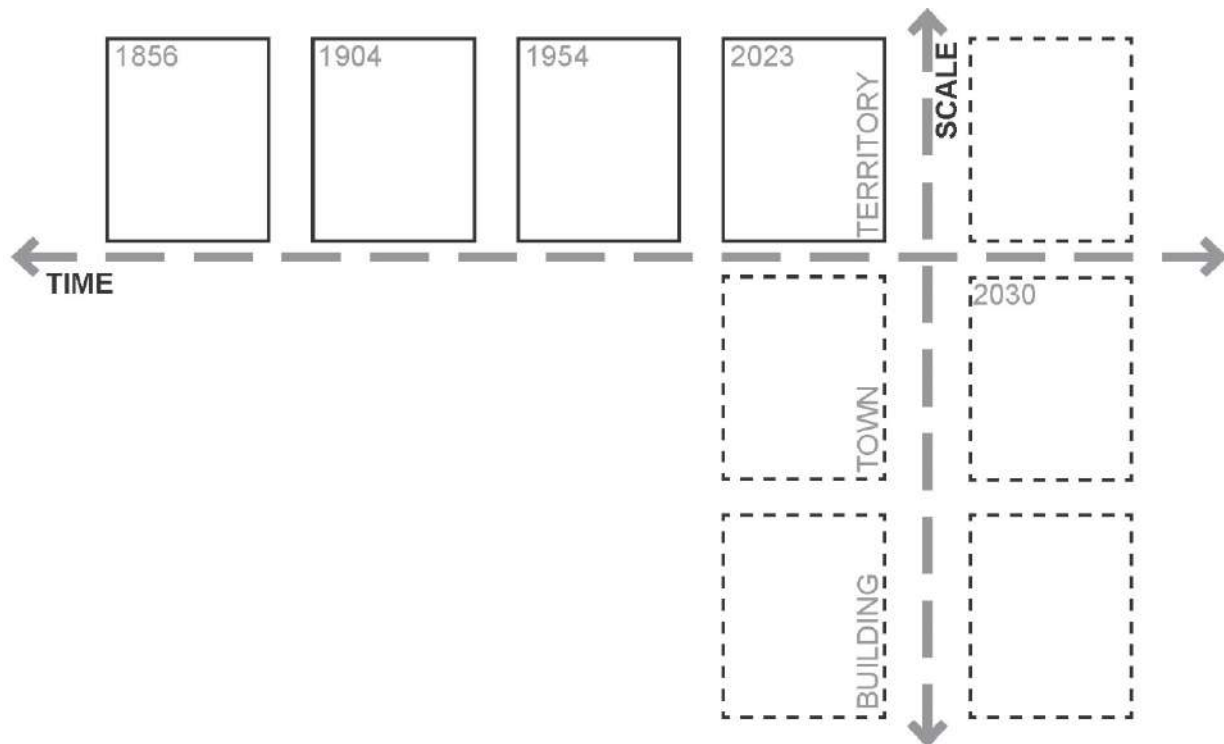
[fig. 3] Diagram of the set-up of the entire research project

To trace the historic co-development of the mining industry and its housing estates, the analysis focuses on one segment of the mining basin in order to provide an adequate scale to analyse the urban forms and figures. The area of Lens-Liévin occupies a central position both in the geography and the identity of the coal strip and is (therefore) also well documented.

This paper produces a series of original maps of the mining habitat combining data of the specialised archives of the *Mission Bassin Minier* and the *Centre Historique Minier* with contemporary geographic information and historical cartography.

Comparable to the use of the notion of 'oilscape' (Hein 2016), this atlas identifies all artefacts, buildings and infrastructures necessary to the coal mining industry and traces them both in time and in space. It focuses on housing with an influence on and of the industrial development, particularly the location and characteristics of the mining pits.

Situated in between a geographical scale showing the entire coal strip in northern France or even Europe, and an architectural scale representing precisely buildings and spaces, the scale used for this paper allows to analyse the general urban development. However, difficulties on data arise from the imprecision of cartography of 19th century, the large destructions of WWI and the following, complex process of reconstruction.

This article uses the definition of 'housing' as a form of dwelling including spatial and social structures in different scales. (Devillers 1974) This definition by the French school of typo-morphology is enlarged to the notion of 'ecosystem' which embraces the economic and social interactions and characteristics as a whole. The expression which seems to fit best would be 'habitat' in English and '*milieu*' in French.

The housing is not limited to spatial and social structures but constitutes a living ecosystem in relationship with the territory. This ecosystem is build up from the characteristics of the territory, namely its geological characteristics and constitutes the socio-cultural identity. On the territory of the mining basin in northern France, the preindustrial ecosystem was based on the disponible of water which shaped the structures of agricultural activities. The discovery of coal introduced the development of a new ecosystem.

"Where it's dark as a dungeon and damp as the dew,
Where the dangers are many and the pleasures are few," (Travis 1947)
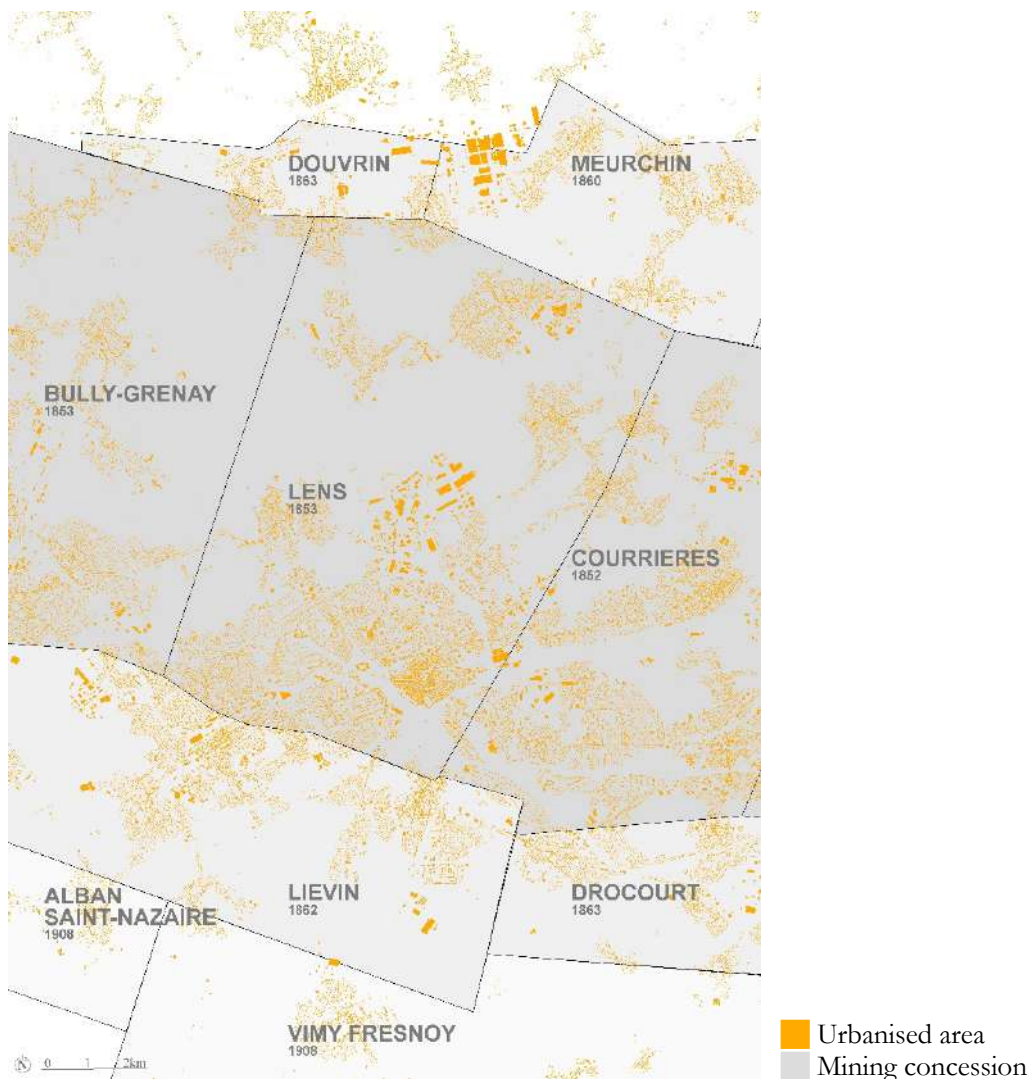
[fig. 4] Lens-Liévin-area

In 'pre-industrial times', the territory is dominated by agricultural activities where the extraction and use of coal is of no real importance.

Concerning the habitat of this period, a large scientific corpus exists treating housing as a part of rural life and agricultural economy. It has been developed beginning in the 1940th in order to present the buildings and villages including the habits and customs. Curiously the monumental work of *'L'architecture rurale française'* (Cuisenier, Raulin, Calame 1988) composed by more than thirty volumes, with one dedicated to the north of France, mentions no example situated in the mining basin, as if this area was excluded of the rural world.

In 1850, agricultural activities have fully taken possession of the entire territory. Successively, the natural landscape had been transformed in order to work the surface and soil. The preindustrial society exploited the resource water and used the muscle workforce of animals and men. The spaces of working and living are combined in sets of building known as farms.

In northern France, as the topography gave no natural access to the coal, its existence has not been discovered until the beginning of the 18th century after coal mining technics spread in Belgium towards and finally over the French border.

The general development of the concessions and extraction sites has been described as a 'spatial system' with a progressive expansion taking place in small steps one after and next to the other. (Baudelle 1994) The first concessions were developed in the area of Valenciennes with small pits located at close distance. The coal mining stripe than expanded westwards in a more or less linear manner before accessing also the lateral areas on both sides.

[fig. 5] Lens-Liévin-area in 1856

Legend:
- Urbanised area
- Mining concession
- Miners housing estate
- Mining pit

The 'proto-industrial period' sees the installation of the first coal extraction sites but the system is still dominated and dependent on other resources.

The concession of Lens was created in 1853 and exploited by the company of the same name. It included only several small towns and was largely dominated by agricultural activities. The first two pits were constructed next to the town centre and in direct relation to the existing infrastructures of transportation and housing.

With the same pattern, other pits were dug time in Liévin and Douvrin but without the formal existence of proper concessions.

At this time, no housing construction was necessary due to the existence of housing structures and the small size of the pits. Only the increasing number and size of the pits created the demand of a larger workforce which led to the construction of housing by the companies themselves. These first constructions of the buildings for pits and housing largely build on the experiences and examples of the existing rural architecture like mills and row houses for dayworkers.

The construction of the first pits prompted the beginning of the industrial revolution by the making coal available as an efficient and transportable energy source. By means of the steam engine, coal energy was used to extract and transport more coal, creating thus a new ecosystem as a self-powering machine.
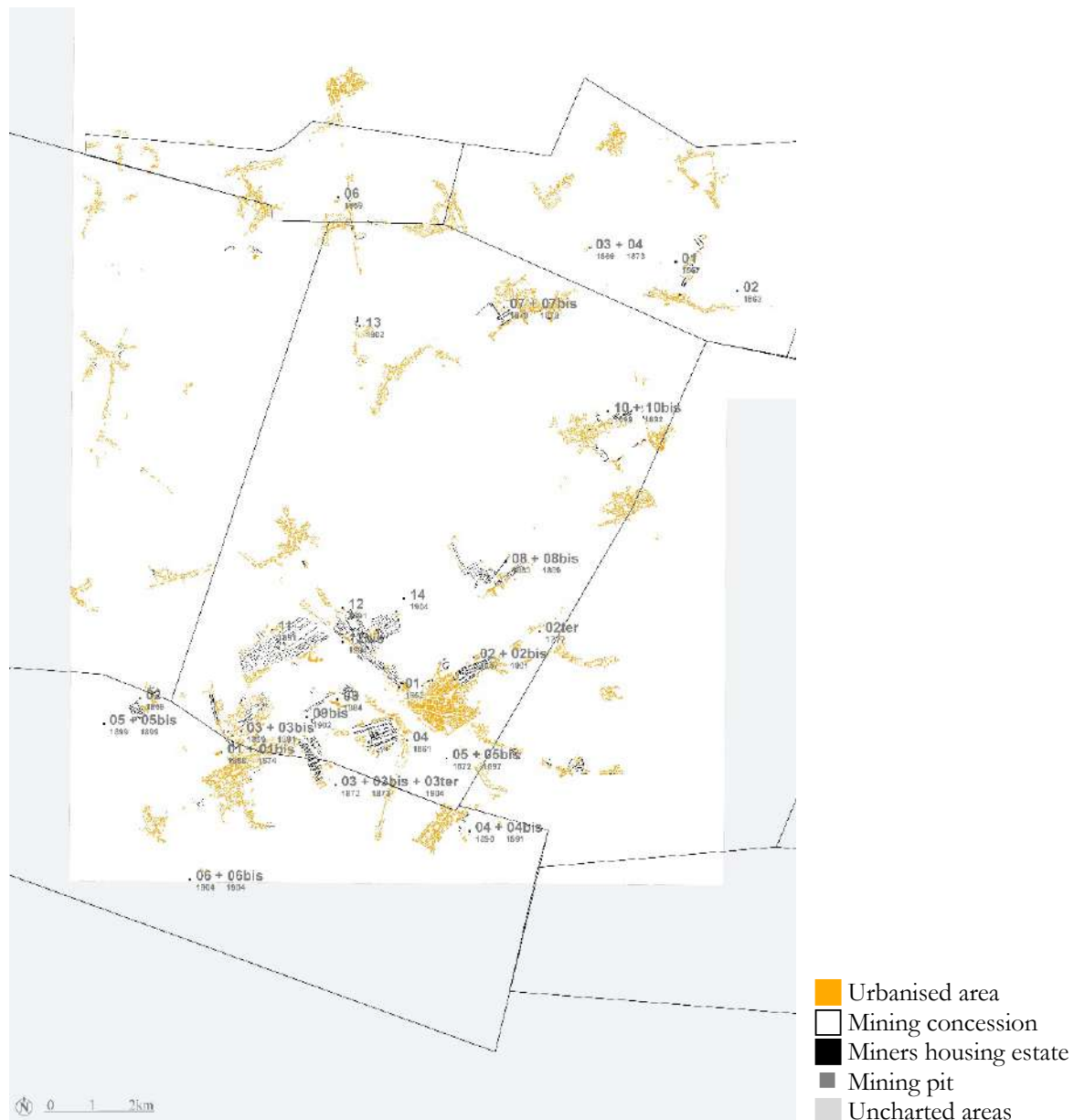
[fig. 6] Lens-Liévin-area in 1904

The phase of 'industrial growth' consists in the constitution and establishment of a new economic system intensifying extraction and territorial occupation. Other activities are side-lined.

The limits of the mining area are extended in this period by the creation of new concessions in the north and south of the central coal stripe. They were smaller in surface and activities. The company of Douvrin for instance was quickly absorbed by the one of Lens after economical misfortunes.

The concessions were developed by the creation of new and the reinforcement of existing pits. New technologies allowed to dig deeper and create longer underground galleries. The pits are located along the transportation lines of existing and expanding railways and canals.

In order to meet the growing demand for labour, new housing settlements are created. They are situated next to the extraction sites, meaning that they became independent from the existing towns and hamlets. For organisational reasons including social confinement, these new settlements were often placed at good distance of existing urban and social centres.

Urbanised area
Mining concession
Miners housing estate
Mining pit
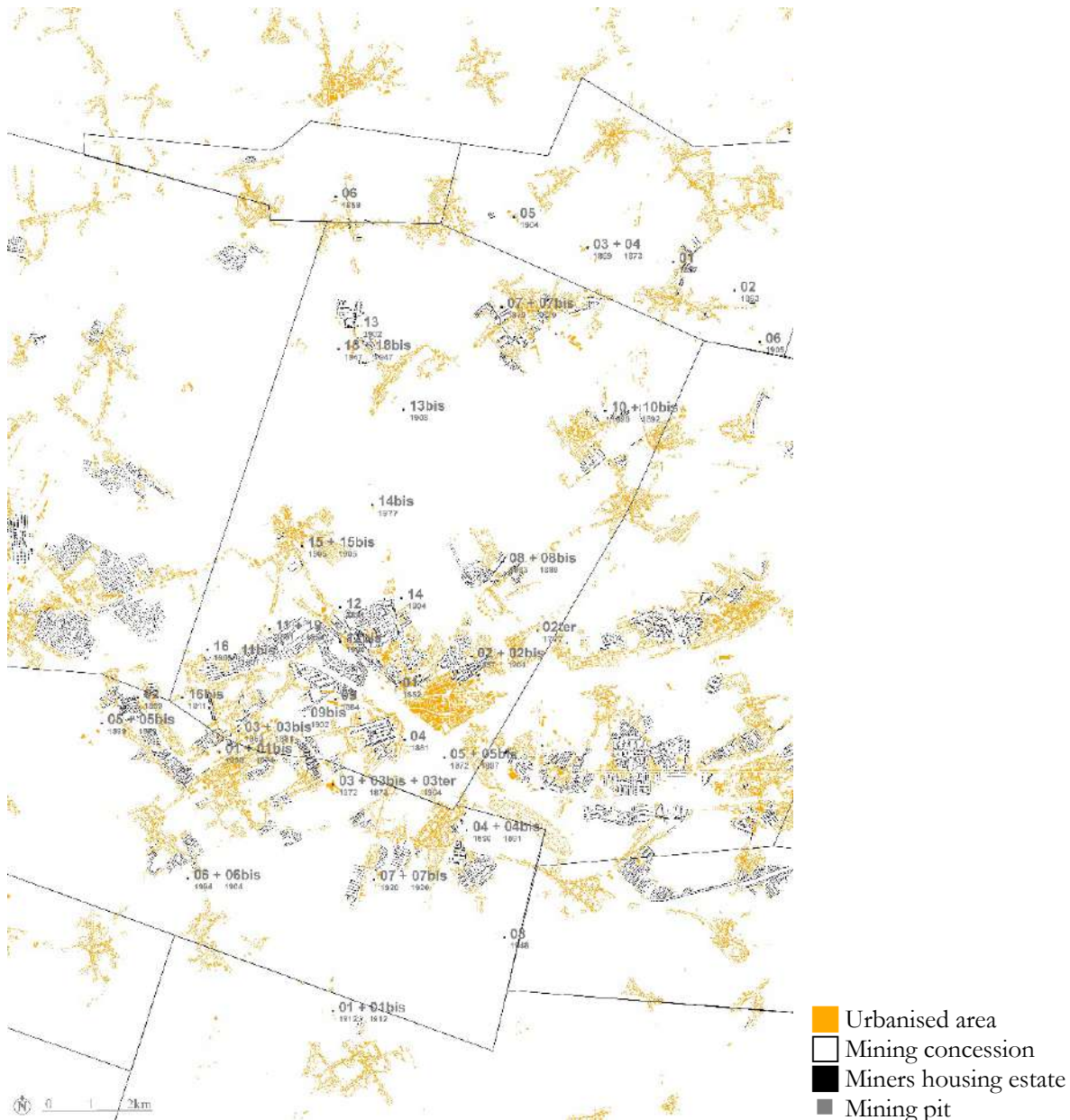
[fig. 7] Lens-Liévin-area in 1954

In its 'climax', the mining industry exploits the population and the territory, seen as part of a total extraction machine.

Still in the beginning of the 20th century, two new further concessions were created in the south of the area, of which only one was exploited on the border with the existing ones. The territorial expansion ended and was replaced by a development taking place within existing boundaries where the central areas were highly densified.

The construction of further pits went on until WWI when heavy fighting took place in the area for several years and most of the industrial infrastructures including pits and housing were destroyed. After the war, the reconstruction was an opportunity to modernise and enlarge the existing sites which made the creation of new ones less important. After WWII, the mining industry was nationalised and its planification centralised. As their size became quite monumental, the number of extraction pits was reduced while the existing ones, all connected to each other below the surface, were maintained, mainly as secondary accesses.

Along with the new pits and their ever-growing scale, new housing estates were constructed leading to a continuous urbanisation of the central parts of the mining areas.

After WWI, housing reconstruction took place without any modification of the urban or architectural forms. After WWII, the densification continued through horizontal extension patterns, curiously avoiding verticality.

Urbanised area
Mining concession
Miners housing estate
Mining pit
~ Mining railway
Spoil heap
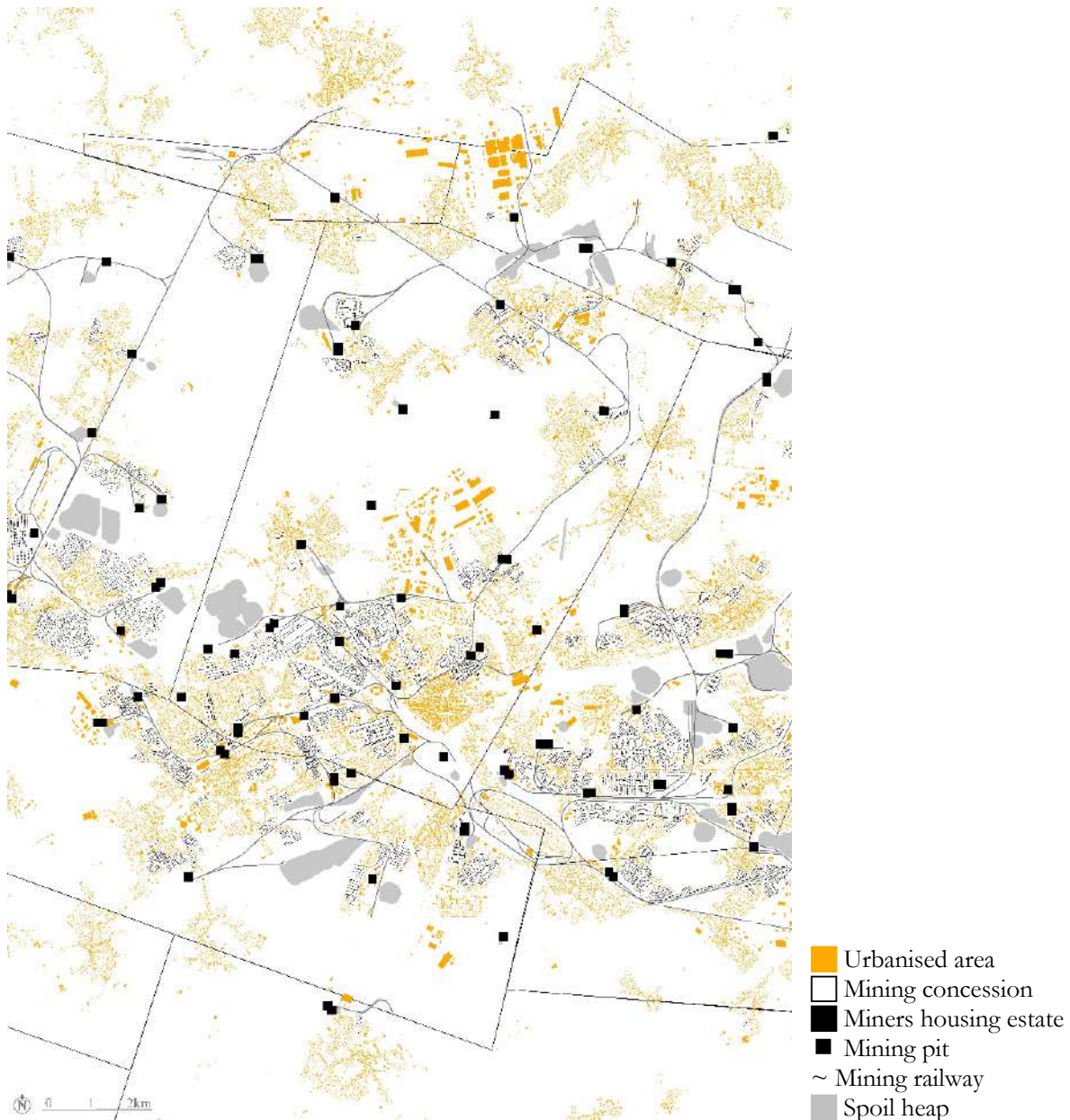
[fig. 8] Lens-Liévin-area in 2023

Due to external influences, the 'decline' of mining activities impairs the economy, the population, housing and the territory.

After a very short period when coal mining had been at the centre of French and European economic and political development, the liquidation and dissolution of its industry was decided in the 1970s and the last pits were definitely closed in 1990.

The process of winding-up included the deconstruction of the extraction sites, with at the time shocking images of the demolitions of the pits by explosives. The fact that some of the infrastructures remained in place was mostly due to the lack of the necessary means to destroy them.

The impact on housing was twofold: no new housing was built and the existing dwellings were disinvested by lack of maintenance or deconstructed following the decrease of the population.

**"Where the rain never falls and the sun never shines,
It's dark as a dungeon way down in the mines." (Travis 1947)**

The cartography produced in this paper draws up a state of play of the coalscape in the region of Lens-Liévin. It unfolds the development of the mining industry and its production of infrastructures and housing following the inherent logics of coal extraction. It pictures settlements and buildings as a part of an industrial machinery that needs to be controlled and optimised. As such, the coalscape introduces and establishes a distinct and coherent territorial system that can be understood at different scales.

[fig. 9] Postcard of Loos-en-Gohelle, about 1915

Regarding the 'scale of the territory', the impact of the administrative organisation of the companies becomes visible through time and space. Initially only supposed to divide the underground resources, the concessions have become more and more persistent figures on the surface. The implementation and development of headquarters, transportation routes, spoil heaps and housing clearly identify their centre and limits. While the railways in north-south direction connect the different parts of the same concession, the borders are occupied by wasteland or traditional urban areas. The entire territory of the coal mining stripe in northern France is thus divided in segments.

A clear distinction appears at a territorial level between the centres of the concessions and their boundaries. Indeed, with the increase of the size of the pits on and under the surface, and due to the optimisation of the transportation of coal and workforce, the centre of the coal mining stripe and the concessions are highly densified while its peripheries remain undeveloped.
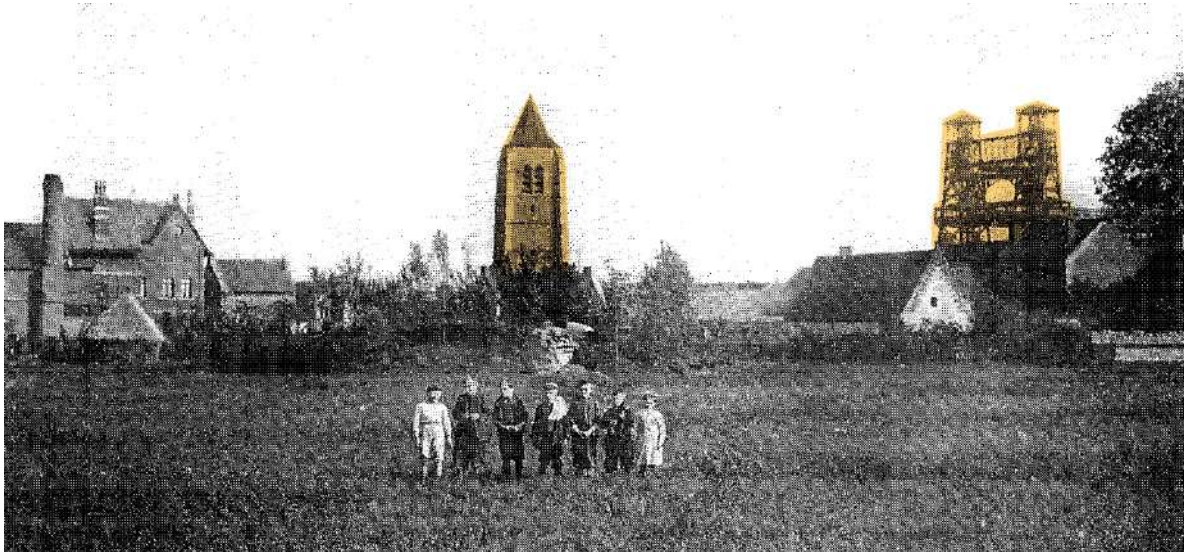
[fig. 10] Postcard of Loos-en-Gohelle, about 1915

At the 'scale of the settlements', the spatial structures of traditional and mining settlements can be described as entities that have very little interactions, just like oil and water. They coexist in three ways:

Firstly, the mining estates developed and coexisted in parallel with traditional parts of the pre-existing towns with little or no interference. For example, in the case of Loos-en-Gohelle, initially a small village but a large municipality, the historic centre remained uninfluenced by the mining activities and its growth follows a traditional concentric model. Nevertheless, within its administrative borders but not physically connected to the town centre, the mining company of Lens started building more and more pits and housing estates. Today the municipality is still divided in clear districts of either traditional or mining housing and has to face challenges that differ according to their different characteristics and needs.

Secondly, the small rural pre-existing towns transformed into important mining cities. Through time, the historic villages situated in the central mining areas were absorbed by the infrastructures of the industry which were located everywhere inside and around its centre. The traditional rural fabric merged with new constructed estates into a polycentric urbanised area and the mental image of the town is fully substituted. In the case of Liévin the municipal institutions were relocated to take this evolution into account and the city council resides today in the headquarters of the mining company.

Thirdly, some pre-existing towns remained completely immune to the industrial revolution taking place in their surroundings. In the peripheral areas of the coal mining stripe and its concessions, the size of the industrial activities and their infrastructures remained less important and had little impact on the rural ecosystem. Hence, the agricultural activities kept on following their own development.

The rural and mining settlements developed within their proper logics. While the expansion of the traditional towns followed a model of concentric growth around an existing core or linear growth along existing roads, the housing estates of the mining industry are developed as autonomous areas. They are located in good distance of existing towns and propose their own centralities around the pit and other institutions related to the mining activities.

In the most urbanised areas, they constitute a continuous urban fabric composed by individual housing in which the style of the building itself does not seem to be of any importance. Regardless the small variations in facades, building and urban plans, the miners houses constitute a clear and homogenous identity distinct but still related to the traditional agricultural housing of the territory.

"And pray when I'm dead and my ages shall roll
That my body would blacken and turn into gold" (Cash 1968)

This research establishes a new typological classification of the forms and figures of miners housing constructed by the coal extraction industry in northern France. The analysis traces the co-development of industry and housing through the history of 19th and 20th centuries. It identifies the components of the coalscape and describes their characteristics and relation to the entire machinery. Thus it links the housing to territory on which it is set.

Regarding this seminary, it is important to underline the inherent logics of the system of the coal mining industry and its territorial and urban planning. The availability of the resource and the organisation of its underground extraction shapes the face of the ground and generates a territory with a distinct identity. On the surface, this coalscape also encounters other logics and forms of socio-economic organisation. In the rivalry of ideas and the context of increasingly limited soil, the urban and architectural models and typologies become powerful tools used to materialise and manifest the social order.

Further work will focus on a smaller scale where spatial structures are more adequately represented. On this urban and architectural level, it will be interesting to see whether and how for instance the position within the historic development of the industry on the one hand and within the mining territory on the other hand had influenced the conception, construction and maintenance of housing. The methods, tool and results of this research can be discussed with respect to other territories on the transeuropean coal mining ribbon. Does the different political and economic contexts produce different kinds of coalscape and other typologies of housing? How can the different territories formerly in a competitive situation, benefit from a common background and identity in the relatively new context of the European Union?

Most importantly, how can the understanding and knowledge of the relationships between housing and territory, linked together by the resource, be used to accompany and shape the contemporary transformations of the territory, especially affordable and sustainable housing?

Is the current focus on tourism, which is the attraction of outsiders as a financial resource, enough to provide sufficient wealth for the territory and income for its habitants? Which other resource(s) can be activated taking into account the necessary ecological shifts of economics and urbanism in order to create a new living, but post-carbon ecosystem?

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Landscapes of Migration. Displacement and the ecologies of urban ruins in mining settlements. The case of Limburg, Belgium.

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Narratives on former mining settlements frequently rely on a distinction between a current state of 'disruption', against the background of a 'glorious' industrial past. In the context of the Belgian Limburg, scholars have typically investigated such mining settlements (also called *Citées* – singular *Cité*) from the perspective of large-scale political and ideological constructs. However, this perspective excludes the reading of more 'unfixed' actors and their territorial articulations – i.e. migrant workers, temporary architectures, and displaced matter. On the contrary, this contribution focuses on mining settlements, from the perspective of marginalized displaced 'Others'. Thus, to grasp the condition of movement and precarity that they share, I introduce the notion of *Landscapes of Migration. Landscapes of Migration* emerge from exceptional phenomena of displacement, as side effects of highly technocratic environments. The main hypothesis of this work is that mining settlements, precisely because of such intense phenomena of migration, also inherit important forms of global, yet specific ecologies. Moreover, I further posit that such heterogeneous ecologies emerges from a relationship that exists between migration and the ruins of highly technocratic environments. This underpins, the necessity for a semantic shift in their representations, moving away from detractive vocabularies towards considering ruination as part of an ongoing process of territorial transformation. As a consequence, the aim of the dissertation is twofold. On the one hand to acknowledge the agency of marginalized 'Others' within the histories of mining settlements. On the other hand, to stress how such mining settlements beside their past of violent extractions, can also represent an important space for imagining new forms of cohabitation.

Introduction

The phasing out of the coal industry has confronted mining settlements across Europe with a series of long-standing and complex problems. In these contexts, the decline of the mining industry, that have historically represented an almost univocal driver of territorial development, extends far beyond the problems associated with the loss of workplaces (Smets, 1990). In the case of Belgium, the social and economic struggles of the mining region of Limburg, have often consolidated in a stigmatization of former mining towns as 'decaying' workers' suburbs (Loeckx and Smets, 1991). Here, a sharp distinction between a tragically 'disrupted' landscapes and a 'glorious' industrial past, generally characterizes the imageries surrounding these towns.
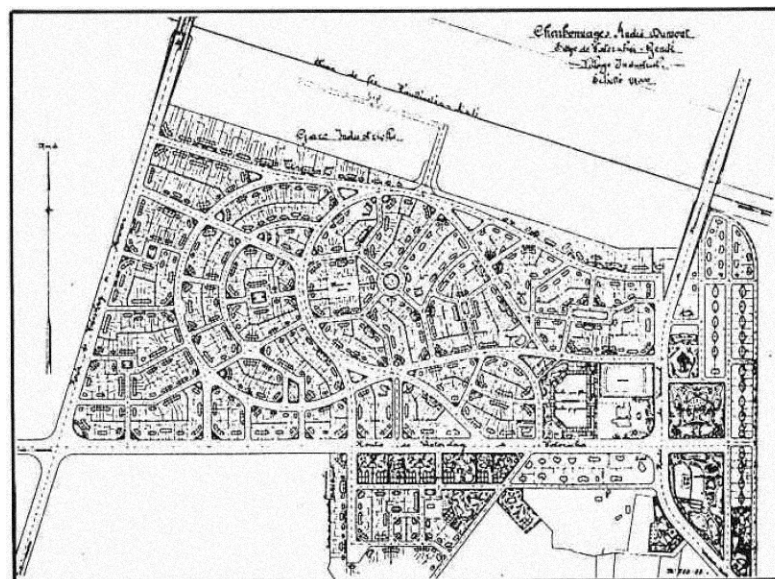
[fig. 1] Plan of the Garden City of Waterschei by architect A. Blomme.
Source: De Meulder, B. De drie gedaanten van waterschei. Cité industrielle, cité jardin, banlieu radieuse.

Scholars have engaged in writing histories of these settlements already since the ending of the last mining activities (Heynen, 1991; Smets, 1977; Swyngedouw, 1996), but the perspective of large-scale political and ideological constructs still seems to be a predominant analytical standpoint. By framing studies through different forms of industrial paternalism and capital organization, such histories tend to approach land and its inhabitants within the 'fixed' representations of the grand urban schemes – appealing to imageries that range from early utopian models such as the Garden City to the post-Fordist model of *Banlieu Radieuse* (Aureli and Tattara, 2018; De Meulder, 1991; De Meulder et al., 1999; Ryckewaert, 2011). On the other hand, I argue that these perspectives have pushed outside of the spotlight, the reading of other important 'unfixed' actors and their territorial articulations – such as migrant workers, their housing in 'temporary' structures, or the displaced matter with which they interacted. Thus, with this contribution I attempt to question how tracking their movement can contextualize industrial and post-industrial urban environments within wider geographies. Approaching environmental, social, and technological issues from the perspective of minor-scale displaced 'Others'.

The ruins of mining settlements and the *Landscape of Migration*

Mining towns are settlements that materialize through exceptional phenomena of displacement. Displacement of matter, human bodies, but also labour, and more generally cultures, all have in common a character of continuous instability and movement. To grasp the territorial implications of such a shared condition of mobility, throughout my dissertation I am formulating the notion of *Landscape of Migration* as a methodological framework. Thus, the main hypothesis of this work is that mining settlements, precisely because of such intense phenomena of migration, also inherit important forms of global, yet specific ecologies. Moreover, I further posit that the emergence of such heterogeneous ecologies is sustained by a relationship that exists between phenomena of migration and the ruins of highly technocratic environments. In fact, as former mining settlements become increasingly associated with a tragic image of toxic dumps, abandoned industries and social segregation, the conceptualization of ruins becomes a central concern. Here, the study of highly technocratic environments needs to be reconnected with the idea of their obsolescence and decay (Picon, 2000), while the idea of ruination demands an important conceptual renewal (Tsing, 2021). In this sense, the notion of *Landscape of Migration* attempts to construct a different understanding of industrialized and post-industrialized contexts. Offering an approach where the material, social and technological 'rubbles' of modern industrial sites, despite being built on histories of exclusion and violence, can also becomes grounds where new ecologies can be imagined. This underpins the necessity for a semantic shift in representations of mining settlements, moving away from detractive vocabularies – i.e. wastelands, brownfields – towards considering ruination as part of an ongoing process of territorial transformation. Methodologically speaking, tracking migrations becomes a way to develop an understanding of how displaced humans and non-humans have intertwined in forms of cohabitation, and how they shape and articulate the territory 'in the rubbles' of capitalist development (Stoetzer, 2022).

The framing of uneven effects of industrial development through pathologizing approaches has frequently reinforced harming and oppressive structures, as the depiction of entire communities as 'broken' or 'disrupted' often comes with other damage (TenHoor and Varner, 2022). Here, I propose the notion of *Landscapes of Migration* as an opposite methodological framework, intersecting environmental and social concerns with the idea of an 'ecological pluriverse' emerging from recent nonhuman and postcolonial conceptions of cities (Gandy, 2022; Stoetzer, 2022). Thinking mining settlements within moving matter, humans and cultures, can offer an alternative methodology that co-constructs histories from within contemporary legacies of industrialization. Thus, I attempt to track the movements of marginalized 'Others' - such as unfertile soils, guest workers or scrap construction materials - beyond their commodity status in the well-established 'grand narratives' of capitalist growth (Hutton, 2020). The testimonies given by material artifacts, personal objects, oral evidence, and other 'unofficial' archives also assume great importance in the reading of such 'non-fixed' livelihoods. In such reading all my own positionalities come to matter differently within the various encounters I make. As a foreign researcher on the one hand, but also as the grandson of a former guest worker in Belgium on the other.

My aim with this research is twofold. On the first hand, is to acknowledge the agency of such marginalized displaced 'others' within the writing of histories on mining settlements. Bringing to the foreground questions of material displacement, precarious domesticity, migrant labour and infrastructural affordances. Stressing how mining settlements, besides being shaped by histories of exclusion and violent extraction, can also represent an important space for the forging of alliances and new forms of cohabitation. Secondly, by constructing on the notion of *Landscape of Migration* as a methodological framework, my aim is also that of producing a new vocabulary for the representation of urban ruins in both industrial and post-industrial contexts. Developing an understanding of how material and cultural migrations can produce ecologies that speaks to a wider and more diversified geography. In my dissertation, I am investigating how the reading of landscape through migration allows to articulate mining settlements from a different environmental, social and technological perspective. Specifically, in this paper I will focus on the reading of the first two. Articulating soil movements in relation to questions of land fertilization on a regional scale, mining and construction waste in relation to questions of housing on the scale of the domestic space, and labour migration in relation to cultural patterns on an urban scale.

Migrating soils

In Limburg, the most prominent environmental trace of underground mining exploitations is certainly the large quantity of matter that is being moved from subsoil to the surface. The presence of such displaced matter still characterizes the so-called 'drosscapes' of mining settlements (Berger, 2006), but the way that extracted coal, sand and clay have articulated their space is often overlooked. On the opposite hand, looking at the mining landscape from within material displacement, means being confronted with the idea that what is extracted, is also often accumulated somewhere else (Frichot, 2019). Thus, a wider understanding of how extracted coal articulated the territory, necessarily needs to be framed not only within the traditional notion of *extraction*, but also through its opposite idea of *insertion* on the mining landscape. Here, the question of land fertilization is of central importance and builds on a history where sandy soils and coal processing by-products intersect with the rich ecologies of dismissed industrial forests.

[fig. 2] One of the photographs taken by the botanist J. Massart representing 'The heathlands and Valley of the Stiemerbeek, between Kuylen and Winterslag'. A closer look shows a man collecting heather and the growing mine of Waterschei in the Background.
Source. Recollecting Landscapes. https://www.recollectinglandscapes.be/nl-1904-massart-genk-54

Before the excavation of the first coal in 1901, the pre-industrial sandy landscape of Limburg attracted the positivistic interest of many botanists, photographers and painters. Their documentation depicts a territory that was already deeply marked by intense material movements. The sandy heathlands of Limburg in fact, had a central role in providing the organic material at the base for pre-industrial forms of land fertilization, through which the region's inhabitation was rendered possible (Notteboom, n.d.).

In the second half of the 19th century however, state-driven narratives of capitalist expansion worked to construct an image of Limburg as a 'deserted wastelands'. The conceptualization of the region as a void, along with its symbolic and cultural meanings, served as a tool for land dispossession. By rendering the sandy landscape of the region as an 'underdeveloped' frontier, such narratives sustained large-scale expropriation campaigns and what the government often named as '*La mise en valeur*' (the improvement) of Limburg (Monkhouse, 1949). Thus, the transformation of the region into a profit-making territory, materialized through large afforestation projects for wood production, but conifers were the only tree that could be grown profitably on these sandy soils.

[fig. 3] The forests of Limburg in 1989. Photograph taken from the 'slag heap' of Waterschei.
 Source: Geheugen van Genk.

The opening of the mines in 1910 came with other drastic changes. The controlled space of the garden cities materialized through the company's need to provide housing for labourers, while dealing with the environmental and social effects of mining exploitations. While the 'blossoming' gardens of the mining towns were celebrated with pride as a great achievement of the companies (Adam, 1924), the induced fertility of the land was mainly possible through the extensive use of cheap fertilizer. Here the by-products of coal processing assumed a central role. Ammonia, deriving from coal gasification formed the base for the growing fertility of the land. Garden cities grew hand in hand with the production of mining waste. Thus, in the 1960s when the mining industry stopped expanding, the industrial forests had lost their profitability falling into disuse, while favourably meeting the new fertile soils of the region. The spreading of these forests over the territory brings to ask how mining and its by-products have articulated the Limburg territory in other ways than the simple juxtaposition of underdeveloped 'wastelands' and 'blossoming' garden cities. As new heterogeneous ecologies emerge through unintended outcomes of the capitalist development of the region, opening space to richer social and environmental meanings.

Migrating Houses

Shifting the focus to an urban scale, the circulation of extracted matter within the mining settlements of Limburg has the question of housing at its core. Representations of Garden Cities often depict them as 'clean' spaces separated from the underprivileged, but they do not consider the lives that unfolded within their poorer edges, where inhabitation often assumed precarious forms. However, from an investigation made in 1956 by the Genk police on 'informal' housing, a persistent unease of local authorities with what the document calls 'isolated, shabby, unhealthy' dwellings emerges quite clearly.[1] The disposal of the extracted matter is again here, a central question. In this section of my work therefore, I focus on so-called 'informal' dwellings placing them in relation to the circulation of waste, produced by the modern development of the region – waste in the form of mining scraps as well as scrap construction material. Following the migratory trajectories of such material beyond the exhaustion of its perceived use-value, I look at how it served the construction of spaces of exclusion, but also served various forms of resistance.

Coal scraps, bricks, wood and metallic components were accumulated in large 'heaps' – also named *Terrils* - and often circulated in the settlements under various forms, including construction material. The material contained within these dumps was re-mined many times and in many different ways – from small-scale digging to large-scale industrial operations – but often interacted with the domestic environments of those who lived in the margins of the settlements. The small-scale digging of material was developed into a form of sustenance for many families. Mainly performed by unemployed inhabitants, women and kids, such activity however came with a triple extraction – of soils, waste and human health (Le Roux and Hecht, 2020). The performers, in fact, exposed themselves to various risks from landslides to contact with toxic particles. Although such 'minor-scale' practices had less visible territorial impacts than their parallel industrial-scale operations, their agency equally shaped the lived space of the settlements. Enhancing forms of mutual care and sustenance, within the precarious inhabitation that took place in the margins of the settlements.

[fig. 4] Women and kids collecting bricks and coal scraps from the *Terril* of Waterschei.
Source: Geheugen van Genk.

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1 'Fortunately, in our municipality we do not have those conditions in the big cities, where one sees mighty and beautiful buildings along the street, but where one comes in the immediate vicinity along narrow alleys in dirty slums, where misery and misery can be found on doors and windows. The cases we know here are mostly isolated, shabby, unhealthy dwellings, which are preferably built up or muddled up in remote places.' Source: Gementebestuur Van Genk Politie Jaarverlag 1956. Translated from Dutch by the author.

Wasted soils were also deployed by the mining companies as a cheap solution to the housing problem. The economy of waste reuse avoided them to face the troubles of high transportation costs while dealing with the post-war fast-growing labour migration. A mixture of wood, sand, and clay stabilized with Portland cement, could be cheaply used to produce construction blocks of composite materials.[2] These blocks often substituted quickly deteriorating wooden structures in the housing of the working newcomers, while perfectly complying with the modern trope of a solid house. From the Company's perspective, this technique allowed to solve both questions of housing shortage, and the disposal of degraded soils.

[fig. 5] Tenements in Durisol blocks and wood in the mining settlement of Zwartberg.
Source: Geheugen van Genk.

However, the contracts for guest workers still often imposed very unstable conditions. For instance, an entire family could be displaced in case of a miner's injury or death. Therefore, many were forced to reclaim living spaces in the margins of the settlements – between polluted *Terrils*, railways and factories – and shape there their domestic environment. Here, the components from older tenements, circulated as an important source of construction material. Older wooden structures were often sold by the mining companies to private owners that asked for high prices for their rent. On the other hand, such components also served in the construction of other sorts of dwellings that challenged the controlling structures imposed by the mining companies[3]. Similarly, older brick houses, abandoned because of land subsidence provided shelter and provisional inhabitation[4].

2 In the tenements built in Waterschei during the 1950s for hosting the Italian and Spanish miners, Durisol was a ubiquitous material. Composed by a mixture of wood fiber, cement and clay, it perfectly matched the arid environments of the Limburg heathlands.
3 The Police record of 1956 also talks of movable and non-movable caravans inhabited by those who did not want to 'register' within a specific municipality. Source: Gementebestuur Van Genk Politie Jaarverlag 1956. Translated from Dutch by the author.
4 The oldest Garden City dwellings in Winterslag, were abandoned because built too close to the Terril. However, they remained inhabited until their demolition.

[fig. 6] The old Garden City of Winterslag, abandoned by the mining company because of the vicinity to the 'scrap heap'. Source: Geheugen van Genk.

Migrating Workers

'Grand narratives' of miners' migration to Belgium frequently fix guest workers as inert labour force exchanged for some bags of coal. Life within the Garden Cities' tenements was meant to comply with the modern nuclear family norms and lifestyles, rigidly regulated through the control of the company's paternalistic structures. However, their urban space is increasingly understood by historians as a ground of mediation between different class and gender struggles, and the industrialists' efforts in directing these forces (Crawford, 1995). Though, the condition of precarity that displaced inhabitants had to face in the margins of mining settlements is often overlooked. Here, aspiration to better life conditions certainly remained ubiquitously present (Cumoli, 2009), but the understanding of a shared struggle also pushed actors to work together across cultural and class differences. These spaces can act as the background where important forms of resistance and mutual care are also communally shaped (Alimia, 2022). Thus, in this section of my dissertation, I track workers' migration to Belgium with a focus on the Italian case, arguing that behind the histories of subjugation to modern industrial dictates, the heterogeneous background of the displaced inhabitants also enhanced important forms of cultural reconfigurations.

The processes of industrialization of the two countries (Italy and Belgium) are shaped by fluxes of labour. Such displacement played an important role in sustaining the Belgian mining industry, although it was regulated by norms that would often make permanence and labour contracts extremely unstable (Cumoli, 2009). However, official migration channels were often paralleled by unofficial strategies placed in act by the mining companies to insure the migration of the most 'calm' subjects – excluding for instance workers from specific regions or those who took part in strikes. As a consequence, the rigid bureaucracy soon developed into a reinforcement of 'informal' recruiting networks, bringing to a reconciliation of communities within the edges of the mining towns. As the majority of displaced workers came from agricultural contexts, the relative isolation given by the margins of the town sustained a continuity with 'rural' social patterns where access to land was developed as a fundamental resource (Cumoli, 2009). However, it also allowed for important practices of care and political resistance – for instance, these spaces often became the background of exchanges with doctors or trade unionists – in forms that escaped the rigid mechanisms of control that regulated life in the Garden Cities.

Towards new forms of cohabitation

With these examples I am attempting to reconnect an understanding of highly technocratic landscapes with the perspective of their legacies and 'side effects' of modern capitalist exploitations. Sandy heathlands that are transformed by the extensive use of fertilizer, also can sustain the emergence of new ecologies in former industrial forests. Scrap material that were used as means to exclude the underprivileged, also developed into forms of domestic disobedience. Migrating workers shaped cultural reconfigurations despite precarity and the companies' efforts in controlling their social lives. Here, I attempted to question how such *Landscapes of Migration*, through their cosmopolitan but highly specific characters can unsettle the organizational logics of modernity (Gandy, 2022). Focusing on how the forms of cohabitation that emerges within them, can produce a counter-discourse to conceptualizations of material and nonmaterial ruins as simple sites waiting to be erased.

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III.b

Commons and nature

Rewriting the urban commons. A sustainable approach to urban logistics

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This research investigates how the cycle logistics affects the design and transformation of streets and public spaces. As part of an industrial PhD programme, the study considers the urban practices that affect the space for the movement of people and goods, in the broader framework of the 'rewriting of the city', as a critical transformative action of what already exists. Recognising the role of the bicycle in creating more sustainable, healthy and inclusive societies, the contribution interweaves several perspectives: accessibility to services, active mobility and decarbonisation. In this sense, sustainable logistics is seen as an opportunity to improve quality of life and urban well-being. The study observes the changes in the use of space promoted by citizens, companies and third sector organisations. It analyses how their practices relate to projects for the redesign of space for movement and the creation of multifunctional spaces related to cycle logistics and active mobility.

Re-writing the streets and public spaces

Recently many urban practices and transformations of spaces have been introduced in contemporary cities, not least the emergence of several green urban logistics initiatives, such as the transport of goods and people by bicycle. As part of the PhD PON programme 'Research and Innovation' 2014-2020, this study explores how to cycle logistics characterise contemporary society, influencing the design and transformation of streets, working and living spaces.

Starting from a reinterpretation of the specific conditions of the case studies within the broader framework of the 're-writing of the city', the research observes the physical transformations produced by different actors. 'Re-writing the city' is understood as a critical transformative action on what already exists. *Re-writing* is a metaphor for the ongoing work of redesigning of the streets and public space, where the transformative action is conducted through both top-down and bottom-up projects. This reimagining and redesigning is part of a long process that began with the urban renewal and the 'hygienist revolution' of the nineteenth century (Zucconi 2022), when technological innovations emerged that undermined the consolidated landscape of the street that seemed forever unchanging. The long process of urban transformation continued in the twentieth century with the cycle plans – begun in Delft in 1979 – and, more recently with projects aimed at ensuring greater urban liveability, reducing the speed of vehicles in urban and peri-urban areas and improving accessibility for pedestrians and cyclists, such as in Barcelona with the *superillas* or 'Milan City 30' announced for 2024. The study then looks at innovations to improve urban spaces for cycling as a vector of well-being, making cities more accessible and equitable (Martens 2017).

The keys to interpreting the research are related to the physical and functional transformations of public space, referred to the material thickness of the ground, as well as the semantic change of the role of streets in the use of the city – of connection, meeting and coexistence of multiple flows. Particularly in the last century, streets and urban space have been reserved mainly for the circulation of cars, to the partial exclusion of various modes of mobility. The research hypothesis pursued in this sense is the need for a 'new project' for the street (Secchi 2011), whose forms and strategies must be dynamic and adaptive, favouring non-specialised spaces, linked to multimodal systems and integrated mobility, and taking possible *mixité* as a guiding parameter.

The choice of the context of interest is based on the exploration of possible forms of co-presence – or conflict – with other forms of mobility in contemporary urban spaces, following the adaptation of places of movement, also taking into account the different mobile populations that did not exist before, such as people with disabilities and the elderly. To test these hypotheses, case studies have been selected in which different local actors, such as administrations, cycle logistics companies and citizens' associations, implement joint projects or experimental initiatives for the transformation and reuse of public spaces.

Objectives and methodology

According to analyses of the socio-spatial quality of streets and public spaces, light sustainable urban logistics is used as a tool and lens to observe urban transformations in terms of accessibility to services, active mobility and decarbonisation. This is done by examining case studies with different degrees of urbanity from the perspective of porosity – the ability to connect spaces, objects and subjects (Haraway 2019), to hold together movements of percolation and proliferation (Tosi 2002). This is also an opportunity to explore possible forms of coexistence or co-presence of different mobile populations. In fact, interactions between co-present actors not necessarily in collaboration, trigger opportunities for generative conflict. To study this, the research will be supported by the collaboration of companies in the sector, in cooperation with administrations and associations, with action-research pathways also involving local communities.

The innovative practices of cycle logistics, together with socio-demographic changes, the dynamics of migration, the ageing of the population and the search for greater accessibility, require a redesign of the existing urban heritage, of the spaces for movement and of the facilities for urban well-being. These proposals are closely linked to the need for access to local services and active mobility – walking, cycling, public transport – as well as the need for freedom of movement and use of open spaces for leisure and social activities, work and study. In this panorama, transport services by cargo bike can be found, which, through situated practices, offer potential contributions to improving urban liveability, mitigating the impact of the goods transport sector and contributing to the diffusion of circular economy systems. The observational perspective adopted in the research considers innovative cycle logistic practices as opportunities to promote the presence of symbiotic, non-dissipative forms of organisation that guarantee greater equity and inclusivity in similar spaces of action and interaction (Tsing 2015).

In order to study this, the research will include several periods of cooperation with companies that are active in the field of cycle logistics. The selection of case studies ranges from different types of organisations to specific business activities carried out with the use of cargo bikes. Some are last-mile bike courier companies. Others are associations developing innovative activities related to urban circular economy processes. Semi-structured interviews will be conducted with these subjects, shadowing their activities in order to tell, according to the ethnographic method, what services they offer and how they relate to the urban space in the contexts in which they operate. In some cases, in order to have a deeper contact with the field, it was decided to work directly as a volunteer in the companies.

Cycle logistics and the urban commons

Recent technological innovations and urban practices (many of which are consumer-oriented) have increased last-mile delivery, which in medium-sized European cities is carried out by oversized vehicles travelling short distances (Wrighton 2016). Over and above the behavioural changes encouraged during the closure period, door-to-door transport and urban delivery, which has been growing steadily in recent years, has now reached a significant level of intensity (Mastrandrea 2021). In response, various initiatives are being taken by administrations or innovative companies to promote cycling and to work with cargo bikes as a substitute for heavier vehicles in urban movement of people and goods (Schliwa 2015).

What the research seeks to reflect is that the development of goods and passenger transport by bicycle in urban areas is not only an innovative transport solution – particularly effective in dense contexts thanks to its flexibility – or a strategy for decarbonisation and energy saving. Above all, cycle logistics is an opportunity to radically rethink the road and urban public space. Not only because it uses very efficient types of cargo bikes for first and last mile transport, which in the short term could face competition from other technologies that could eventually replace them. In this sense, therefore, it will not be the 'new paradigm' that defines the city (Rifkin 2011), as the automobile did in the twentieth century, transforming urban space and conurbations, effectively becoming the means of movement that dictates the dimension of the space of movement. Instead, cycle logistics could play an important role in promoting social innovation and finding ways to rethink urban space. Thanks to its economic characteristics, it is accessible and adaptable to different types of spaces and to people of different professions, ages and physical conditions. It allows them to mix the public space that has been specialised by the car. From this perspective, the

practice of cycle logistics can contribute to respond to the global challenges of innovation and accessibility in order to reduce inequalities and develop more sustainable cities and communities, according to the objectives of the United Nations 2030 Agenda (SDGs 9, 10 and 11).

In addition, besides projects to redesign spaces for movement, new shared spaces are emerging, multifunctional spaces used in relation to sustainable mobility and intermodality practices, such as *dark stores*, *velostations* or neighbourhood logistics micro-hubs. These 'multitasking infrastructures' (Rappaport 2022) are implemented on the basis of principles of social justice and in response to the environmental crisis, often in cooperation with companies and local communities. These are inhabitable places, not just places to store or dispatch freights, sell goods or serve as intermodal transport stations. Such spaces are used for cooperative practices, infrastructures that therefore support the people who have access to them. These multifunctional spaces are connected to the network of paths for active mobility and host services for the use of the community. In this sense, they are urban commons.

The Strasbourg case study

The research observes a number of experiences in European cities where bottom-up innovation initiatives and cycle logistics companies are active and where experiments have been promoted by the administration (as in the case of those involved in the City Changer Cargo Bike project). In Strasbourg, for example, the administration encouraged the use of cargo bikes by lending them out for a trial period and by setting up special parking areas in front of some public buildings in the city centre. Following these trials, they were incorporated into the fleet of bikes available through the Vélhop rental service.

Among the various cycle logistics services offered in the city, since 2018, the association Sikle - Les Composteurs de Strasbourg has set up a network to collect food waste from professionals. At the beginning of 2023, it has around a hundred partners (restaurants, canteens, caterers, etc.) and collects eight tonnes of waste per week, tripling its work compared to 2020. Sikle has forged a partnership with a market gardener near the city, which has provided him with a composting area. Two other composting microsites are located in family gardens, one to the south and one to the north of the Strasbourg *hyper centre*. The collection of organic waste is carried out using five cargo bikes with two 250W motors, which can pull one or two trailers with a maximum payload of 400kg. The team consists of nine men and three women, and the composting process is supported by a team of volunteers. There are 40 rounds per week with an average distance of 15 km.

Since 2016, the separate collection of organic waste in restaurants is mandatory for those producing more than 10 tonnes per year. From 1 September 2016, article 102 of the "Loi de transition énergétique pour la croissance verte" (energy transition law for green growth) requires all public establishments and all local authorities to implement a process to combat food waste in catering services[1]. Furthermore, from 1 January 2023, the threshold has been lowered to 5 tonnes of organic waste per year, and from 31 December 2023, all administrations will have to ensure the separate collection of organic waste at source, regardless of the annual amount of organic waste produced. In addition to triggering a virtuous recycling process, those who use the collection service offered by Sikle will obtain the recovery of organic waste on site, without having to set up a designated storage area, and will not autonomously transport the waste to a recycling centre. The collection, transport and composting of organic waste is carried out entirely by means of cargo bikes and with the support of volunteers, who take turns with the employees [fig.1].

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[1] Loi de transition énergétique pour la croissance verte is published on the site of Ministère de la Transition écologique et de la Cohésion des territoires, Accueil, Politiques publiques , Transition énergétique & bas carbone https://www.ecologie.gouv.fr/loi-transition-energetique-croissance-verte

[fig.1] Organic waste collected and transported on a cargo bike by Sikle - Les Composteurs de Strasbourg. Source: photo by the author.

In 2021, after an initial collaboration with the Eurometropole – currently underway – which plans to collect organic waste from 120 families living close to the Place de Saint Etienne, in the *hyper centre* – where there are no collection bins or microsites for composting neighbourhoods – Sikle proposed to the office of the Potagers Urbains Collectifs (which manages allotments in urban gardens) the creation of a gardening and social space in the Parc du Heyritz. The land was polluted with hydrocarbons and had been abandoned in the previous period. The proposal for the regeneration of the site included the creation of a micro-composting area to preserve the urban agricultural vocation of the site without cultivating the open land, as well as a project to create a thin forest on part of the site. The *jardins familiaux* (family gardens) department carried out important work to make the site viable: creating an access for lorries to deposit the shredded material, clearing the site, clearing the area, levelling the parts intended for composting, shredding and storing the shredded material.

The Jardin Soleil is one of two active micro-sites for delivery and composting [fig.2]. The other is at the Église Rouge in the north of the city. Sikle delivers both the organic waste collected from professionals in the city centre, which represents the material with a high nitrogen content, and the shredded branches and leaves from the maintenance of public green spaces, which represents the carbon part useful for the maturation of the compost. The citizens involved take part in the subsequent sifting operations and use the compost produced on site to cultivate vegetable gardens in greenhouses and in boxes. Relationships and economies are also created that link the composting site with family gardens in the immediate vicinity, which buy the fertiliser produced in the micro-site, thus activating a circular economy process by returning the waste produced by citizens to cultivated land in the city.

[fig.2] Jardin Soleil, a shared space in the micro-site managed by Sikle - Les Composteurs de Strasbourg, Parc du Heyritz, Strasbourg. Source: photo by the author.

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Visualising fluid territories: settling in and within shifts in the *chars* of Assam, India

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The introduction of land-use planning has resulted in a categorical differentiation between land and water. This perspective of territories and categorical labelling disregards other cultural systems, ecologies, and economies that have adapted to indeterminant shifting landscapes. The paper explores the *chars* (river islands) of Assam to investigate how an alternative methodology of mapping can render the temporal *chars* more visible and legible, and help dismantle fixed land-use typologies in the process. The paper develops an alternative cartography, as a prerequisite to explore the fluid *chars* and illustrate different ways of settling and occupying shifts. Such multi-scaler and interpretative mapping reveal how inhabitants navigate the territory using the landscape's capacity and challenges. In a territory where fixing and controlling land and water has been proven to meet its limit, the uncontrollable realities of *chars* illuminate the need to acknowledge the nuance and gradations of the landscape.

Introduction

Strict land-water distinctions have resulted from the introduction of cadastral maps and are the consequence of tax impositions on land. Land use planning has strengthened this distinction, that are articulated physically through embankments, dykes, etc. Continuously now, projects straighten these artificial edges and impose generic development models that fail to acknowledge the complex gradients of wetness that *char*acterize wet-lands (land that is wet), which support unique cultural and ecological systems. By attempting to engineer land-water edges, "these boundaries do not simply separate water from land but create water and land on either side of it as entities that can be mapped and commodified and as such coveted, made scarce, and violated" (Cunha 2019, p. ix). In recent years, sea level rise has called the boundaries of the recent past into question (Wolff 2021). In addition, this perception of land and water alienates and rob the landscape of their histories by extracting them from their socio-cultural setting (Lahiri & Samanta, 2014, p.513). Hence, there is a need for a new drawing format to "uncover realities previously unseen or unimagined" (Corner 1999, p. 89) at the margins of land and water.

The paradoxical environment of *chars*, composed of mud and silt, possesses immense potential for livelihoods, even as it poses uncertainties to its communities. As such, *chars* represent a compelling reality that is productive and destructive simultaneously. Therefore, this study investigates the *chars* of Assam with an alternative methodology that renders the temporal *chars* more visible and legible, and helps dismantle fixed land-use typologies in the process. In turn, it illustrates how attunement to the temporal can lead to a move away from the "sterile dichotomy between indigenous and western, or traditional and scientific knowledge"(Agarwal 1995, p.31). The paradoxical environment of *chars*, productive yet destructive at the same time, offers a unique opportunity to understand how "resistant and resilient people seek refuge in response to the statist consolidation of borders" (Scott 2009, p. 22) and explore "alternative forms of urbanism to productively transform and socio-culturally appropriate nature and the landscape in order to effectively guide their use, occupation and urbanization" (Meulder and Shannon, 2010, p. 70).

The study begins by illustrating the fluid and dynamic nature of 'charscapes' (*char* landscapes). Secondly, an alternative cartography is developed, as a pre-requisite to understand the shifting *chars*. Lastly, three cases illustrate how people settle with and within these shifts, making use of the assets that come out of these various conditions, and reveal a mobile way of living with nature, rather than against it. This understanding of the constantly shifting human and landscape ecology pushes to develop new ways of thinking about urbanism and categorization.

Fluid territories of *char*

As the river enters Brahmaputra Valley in Assam, the sudden flattening of slope and joining of tributaries carrying massive quantities of sediment result in an oscillating braided pattern creating

chars. They are extremely transient and can shift, submerge, disappear, and sometimes reappear over the years. *Chars* are neither land nor water but a uniquely fluid environment where the "demarcation between land and water cannot be well defined, or made permanent" (Lahiri-Dutt 2013, p1). Consequently, *chars* form a landscape in which no fixed or permanent boundaries on the ground establish limits. With one of the highest sediment yields in the world- 852.4 tons/km2/year (Lahiri and Sinha 2012), Brahmaputra River in Assam forms a network of braided channels interspersed with *chars*. [fig. 1] illustrates the braided nature of the river and hydromorphology which changes frequently due to natural causes like earthquakes, annual flooding and manmade causes like embankments and dams which try in vain to tame the river. *Char*, as a landform is born out of this dynamism.
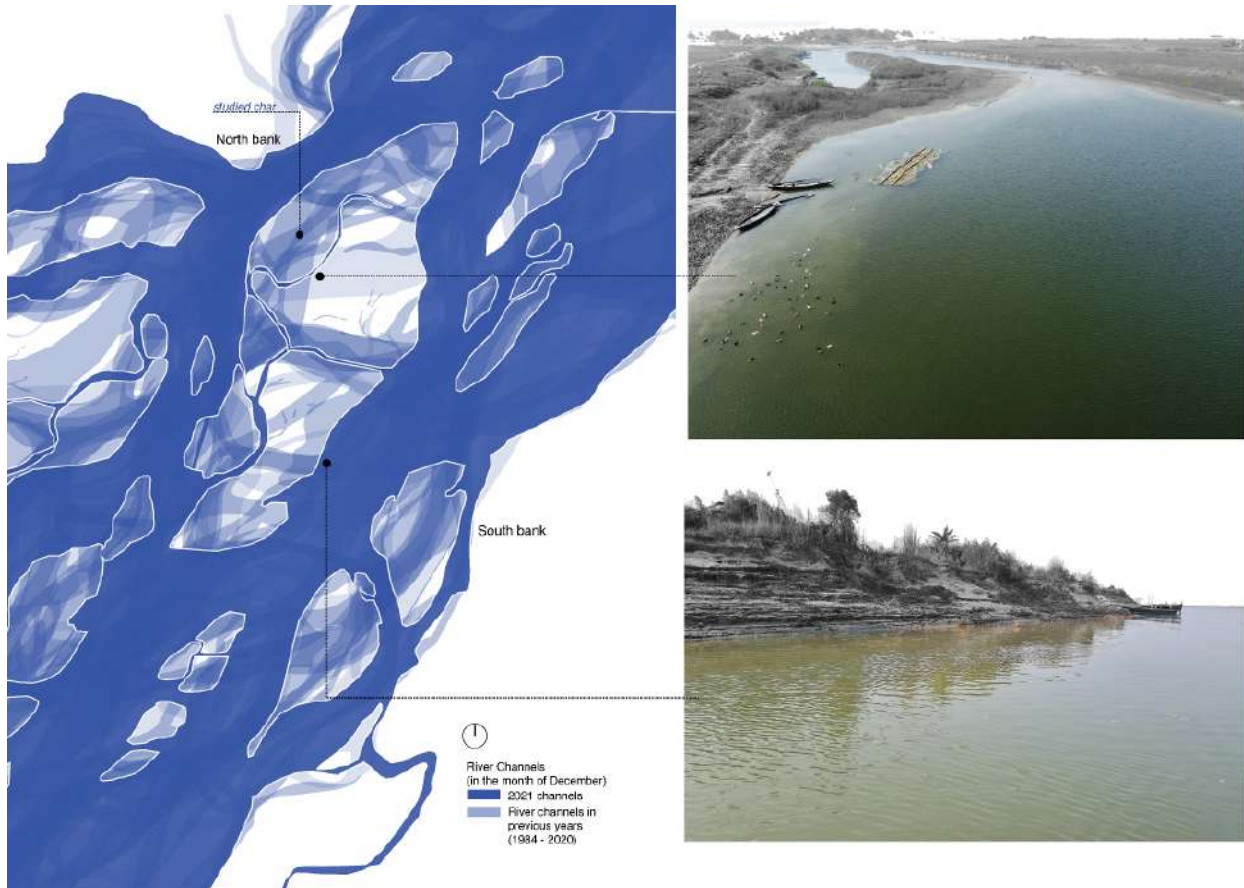
[fig. 1] Water movement. Overlaying river channels during major flood years illustrate the dynamic nature of water in the Brahmaputra Valley. Source: elaborated by author from satellite images in the month of December over the years (1984-2021) - Google Earth and GIS accessed on 3 Jan 2022 with images from fieldwork.
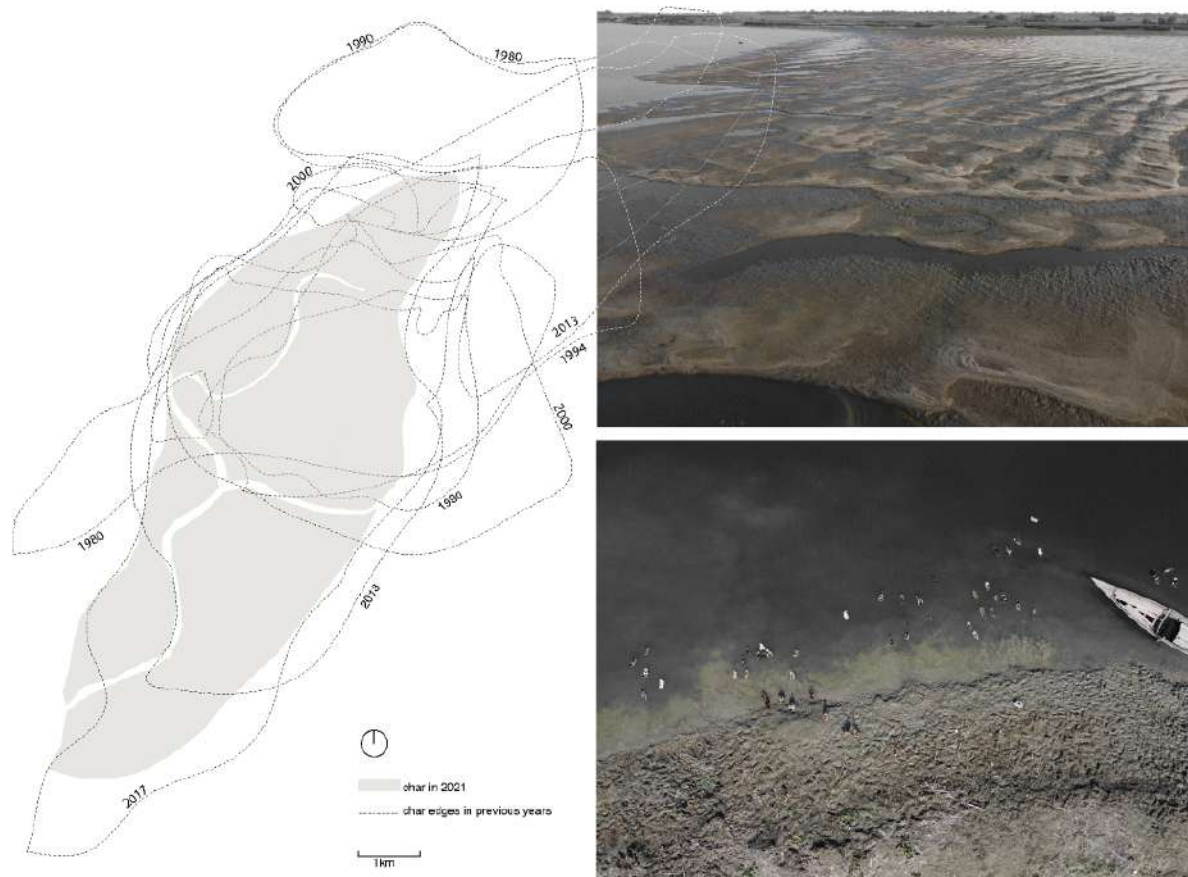
[fig. 2] Movement of *chars*. The dotted lines represent temporal edges during major flood years and comparison with site images reveals how the edge of land and water is a gradient of wetness rather than a single edge/line. Source: elaborated by the author from Google Earth and GIS data accessed on 5 Jan 2022 with images collected during fieldwork.

Between seen and unseen

The studied *char*, Birsing in the Lower Brahmaputra Valley[fig.3] is framed by Dhubri (the westernmost town of Assam) on the north, the porous India-Bangladesh international border on the West and the woodlands at the foothills of Khasi hills in the South. The region has the highest number of *chars* due to the flattening of the riverbed, widening of the river bed, and slowing down of the water's speed resulting in more silt deposition. Assamese Muslims make up the highest percentage of the *char* population here. The woodlands at the foothills of Khasi Hills in the South and watery borders with Bangladesh in the West serve as migration routes to reach the *chars*. The 2003-04 survey by Assam State *Char* Area Development Authority recorded around 12,000 inhabitants(in clusters of villages) living on the 951 hectares of Birsing *char* (Government of Assam 2004).

Until now, the *char*uas (people living in *char*s) have navigated the fluctuating territory by using the capacity and challenges of the landscape and occupying the margins of land and water, without being fully incorporated into the state system. The proximity to the international border and the Assam-Meghalaya state border makes Birsing a strategic location for the state. Engineering projects aimed at constraining and diverting water flows within embankments as well as a 19km bridge connecting the North and South banks are under construction[fig. 3]. With a major road (National Highway 127B) ending at each bank, the proposed bridge is crucial for the state to regulate trade across the river, which is mostly dependent on *char*uas and their boats in this part of the river. As the bridge spans large areas of *chars* where border conflicts occur between BSF (Border Security Force) and people crossing the India-Bangladesh border, the state agenda of control through infrastructure is apparent. The upper reaches of Brahmaputra underwent a similar process of infrastructure development(road and bridge construction across the Brahmaputra) and currently,

426

water routes are completely controlled by the state with no private boats allowed. Areas like Birsing *Char* are on the radar with such development plans of the state making the territory, and with its territory mastering the population within that territory through citizenship. When the state intervenes in the management of territories like the *chars*, the omission/erasure in state maps perpetuates violence with as much as nine percent of Assam's population who reside and move between *chars*, being excluded from any state record.
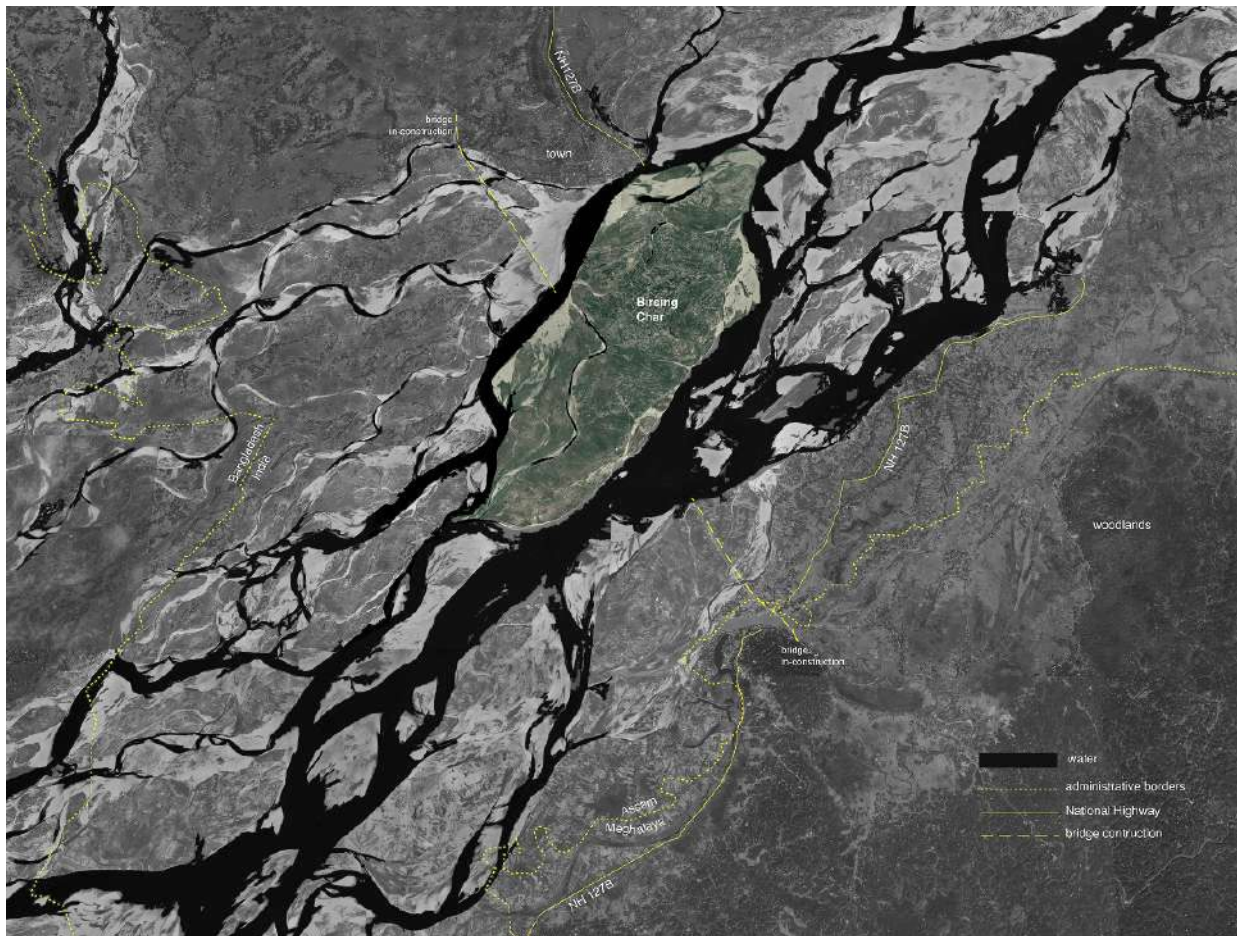
[fig. 3] Studied *char*. Birsing *char* is situated between the banks of Brahmaputra with close proximity to the Indo-Bangladesh international border and Assam-Meghalaya state border, holding a strategic location for the state for trade and security purposes. Source: Elaborated by author based on Google Earth imagery accessed on 5 Jan 2022.

The study focuses on the dynamic realm of *chars*, which have a historical context of migration for sustenance. In light of the dynamic and volatile nature of *chars*, conventional mapping tools are deemed inadequate for capturing their complexity. James Scott points out that "the cadastral map is very much like a still photograph of the current in a river"(Scott 2020, p.46) representing the condition at the moment the survey was conducted. In the absence of established cartography that adequately captures the volatility inherent in *chars*, it becomes necessary to construct a new framework that effectively incorporates the *char*acteristics and practices unique to these regions. Consequently, conventional cartography must be set aside to develop a cartography that incorporates entities that have been left off maps. By employing colonial instruments such as hydrology, the study engages in reinterpreting these tools to facilitate a deeper understanding of *chars*. This serves as a foundation for understanding how the different locational assets created by the water conditions, are exploited by the people that settle within them.
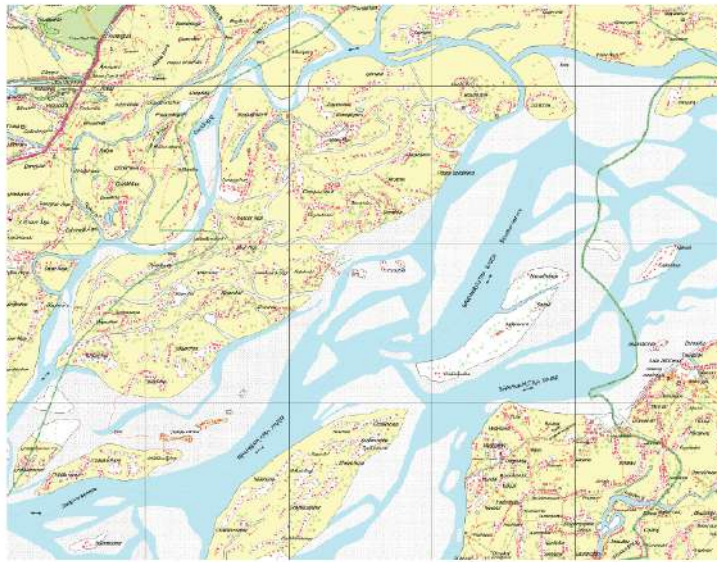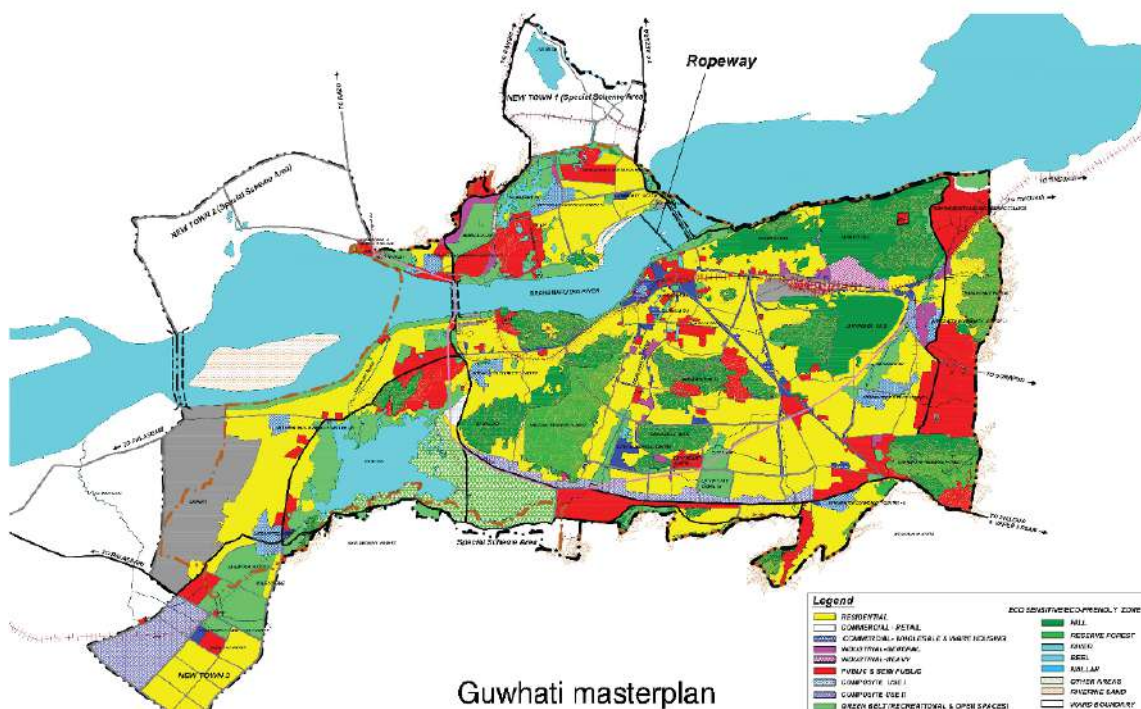
Survey of India map   Newspaper headlines

Guwahati masterplan

[fig. 4] Static maps and the violence they incite. Cadastral surveys and masterplan with colour-coded land use define fixed monofunctional uses. Territories like *chars* that do not fit into these maps are not represented and result in the omission of entire groups of the population who occupy temporal *chars*. Source: compiled by author from state maps from SOI(Survey of India), GMDA(Guwahati Municipal Development Authority) and news clippings.

Cartographic exploration of fluid *char*scapes
In order to adequately account for the *char*acteristics of watery territories like *chars*, a novel cartographic approach is required. As such, new mapping represents an opportunity to investigate alternative means of depicting the fluidity and dynamism of *chars* by combining quantitative datasets and inherent knowledge of the site. Specifically, these visualizations aim to conceive of *char*scapes as a distinct terrain that cannot be straightforwardly classified as either land or water.

Visualising shifts
Illustrating the dynamic nature of water in the Brahmaputra Valley, [fig. 5] highlight the shift of river channels over a longer period (between 1984 to 2022). Extracted hydrology data depict newer water channels in green, while dried/silted-up channels are highlighted in hues of red. The degree of change is indicated by the colour's intensity. For instance, darker red area lose more water (than

lighter red parts). These hydrologic data are combined with fieldwork in the section that documents shifting of the main river channel southwards post-1980s. The map clearly indicates more green extending towards the South bank depicting new occurrences as opposed to the drying up of channels near the North bank visible in red.
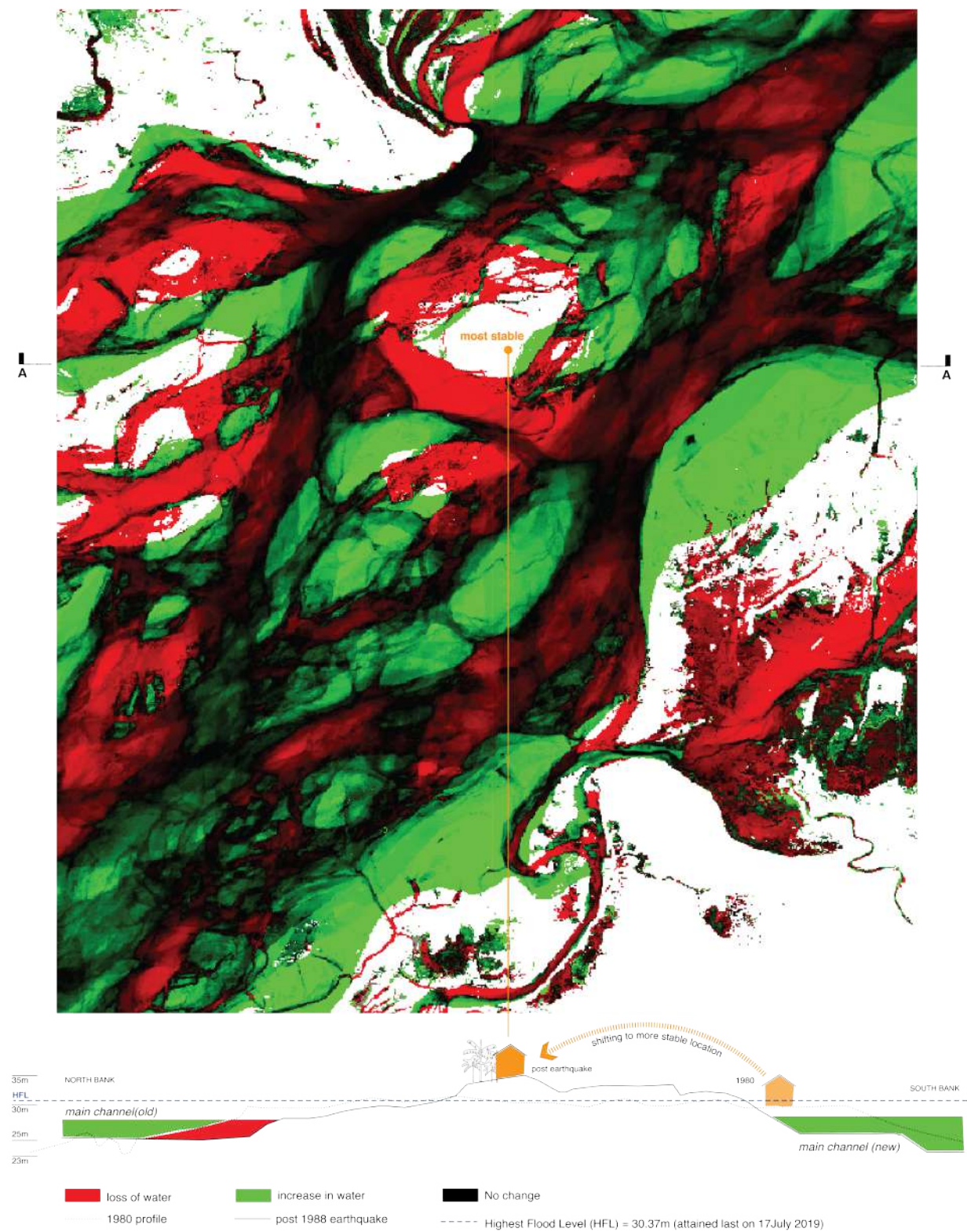
[fig. 5] Channel displacement. Source: Elaborated by author based on data from global-surface-water.appspot.com, flooding data from ffs.india-water.gov.in and fieldwork interviews.

This shift was initiated by a series of earthquakes and floodings between 1980-1990s[1] [2] brought up in several interviews on site. *Char*uas shifted their belongings along with cattle in their boats. Many set up temporary shelters in boats or dikes (higher grounds) waiting for the water to subside. Few shifted to the mainland where other family members reside. As the water subsided, many *char*uas returned to their lands. They initiated rebuilding their washed-away houses and eroded lands in another location on a higher ground deposited by the river. As one *char*ua laments "River lifts, river also drowns" (fieldwork 2021), and this cycle continues. It is apparent that the concept of property ownership and land is quite different in the uncertain *chars*. The new land deposited is considered a gift from the river and *char*uas accept it as compensation for eroding their previous lands.
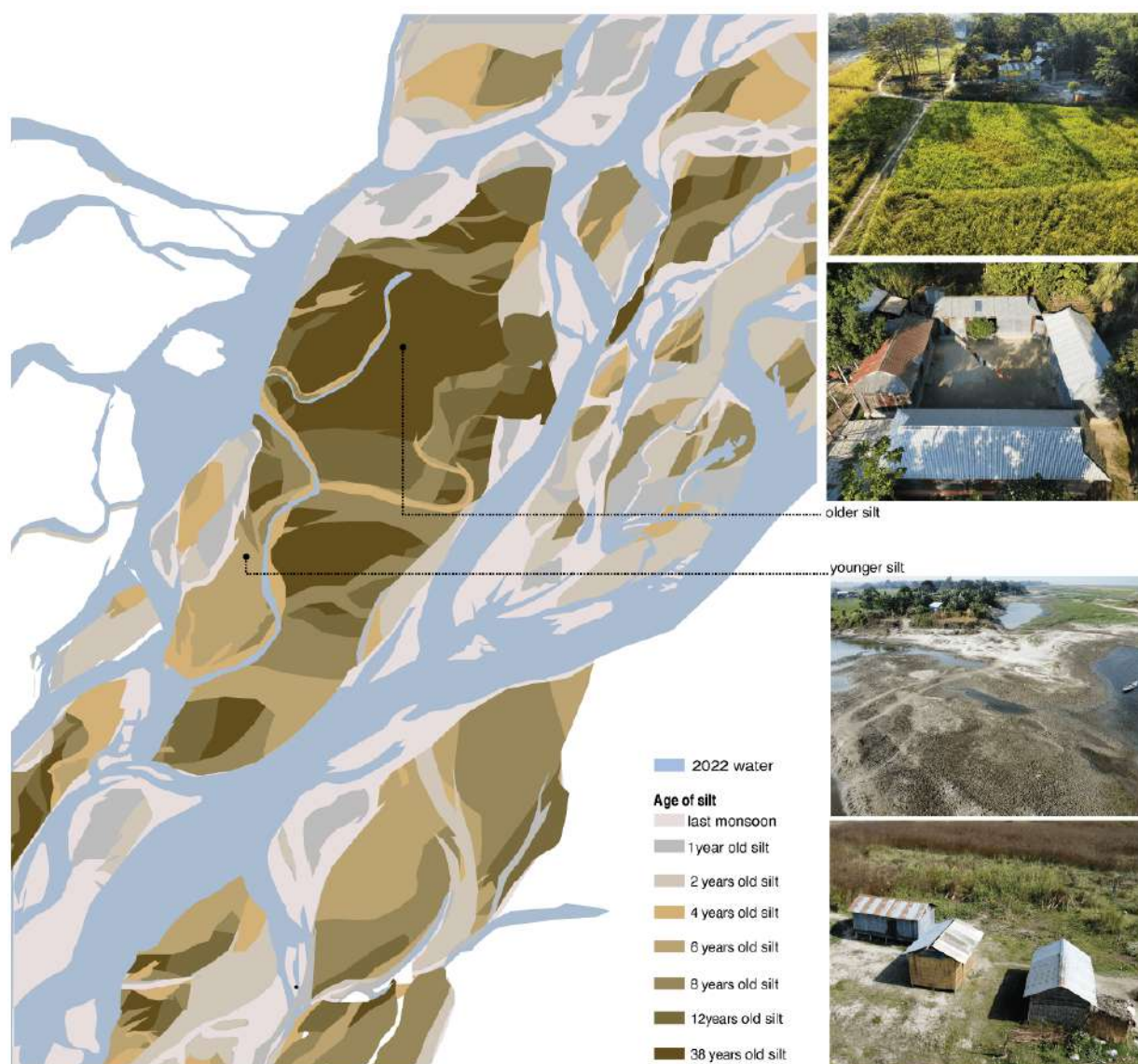
[fig.6] Settling in silt. Source: Elaborated by author based on satellite imageries from Google Earth accesses on 7 Mar 2022 and fieldwork.

As silt is deposited, vegetation grows on the fertile silt and loose silt gets stabilized over years of deposition and gets transformed into soil. In various shades of brown, [fig 6] shows the various age of silts on Birsing *char* in the year 2022. The darker browns located in the center of the *char* indicate the most stable areas where relatively permanent houses and fields are located. A look at the

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1 Assam experienced significant earthquakes in the years 1980(magnitude 6.6), 1984(magnitude 6), 1985 (magnitude 6), 1988 (magnitude 7), 1989(magnitude 6.4) and 1990(magnitude 5.8).

2 The change in the river bed during earthquakes can be linked to significant flood events including the 1984, 1988 and 1990 Assam floods. The floods in 1988 were one of the most devastating flood events in Assam's history. Heavy monsoon rains and the overflowing Brahmaputra River led to extensive flooding across the state, causing significant loss of life, displacement of people, and damage to engineering infrastructure and agricultural land.

fieldwork images on the right highlight the conditions of the most stable (darkest brown) areas in comparison to areas at the margins of land water. As *char*uas navigate the gradients of wetness, relatively permanent structures are constructed in stable parts and expanded into family homes with several family members over time while temporary single-unit huts, easy to dismantle, are erected in watery lands. This can be understood as a way of 'mobile' occupation of the territory, exploiting the various locational assets (that are fluctuating themselves) and hence generating a mobile form of living/dwelling.

Visualising flows and gradients
Chars are seasonal landscapes with different levels of water and silt within a single year. The Seasonality Map [fig. 7] show both permanent and seasonal water and illustrates the intra-annual behaviour of water during the year 2021. The permanent water is represented in dark blue and areas of seasonal water are shown in lighter blue. The dark blues are areas where water remains even in the dry season. The lighter blues reflect the water that spills during the monsoon from June until August. The resulting shades of blue/degrees of wetness are exploited for crop varieties that adapt to different levels of water.
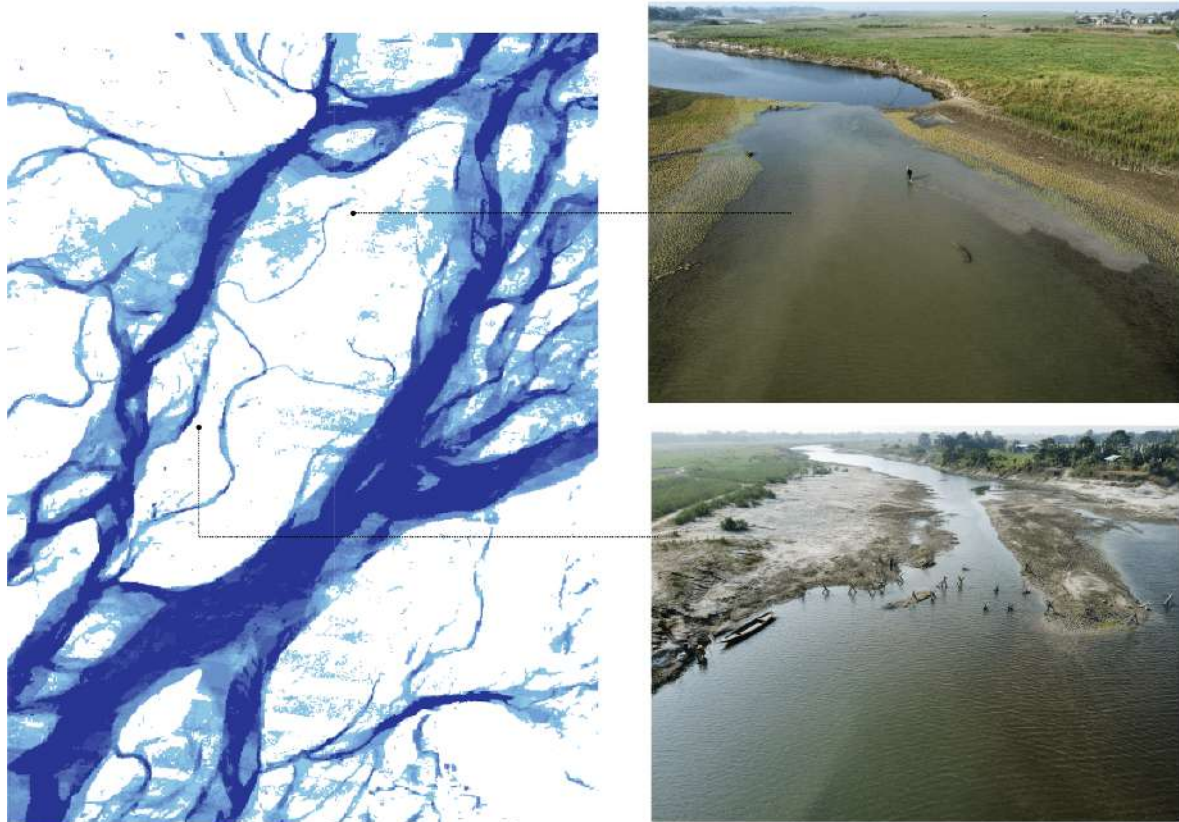
[fig.7] Seasonal waters. Source: Elaborated by author based on data from global-surface-water.appspot.com for the year 2021, flooding data from ffs.india-water.gov.in and fieldwork.

These shades of blue construct a gradient of landscape that reveals that the binary conception of land and water in *chars* is better understood as a continuum of varying degrees of wetness. Using dynamic mapping methods[3], [fig 8] maps the territory as an always-evolving domain with continuously shifting grades of wetness/gradients of so(i)lidness. By using a transition from lines to dots, the maps visualize the flows of water and silt to convey the gradients and so(i)lidness that make up the *chars*capes. This seasonality further steers the cropping patterns and agricultural festivals embedded in the social lives of *char*uas. Local names(in blue) linked to their uses, better reveal the nuanced degrees of such landscapes. For instance, boka is a wet mud with sticky and soft texture to it and is ideal for planting rice saplings. Usually after flooding water recedes, water

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[3] inspired by the Traffic Study project of proposed traffic-movement pattern (Louis Kahn 1952).

hyacinth grows on boka. It is malleable when wet and hardens when heated. So boka has various uses for *char*uas who utilize it to make utensils and coat mud floorings of their houses.
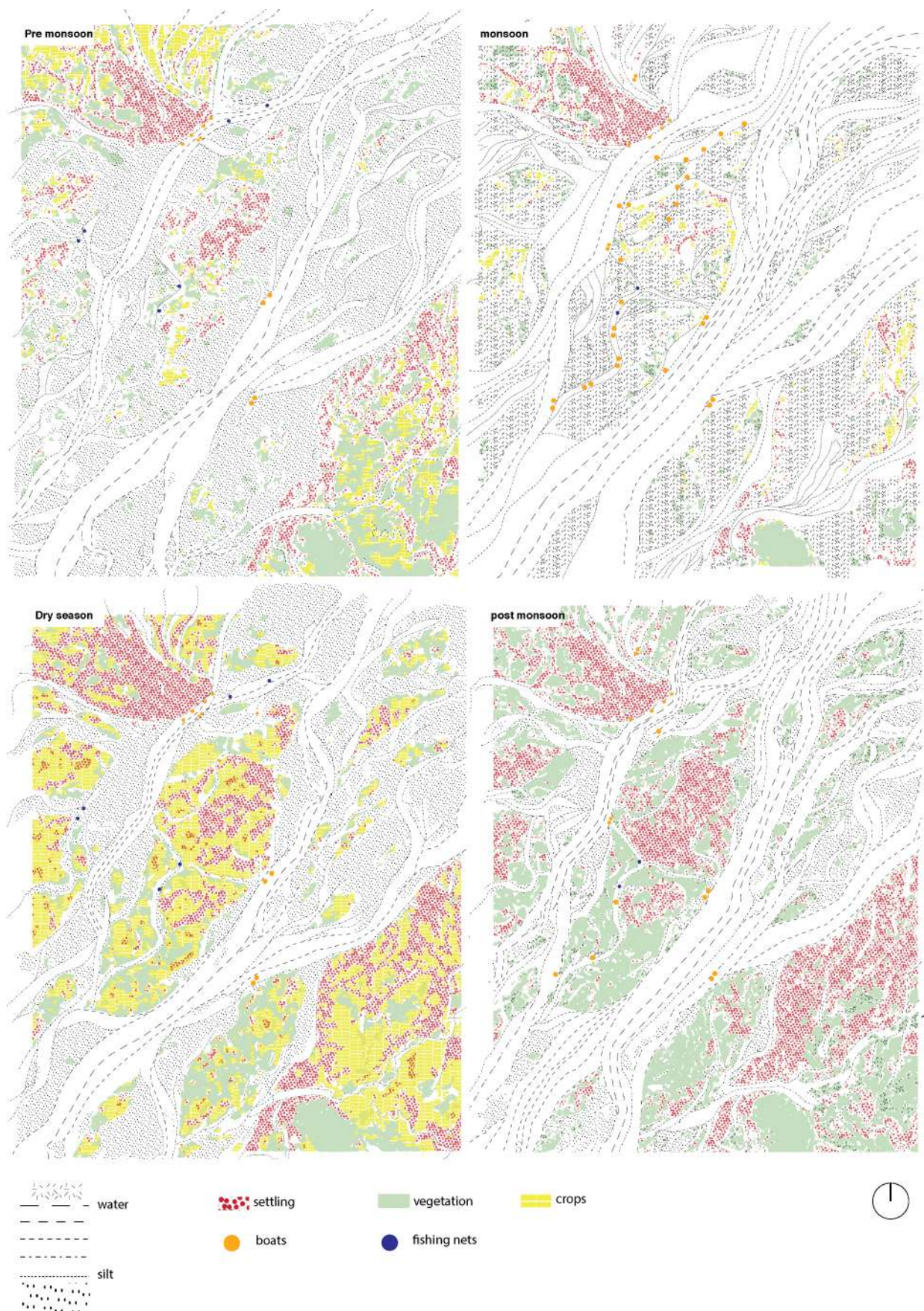

[fig.8] Gradients of water and silt. Source: Elaborated by author from Dynamicworld.app, satellite imageries from Google Earth, flooding data from floodmapping.inweh.unu.edu and fieldwork.

Settling in shifts and gradients

Occupation of the various gradients of wetness is dependent on the seasons. Seasonal changes occur even between the dry and monsoon seasons, which impact practices of occupations. The seasonal negotiations of making a productive landscape is a form of occupation. As the settlements, agricultural lands, and vegetation undergo transformations through the four seasons [fig. 9], notable is the use of boats and fishing nets that increase during the monsoons as opposed to settlements. As water recedes in the post-monsoon landscape, the fertile silt facilitates vegetation growth in the *char*. Settlements return during the dry season, and the silt resurfaces. The occupation of *chars* through different modes of occupations - growing crops, putting cattle to graze, erecting settlements, fishing etc. depends on how the landscape utilisation change depending on the silt, mud, water, and their gradations.

Pre monsoon

monsoon

Dry season

post monsoon

water

settling   vegetation   crops

boats   fishing nets

silt

[fig.9] Seasonal *chars*capes. Source: Elaborated by author from Dynamicworld datasets, satellite imageries from Google Earth, flooding data from floodmapping.inweh.unu.edu and fieldwork.
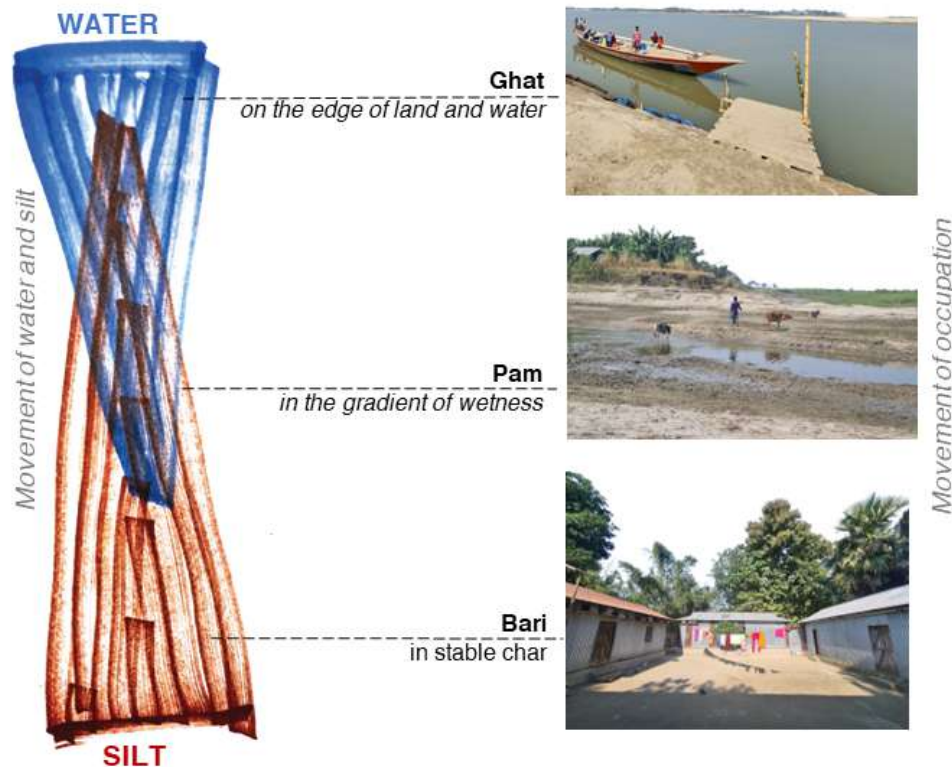
[fig.10] Three modes of occupation in a shifting territory. Source: Elaborated by author.

With an understanding of the territory as an always-evolving domain, three narratives of occupying shifts are explored. The understanding of how people settle with and within these shifts by making use of the assets that arise out of the conditions of the landscape, reveals a mobile way of living and negotiating with nature.

*Narrative 1: Ghats - occupations at the edge of land and water*
Ghats[4] are important links between *chars* and the mainland. Birsing ghat serves as the entry to the *char* and provides a window to understanding how the constantly moving edge of land and water is being occupied. [Fig.11] illustrates the transformation of Birsing ghat by a series of satellite images that capture the fluctuation of water and silt. The 2019 monsoon and subsequent floods resulted in the deposition of a considerable amount of silt on the *char*'s edge, which retained water even after the floodwaters had receded. When the 2021 flooding occurred, the water rushed into the crevices, creating a new river channel was created. This water route was convenient for the locals, who could now reach the town(on North bank within ten-fifteen minutes boat journey and a nominal fee of 10 rupees. However, during the year 2021, water reached higher levels than the *ghat* and buried it under significant silt, necessitating the relocation of the *ghat* to the western edge of the *char*. This new location increased the commute time to the mainland by three to four times. These cycles of relocations continue as water and silt significantly influence how people and goods enter and leave the *char*.

In close proximity to the dirt roads leading from the *ghat* to the villages, one can observe cattle grazing. These grasslands not only serve as pastures for the animals but also as a source of fuel and housing materials for the local villagers. Additionally, there are several patches of crops that can be observed in the vicinity[fig.11]. These crops serve villagers as an additional source of sustenance during the lean season. The integration of these practices within the *ghat* highlights the sustainable land use practices in enhancing the resilience of communities in the face of changing environmental and economic conditions of the *chars*.

The *ghat* is also a critical hub for economic and social activities, and a range of shops, parking spaces, and other amenities come up. These spaces are an integral part of the village's social fabric, providing a space for villagers to socialize and exchange news and gossip while waiting for the next

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[4] *Ghat* is referred to the connection on an Indian riverbank that provides access to the water, for example a landing for ferries.

boat. The vendors set up shops to earn a living from the shops, but they also contribute to the creation of a public space where social interactions can occur. Most village clusters are at a distance of 15-20 mins ride from the *ghat*. As such, many villagers park their own motorbikes and cycles next to the shops and entrust the vendors to keep an eye on the vehicles while they commute to the other side of the river. Additionally, a public shared car (known as *trekkers* by locals) system brings villagers to and from the *ghat*. It is interesting to note that the massive *trekkers* used for transportation, are assembled in Birsing from second-hand parts through the trading of motor parts across the India-Bangladesh border. The 4,000 km border is *char*acterised by a range of formal and informal crossings, which serve as essential hubs for trade and commerce, facilitating the exchange of goods and services between the two countries. Motor parts are among the most traded goods across the border, with a range of components, including engines, tires, and other parts, being exchanged. The trade-in of motor parts is facilitated by a range of sociocultural practices that govern the movement of goods and people across the border. In her work 'Drawing in the Dark', artist Shilpa Gupta writes about how the daily life in borderlands belies state intentions of India building a 4000km fence encircling its neighbour Bangladesh. As "the flow of people and goods continues, prompted by historic and social affinities, geographical continuity, and economic imperatives"(Gupta 2021, p. 17), a vibrant subversive economy exists in the *chars*. The interplay between social, economic, and cultural practices is essential to understand the practices of settling and moving at the edge of land and water.
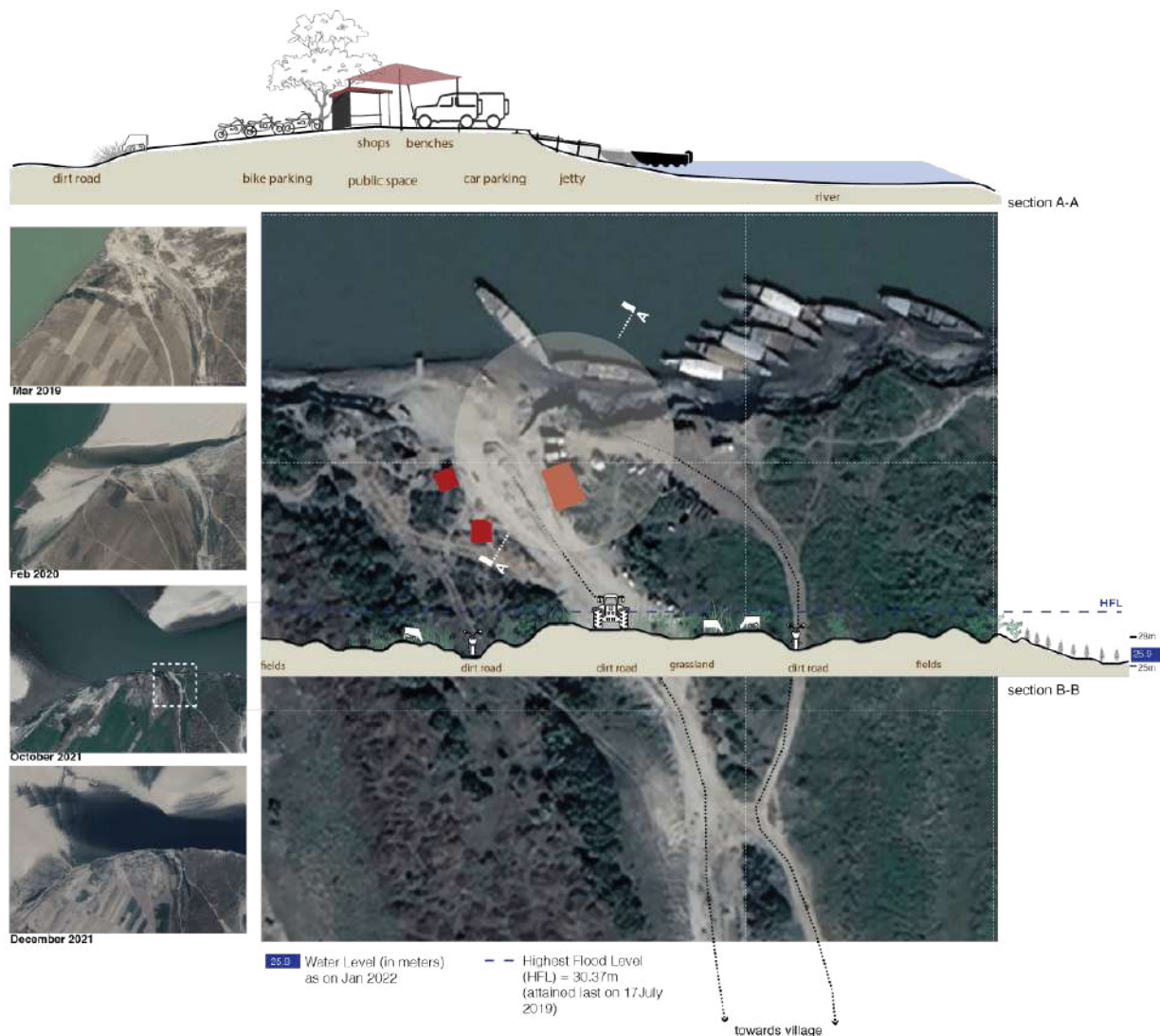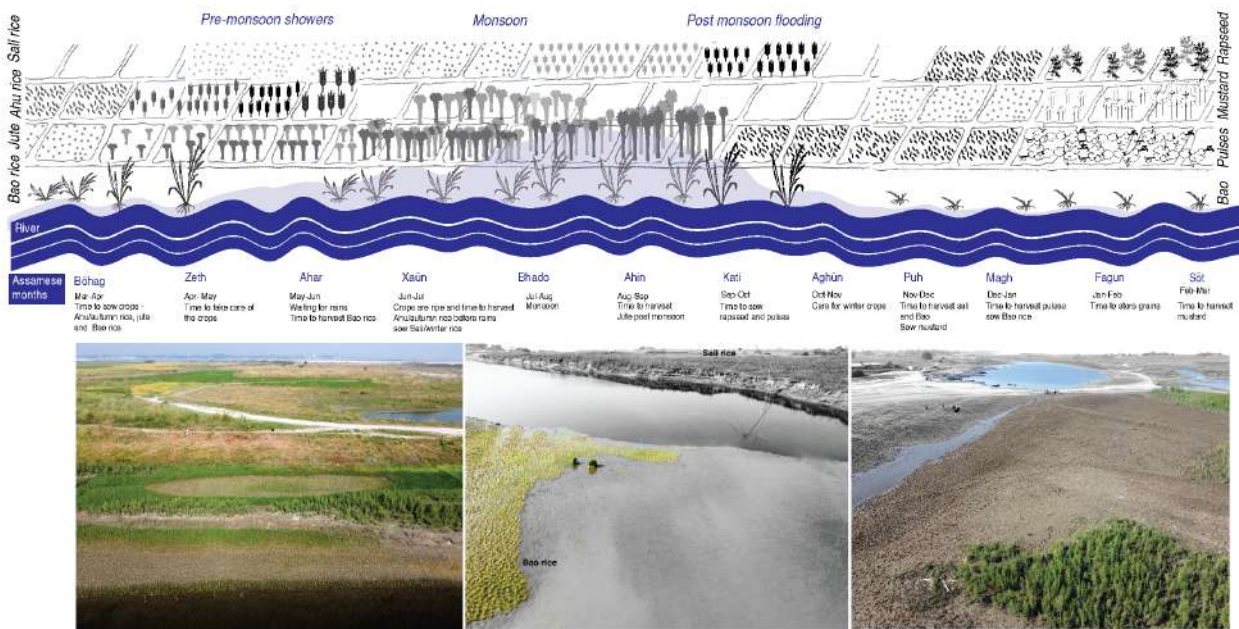

[fig.11] Birsing ghat. Source: Elaborated by author based on satellite imageries from Google earth accessed on 8may 2022 , flooding data from ffs.india-water.gov.in and fieldwork.

Narrative 2: Pams - moving occupations for productive landscape

Pam, in Assamese language is land taken up at a distance from home usually for temporary cultivation. Locals of Birsing village erect *pams* and engage in agricultural activities on the surrounding land. Owing to the recurring cycles of sediment deposition and erosion in the area, settlers have been compelled to relocate periodically. During the post-monsoon year 2022, *pams* are observed adjacent to a receding channel[fig.13]. The rhythmic patterns of flooding have instigated a nomadic way of life among the *char*uas, who traverse the region seasonally in search of fertile lands suitable for settlement and cultivation[fig14]. As the fertility of the soil diminishes after two to three years of cropping, the *char*uas abandon such areas and venture towards alternative tracts. However, the annual inundation of the region remains a natural process that replenishes the soil with river-borne silt, thereby enticing the *char*uas to reclaim abandoned tracts after a few years. Notably, the year 2019 witnessed a significant flooding event, with the river reaching its highest flood level (HFL) at 30.37 meters. Consequently, a new channel was formed, elevating the adjacent terrain. This transformation prompted the establishment of new *pams* in the following years around the vicinity of the channel, where fertile deposits were concentrated.

The cycle of cultivation is attuned to seasonal cycles and levels of water. Most prominent, Sali rice is grown on manicured permanent fields fed by rainwater and nourished by the silt from floods. Newly emerged land is typically covered in tall grasses and *Jhao bon*(catkin grass) is burned and sown with *ahu* (autumn rice) in March and April and harvested before the area is submerged under high water in July. The land is cultivated again after the floods recede. Post-monsoon, winter crops like rapeseed, mustard, or a variety of pulses are sowed, that are harvested in March. Since *ahu* rice yields are low, crop regimes are adjusted in the lower part of the flood plain to avoid the fury of the flood and use the early rains for growing paddy and the moisture and fertility generated after the flood to grow a good crop of rapeseed and mustard. The edge of the river channel is inundated only when the floods are high. This land is used to grow a special variety of rice with long stems known locally as *bao* [fig.12], which grows despite flooding and survives due to its long stem. *Bao* rice is grown specifically in *Baotalis*, low-lying areas regularly under water for several weeks by monsoon and floodwaters.
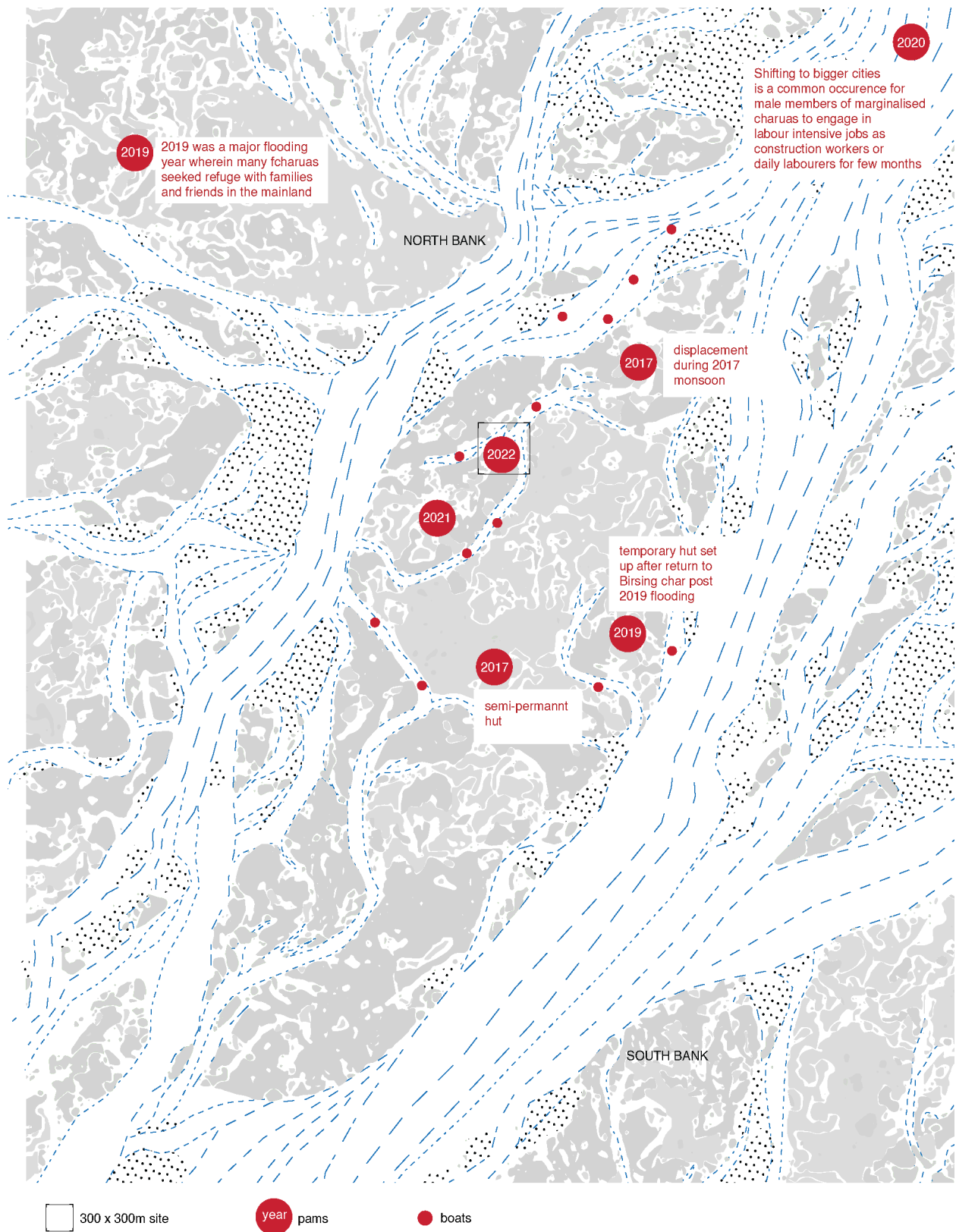

[fig.12] Productive landscape. Adapting to the seasons and water levels, different cycles of crops are cultivated. Source: elaborated by author from fieldwork.

[fig.13] Transformation of pam site and livelihood activities. Source: Elaborated by author based on satellite imageries from Google earth accessed on 8 may 2022 , flooding data from ffs.india-water.gov.in and fieldwork.

2020

Shifting to bigger cities
is a common occurence for
male members of marginalised
charuas to engage in
labour intensive jobs as
construction workers or
daily labourers for few months

2019

2019 was a major flooding
year wherein many fcharuas
seeked refuge with families
and friends in the mainland

NORTH BANK

2017

displacement
during 2017
monsoon

2022

2021

temporary hut set
up after return to
Birsing char post
2019 flooding

2019

2017

semi-permannt
hut

SOUTH BANK

300 x 300m site   year pams   boats

[fig.14] Migration pattern of studied pam. Source: elaborated by author from fieldwork.

438

Narrative 3: Bari - dwelling as territorial occupation

The concept of *bari*, commonly known as the home garden in Assam, is an agro-forestry practice whereby field cropping, livestock rearing, and the plantation of forest species are integrated harmoniously. This method has been deeply rooted in traditional homestead farming practices and has persisted since immemorial, providing supplemental sources that contribute to food and nutritional security and livelihoods. Within the dynamic landscape of the region, certain areas exhibit remarkable stability and are utilized for marketplaces, as well as the construction of essential public infrastructure such as hospitals and schools. These spaces also serve as shelters during periods of flooding. Furthermore, clusters of villages are placed on higher grounds in relatively stable locations. The most resilient sections of the *char* are predominantly inhabited by prosperous families who have resided in Birsing village for an extended duration and have made substantial investments to expand their residences. These families possess larger plots of land, boast a higher level of education among their members, and possess the means to relocate from their ancestral homes in the *chars* in search of white-collar employment opportunities. Nonetheless, the ties within the community remain strong, and Birsing continues to hold significance as their familial abode. For instance, consider the case of an individual within one of these families, an extensively educated engineer, who frequently transitions between his occupation in Dubai, his family residence in Dhubri town (located on the north bank), and his ancestral home in Birsing *char*.
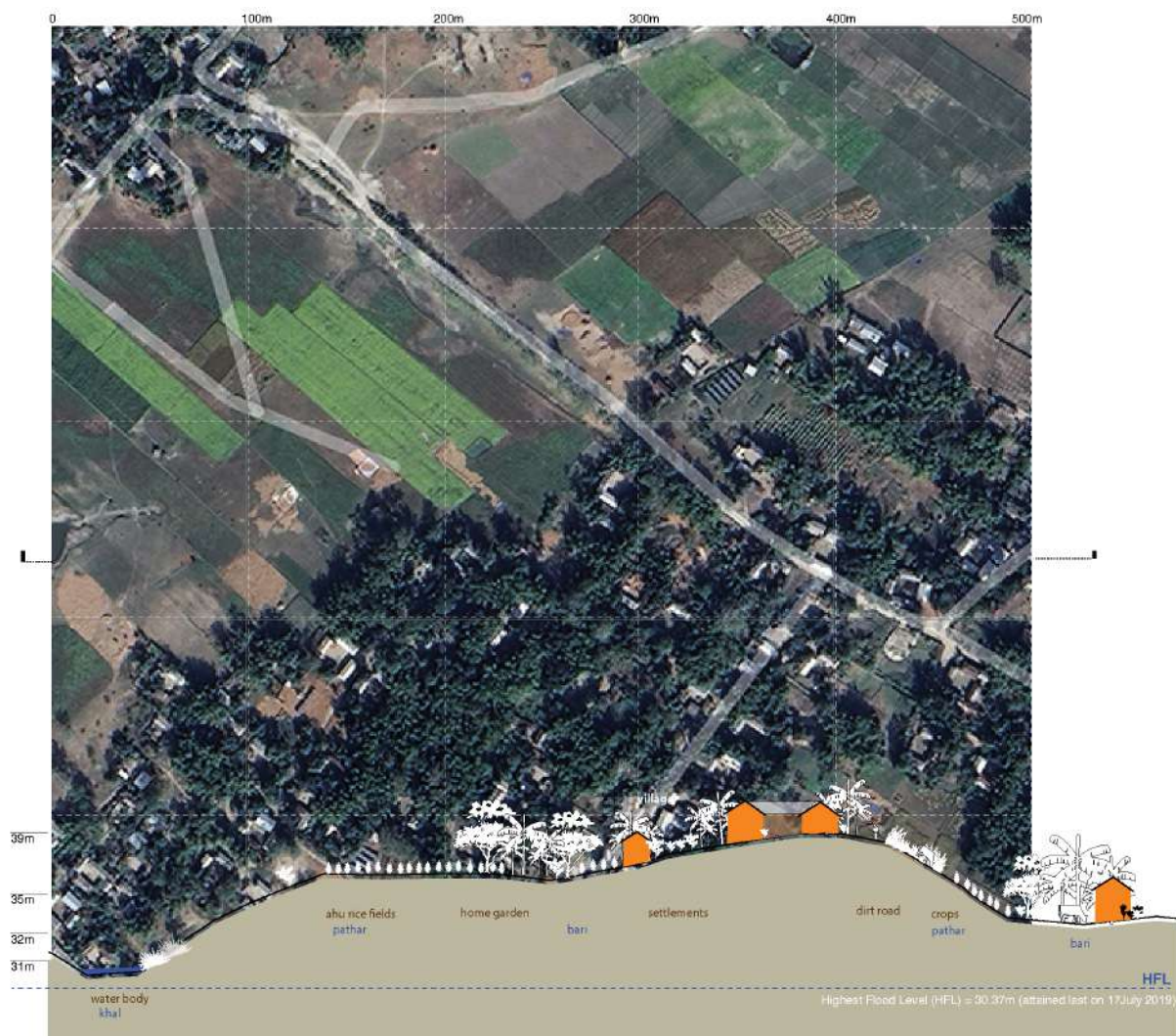
[fig.15] Bari in interiors of Birsing *char*. Source: elaborated by author from fieldwork.
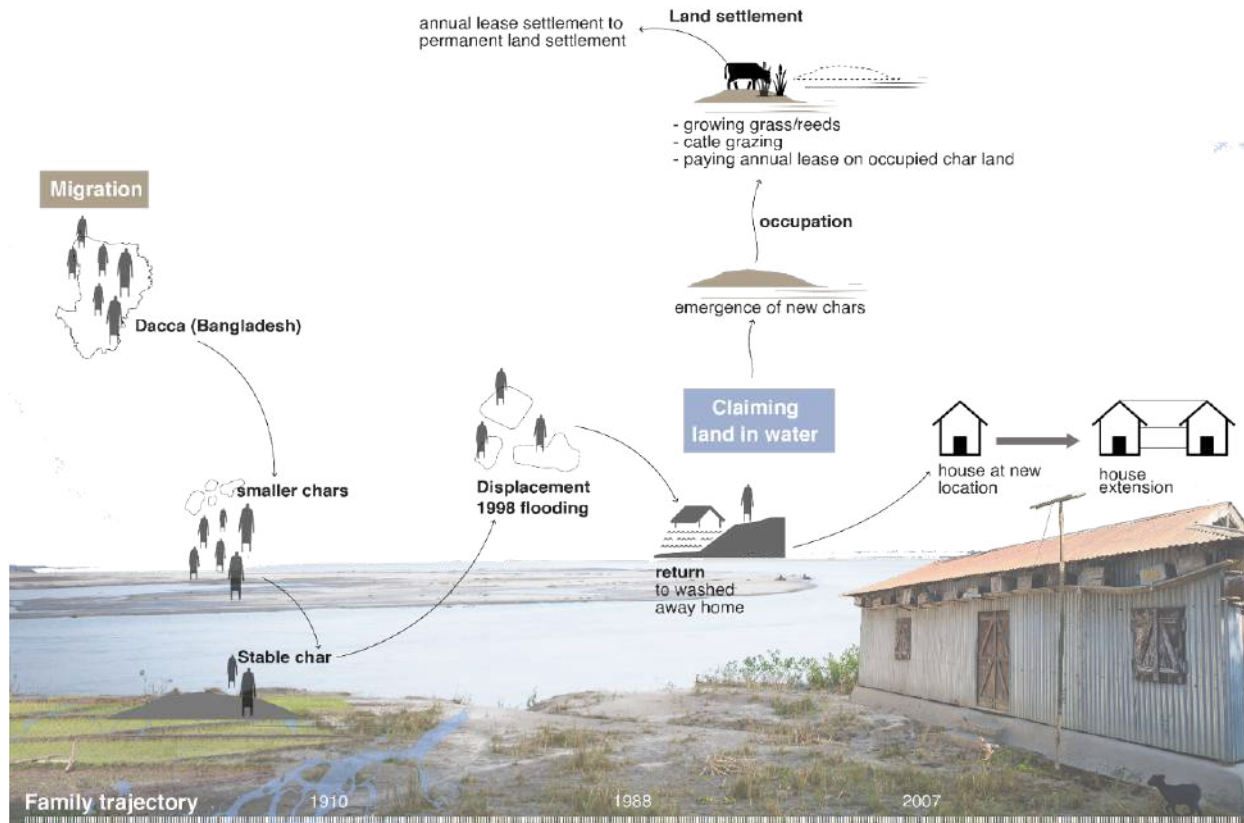
[fig.16] Family home. Source: elaborated by author from fieldwork.

Most *char*uas in this part of the village have migrated from Dacca, which is now in Bangladesh, across the Indo-Bangladesh border. The river and its various channels play a crucial role in facilitating the border crossing, as individuals hop from one *char* to another until they reach the main channel or a relatively stable *char* with community ties, where they can settle down. By examining the migration patterns of a specific family since their arrival in Birsing, it is evident that multiple generations have moved in and out of their ancestral home. After their ancestors migrated to India in the early 1900s, the family moved around but ultimately chose to settle in Birsing *char* due to community connections. To adapt to the annual flooding, those residing in Birsing *char* developed strategies such as relocating to raised platforms or staying in boats until the floodwaters receded. However, the severe flooding in 1980 displaced the family, and they sought refuge with friends on the mainland near Dhubri town before eventually returning to the *char*. Since the land had eroded significantly, they constructed a new house a few hundred meters away. Following the 1980 flood, the river changed its course, moving the main channel southward away from Birsing *char*. Subsequent flood events had lesser impact, and the family recognized the increased stability of the land, prompting them to expand their house to accommodate more family members. While newer generations built more permanent homes in nearby towns, the house in the *char* [fig.16] continues to serve as their ancestral home.

The occupation of newly emerged *chars*[fig. 17] demonstrate the organic system of claiming land in water. When a new *char* emerges with sandy deposits, *charuas* are cautious that it might not last out the season. However, loamy soil with sediments could serve a shorter cycle of rice or lentils during the monsoons. Newly emerged land during the dry season (winter months) is swiftly cultivated or cattles are left to graze on *kohuwa bon* (catkin grass) that grows tall and makes the soil firmer and fertile. Interviews during fieldwork revealed that it is generally accepted that new *chars* formed in the continuity of one's land are considered as an increment to the land of the owner. Newly emerged *chars* belong to whoever occupied and cultivates it. Strategies for claiming range from growing crops to grasses to converting silt to the soil as well as releasing cattle to feed on the naturally growing reeds that stabilize the *chars*.

In numerous instances, a rental fee is remitted by the individual who pioneers the exploration of the newly emerged *char*, to the revenue department. This nominal payment facilitates the acquisition of an *eksonia patta*, which is an annual lease receipt. Remarkably, this nominal remittance persists even if the *char* land becomes submerged or succumbs to erosion in subsequent years because these

receipts play a crucial role as legal evidence during the periodic surveys conducted by the Revenue Department, which occur every 10-12 years. Consequently, the landowner is afforded the opportunity to select an alternative *char* in close proximity and convert their lease into a *miyadi patta*, thereby establishing permanent land ownership. These practices are adhered to even in the absence of visible land, thereby ensuring occupation despite the lack of physical territory. By tracing the migration patterns along shifting *chars*, the strategies of dwelling as a form of territorial occupation become apparent.

[fig.17] Migration pattern of one family in Birsing *char*. Source: elaborated by author from fieldwork interviews, December 2021.

Towards a nuanced understanding of fluid territories

In the face of the current environmental crises, this paper highlights the need to carefully consider fluid landscapes with shifting occupations. The paper aimed to develop alternative cartography that can render the temporal *chars* legible. This is a pre-requisite to understanding how the different locational assets created by the water conditions are being navigated. An exploration of the three cases of settling highlights how *charuas* navigate the *chars*capes by embracing the assets derived from environmental conditions. These cases illustrated a mobile way of living with nature, fostering a harmonious relationship between human communities and their natural surroundings. These visualisations serve as archetypes, highlighting the rationality inherent in the mobile way of living and navigating shifts within *chars*. The rationality of such an approach becomes evident in the context of inhabiting *chars*, where *charuas* demonstrate superior skills in engineering their landscapes compared to conventional engineers who primarily rely on embankments and dams in attempts to control and manipulate rivers. Thus *chars*capes possess potential lessons to illustrate other ways of settling, thus contributing to alternate forms of urbanism.

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Dakar is leaking. Mapping changes on the territory of urban drainage services through time.

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Throughout time, Dakar's urban landscape has been shaped by ever-renewing infrastructures to meet its growing societal needs. Along with this transformation, stormwater and waste-water drainage services are put under pressure. As flooding events take over various parts of the city throughout the year, urban planning strategies urge to find a response to health and living issues. Hereby, attempts are made to address environmental challenges like drought and pollution. Though these changes are being pushed by institutionalized systems, numerous movements in which alternative actors participate have emerged. A historical tracing of hidden layers of the urbanized area reveals the significant role of citizens in drainage services. Yet, marks on the territory have faded over time. A better understanding of these transformations in the past could contribute to tackle current and future challenges. In the role play between citizens and the drainage system, the urban setting proves its undisclosed importance. The impact of the spatial characteristics (e.g., density, connectedness, and morphology) of these transformations is to be understood.

Environmental challenges in the Sahel. Senegal is flooding

During the past 40 years, major floodings have been occurring in numerous African countries (Leclercq 2020; World Bank Group 2010). Specifically, West African areas in the semi-arid Sahelian[1] region suffer more and more from changing environmental circumstances. Due to population growth and the strong urbanization trends, these flood-prone areas are increasingly at risk (Sy, Frischknecht 2020; Wade, Faye 2009; World Bank Group 2022). This problematic inextricably involves drought, pollution, and recharging shortages of aquifers. In Senegal, floods have affected up to 600.000 people annually between 1980 and 2008, seriously harming private property as well as urban infrastructure (World Bank Group 2010). Since, this calamity appears to have made a permanent home, wiping off the map entire neighborhoods (IFRC 2022). In 2009, more than 88 million euros in damage was noted, of which the biggest part affected peri-urban[2] areas (USAID 2017). Ten years later, heavy rains forced almost 9.000 citizens to abandon their homes (World Bank Group 2022). In addition to the increase in scale, a growing frequency of flooding occurrences is notable over time (Leclercq 2020). The expected growth in Senegal's urbanization pattern – moved by climate migration and a substantial demographic growth of 2.5 percent per year – will continue to put pressure on the water demand and disposal (Wade, Faye 2009). The needs of people and nature are intertwined. Without careful planning that takes the water supply and drainage into account, the expansion of urban areas may make environmental issues problematic. The segmentation of actors makes it difficult to determine who is responsible for implementing preventive measures, leading to a lack of clarity in water governance.

Two trends of transformation: towards alternative actions and integrative operations

Globally, institutional drainage systems prove little flexible solutions in response to the growing environmental challenges. Therefore, two trends of transformation can be identified in the management of urban water drainage (Dobre, Vinke-de Kruijf 2018; Grassini 2017; Mahaut 2009; Schaer 2015). As the technocratic (centralized) drainage systems generally show high maintenance costs, the first trend moves towards the implementation of alternative actions (e.g., the gradual renovation of infrastructures through revitalization projects). Hereby, more attention is drawn to the ecological circumstances and physical setting by the implementation of small-scale and site-specific actions (de Graaf and van der Brugge 2010; Dobre, Vinke-de Kruijf 2018). The second trend is characterized by the inclusion of citizens in integrative operations. During the years, academics started to acknowledge the importance of the citizen as active participant in service production (Brandsen, Steen 2018). Reinforced by literature recognition, opportunities of

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1 The Sahel is a region of Africa bounded on the north by the Sahara Desert and on the south by savannas.
2 The peri-urban is a mixed territory immediately adjacent to a city or urban area.

interaction with local policies got conducted (Benjamin and Brudney 2018; Ostrom 1973). As a result, neighborhood resilience and safety prove to enhance. Jaglin (2004) describes the objectives of integrative operations – applied to water governance – as follows: to meet the demand of population effectively, to promote flexible social learning methods, and to guarantee long-term commitment of population in management. However, it is still unclear how these trends affect the long-term viability of urban drainage systems (de Graaf and van der Brugge 2010; Faldi, Rosati 2021; Schaer 2015).

Integrative operations in Senegal: key actors and the decentralization process
Since its independence in 1960, Senegal knows an institutionalized water management separating water in three different flows – drinking water, waste-water[3], and stormwater (Galletta, Mouhoub 2021). From 1983, the state-run *Société Nationale d'Exploitation des Eaux du Sénégal* (SONEES) was responsible for both the distribution of drinking water and the implementation of waste-water networks (Ba 2006). Local authorities were however responsible for management and maintenance. In 1995, a policy reform marks an important turning point (Galletta, Mouhoub 2021). In response to the dysfunctionality of the water sector, the World Bank invested in stormwater drainage infrastructure. It aimed to break the public sector's monopoly by bringing water in the category of market goods (Banque Africaine de Développement 2012). To this end, SONEES was divided into three structures: a public establishment responsible for managing the national water resources (*Société Nationale des Eaux du Sénégal* or SONES), a private company producing and distributing drinking water (*Sénégalaise des Eaux* or SDE – now Sen'Eau), and a public establishment in charge of collecting and treating waste-water (*Office National de l'Assainissement du Sénégal* or ONAS) (Galletta, Mouhoub 2021; Guéyé 2012; Leclercq 2020). However, the restructuring to privatization is questioned as it leads to a model in which profit is prioritized (Ba 2006). Peri-urban and rural zones require more infrastructure costs than urban poles, where billing and collection of water rates are more effective. Thus, urban areas gain the most from the investments. Accordingly, while ONAS oversees primary and secondary waste-water networks, peri-urban areas are left out. Here, actors at municipality level are in charge – despite having few resources (Schaer, Thiam 2017). Regarding stormwater management, the *Commission Nationale de Gestion Prévisionelle des Inondations* was established in 2001, integrating all agencies involved in flood management (Lo 2013). Its goal is to facilitate stormwater drainage out of the city. These concerns are mainly addressed through urban restructuration projects (Bottazzi, Winkler 2019). *Agence de Développement Municipal* (ADM) is responsible for creating a master plan in flood-prone areas (Schaer, Thiam 2017). Founded in 1997, its aim is to curb corruption and centralize the management of large-scale drainage projects. Recently, the *Direction de la Prevention et Gestion des Inondations* (DPGI) was established to create a political environment that brings together all departmental actors involved in flood management (Bottazzi, Winkler 2019). Yet, peri-urban neighborhoods are largely excluded. The lack of resources of local municipalities forces other actors – such as citizens and non-governmental organizations (NGOs) – to operate (Schaer and Hanonou 2017). As a result, Senegal is marked by an entangled dynamic between local and institutional water managers. Accordingly, community management slowly became a standard approach (Galletta, Mouhoub 2021). The trend towards integrative operations is therefore further elaborated in the scope of the text. Senegal embarked on a decentralization process[4] with benchmark acts in 1972, 1996, and 2013 (Faye 2008). In doing so, the regionalization of urban planning was encouraged (World Bank Group 2018). Following programs indicate how this decentralization process got translated in water management policies over time: for decades, the *Plan Directeur d'Assainissement* (PDA) promoted participation of citizens in planning and management of waste-water systems (Leclercq 2020). Issued from 2002 to 2006, the *Programme d'assainissement des quartiers péri-urbain de Dakar* (PAQPUD) aimed to put in operation a co-management model between ONAS, municipalities, and civic organizations (Norman, Scott

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3 Research on water comes with a specific jargon. In literature, wastewater is considered both a polluted waterflow and a flow in which water is used as a means of transport for waste. In the latter case, water is rather considered a 'flushing agent'. The use of language varies, allowing friction between different interpretations. A reflection about the meaning of wastewater brings forward its problematic artificiality. To question its impact, the non-natural identity of the word is stressed in this text through its notation – as waste-water.
4 A controversy arises between the introduction of a centralized infrastructure and the decentralization process. This will not be elaborated further in this text since the focus lies on participatory management that is in line with this decentralization.

2011). Most recently, the *Projet de Gestion des Eaux Pluviales et d'Adaptation au Changement Climatique* (PROGEP) tried to reduce flooding risk in peri-urban areas, focusing on a drainage system per watershed[5] (ADM 2013). Hereby, it put in place a local committee to coordinate the PROGEP and maintain realized infrastructures. Citizen initiatives (e.g., collective savings for drainage pipes and local maintenance actions) are thus deployed progressively for the creation and maintenance of secondary and tertiary drainage systems (Bottazzi, Winkler 2019; Galletta, Mouhoub 2021; Pezon 2018). Despite the launch of the decentralization process, its competence is not fully implemented in the drainage and sanitation sector. The institutional nature of the framework does not allow a fully operational principle of participation at the local level. Citizens still express dissatisfaction in the quality of services (i.e., pollution and drainage systems congestion resulting in water stagnation) (Galletta, Mouhoub 2021).

Unraveling the urban décor. Towards a balanced urban 'water machine'

A better understanding of integrative water management throughout the transformation to resilient urban areas is being developed (Dotti 2016). Considering that cities continue to expand while crossing nature's boundaries, the interrelation between citizens and the territory is a crucial subject of study. The spatial context in which drainage services are embedded plays a significant role in this participative service production (Ranzato and Moretto 2018). Yet, it is still unknown how. This study aims to advance knowledge on the setting of the changing 'water machine'[6]. An analysis with respect to the theoretical transition framework is done to more accurately detect and examine changes over time.

Transition theory. The spatial dimension of change in integrative water drainage management
The idea of 'moving toward sustainability' is connected to transition in literature on societal development (Geels 2011; Köhler, Geels 2019). According to Markard et al. (2012, pp.956), this sustainability transition is generally defined as "a long-term, multi-dimensional, and fundamental transformation process through which established socio-technical systems shift to more sustainable modes of production and consumption". Various studies discuss and recognize the link between flooding problems and urbanization (Leclercq 2020; Nguirane 2016; Wade, Faye 2009). The metropolitan area of Dakar is by far the largest urbanized area in Senegal and thereby the biggest victim of floodings (Galletta, Mouhoub 2021). A projection of this framework on Dakar's drainage system and its changes over time can provide insights into its sustainability. One of the approaches of sustainability transition is the multi-phase concept (Loorbach and Rotmans 2006). The transition is hereby divided into four phases – namely predevelopment, take-off, acceleration, and stabilization. This division helps to observe the changing system and allows to identify useful patterns that lead to success or breakdown. However, to comprehend changes in the production of an urban drainage system, an understanding of how they relate to their territorial context is essential (Geels and Schot 2007; Köhler, Geels 2019). Academic research on the geography of sustainability transitions is lacking (Coenen, Benneworth 2012; Markard, Raven 2012). It is thus still challenging to gain understanding of the spatial context and scale of practices going through a sustainability transition (Gimenez-Maranges, Breuste 2020). This work is therefore approaching the changes in Dakar's urban area from a spatial perspective, supported by the claim that more work needs to be done to integrate the socio-ecological and geographic dimensions of change (Raven, Schot 2012). As research on societal transitions lacks a general understanding of the role of scale and geography, a study across space and time is required (Köhler, Geels 2019). Here, the spatial characteristics from the co-production framework like settlement type, housing density, morphology, and connectedness are used as guide (Faldi, Ranzato 2022; Faldi, Rosati 2019). Consequently, the research interest is the selection of place-specific examples in which the spatial characteristics of these transformations are detectable. This work thus aims to develop an understanding of how and at what scale the spatial configurations of the urban area (i.e., change in building morphology, density, network, access to service, etc.) influence the waste-water and stormwater services and

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5 A watershed is an area of land that drains into one body of water – such as a river or lake.
6 The 'water machine' refers to the intertwined network of artificial and natural water flows.

conversely. In addition, it also looks for the internal changes of the drainage service (i.e., the device and technology).

Methodology: the historical tracing

The first signs of flooding in Dakar only date back about 30 years (Wade, Faye 2009). Yet, the aim is to understand this issue looking at its long-term history – inextricably intertwined with the urbanization process. The link between the urban environment and flooding can be perceived in space and time. Nevertheless, it is still unclear what scale and which spatial configurations to look at to get a comprehension of change according to the transition framework. Therefore, 'layers' of spatial information on the scale of the urbanized area of Dakar are collected and superposed. This accumulation or 'palimpsest' consists of layers from different source types. An introductory map serves as base layer and shows the most recent areas that are prone to flooding. An excavation of historical layers of the urban fabric aims to give the outline of the history of Dakar's urbanization and most impactful infrastructural changes. Adding this to a collection of geographical and hydrological layers and the base layer allows to put in relation the floodable areas, the natural drainage system, and urban infrastructure. Then, problematic zones are highlighted and categorized according to three main causes. The spatial superposition is done through literature review, supplemented with (historical) maps and information gathered from fieldwork experiences (i.e., photo series, and drawings during urban walks). Subsequently, key actors are identified for the areas that experienced flooding. For two of the causes of urban flooding, an example is briefly discussed in which citizens play an active role. Hereby, the scale and spatial configuration are defined. One of these cases is further elaborated, identifying the change in the spatial characteristics of the built environment and the drainage system through map analysis.

Dakar as forerunner in a 'water-shy' story

Since the end of the 1980s, the popular neighborhoods of Dakar have been affected by floods (Wade, Faye 2009). A combination of human and natural factors is to blame. It is notable that earlier floods are mainly situated in the west of the peri-urban area while recent floods occur in the east. A significant mobilization of civic organizations has intervened to provide solutions (Diop 2010; Streule, Karaman 2020). Although the delineation of the study area is further explained, a clarification can be made and visualized when explaining the stated boundaries of Dakar [fig.1]. With respect to the discussed flooding problems, the peri-urban area of Dakar is mainly at stake. Four out of the five departments are covered by this area, namely Guédiawayé, Pikine, Keur Massar, and Rufisque – referred to as the peri-urban. The department of Dakar falls outside the discussed area because of its high elevation and extensive drainage system.

A historical tracing of Dakar's natural water system

Regarding the floods, a description of Dakar's natural geographic and hydrologic system is elaborated, based on map analysis and the works of Faye et al. (2019), Laaroubi (2017) and Nguirane (2016) [fig.1]. The urbanized area has continued to spread regardless of its geologically diverse surroundings. The topography of the Cap Vert is the result of several million-year-old volcanic activity. The western point lies 20 meters above sea level. Because this plateau consists mainly of a thick layer of volcanic deposits, little flooding problems are experienced. The remaining part of the peninsula which connects the Cap Vert's plateau to the continent can geographically and hydrologically be divided into a northern and southern watershed. A freshwater aquifer – known as Thiaroye[7] – maintains humidity in the middle of this area's depressions – called Niayes – for most of the year. The drainage of the Niayes reaches from the inland towards the northern and southern estuaries into the sea. The northern part – mainly covering the department of Guédiawayé and Keur Massar – is characterized by a series of dunes along the coast. These dunes prevent drainage of inland water towards the sea. This 'congestion' in the low-lying inland areas forms a succession of lakes that stretch along the coast like a pearl string. This series of lakes is naturally interconnected and extends into the north of the continent up to almost 100 kilometers outside of Dakar. The southern part mainly corresponds to the administrative limits of the department of
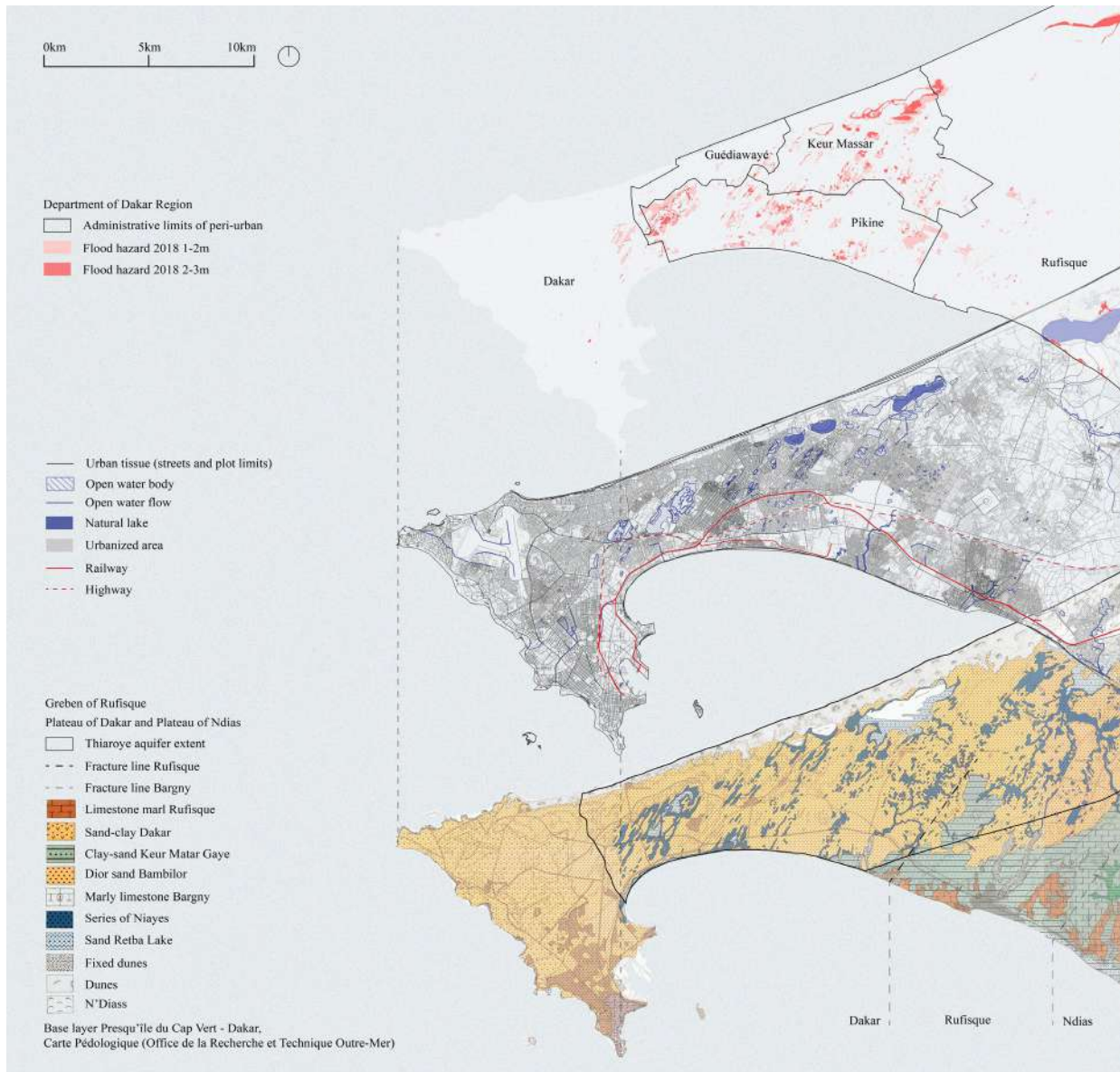
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7 The Thiaroye lies underneath the Niayes, largely covering the departments of Guédiawayé, Pikine, and Keur Massar.

Pikine. It knows a different type of drainage from the inland. Here, the Niayes are connected to the sea with several river branches. Finally, the urbanized area of Rufisque is situated in the south-eastern part of Dakar and characterized by a half-open depression or *demi-cuvette*. It lies exactly on the fault line between the plateau of Dakar and the inland plateau of Ndias.

A historical tracing of Dakar's urban infrastructure
The delicate water system in this diverse peri-urban territory is manipulated through time. An overview of changes in the urban tissue is subsequently described and visualized [fig.1]. Starting from the 15th century, the urbanization of the Cap Vert concentrated mainly around the poles of Dakar and Rufisque. Due to a long drought period in Sahel during the seventies, rural inland population migrated in the seventies to the urban coastal areas (Laaroubi 2017). Situated at the extreme point of the Cap Vert, Dakar has since only known an eastward expansion. The entire peninsula gradually urbanized to such an extent that the city of Rufisque has now been 'swallowed' by the capital (Doyle 2019). The limited resources of this migrant population resulted in the emergence of self-constructed spontaneous neighborhoods, established in lowlands (Schaer, Thiam 2017). Water supply and sanitation services were non-existent (Nguirane 2016). Until the 1980s, the drinking water was largely supplied by pumping the Thiaroye aquifer (Bottazzi, Winkler 2019). The infiltrating nitrates from septic tanks that came with the settlements polluted this underlying aquifer. This induced the stop of exploitation. Drinking water was henceforth obtained from a lake 250 km outside the city, leading to two impactful consequences. Firstly, the pumping stop caused pressure on the Thiaroye aquifer. Secondly, used household water was added to this through infiltration, causing the groundwater table to rise (Ministère de l'Énergie et de l'Hydraulique 2004). Another change at the scale of the peninsula is the series of infrastructural interventions for transportation. Over time, new transport networks have been introduced into the urban landscape of Dakar. A highway was constructed from 2005 until 2013 to promote rural and urban development (Diop and Mbeguere 2006; Graftieaux 2017). This road connects the Cap Vert with Rufisque to continue to the international airport. A few years later, in 2019, a railway was inaugurated. This line also crosses the entire peninsula from Dakar city to the east outside the region and parallels – just like a part of the highway – the southern coastline. Furthermore, the downside of some infrastructural projects against flooding cannot be denied. Powered by the PROGEP, retention basins have been constructed in Pikine and Guédiawayé, which buffered stormwater in the city during heavy rainfall. Entire neighborhoods were evacuated to give place to these basins. The concerned citizens got assigned a new location a few kilometers eastwards (Ministère de l'Habitat, de la Construction et de l'Hydraulique 2010). Although these new neighborhoods were built with a sanitation and drainage network, new construction zones 'branched' to them for which no drainage system was provided. Now, the unfortunate outcome of these new poles is already visible. The new built-up areas have been the most recent affected by flooding (Schaer, Thiam 2017). On top of that, the lack of maintenance by ONAS and the users of the various urban infrastructures is a reinforcing factor for the natural drainage obstruction. Although organizations at different levels (e.g., ONAS, NGOs, and citizens) are cleaning of canals, basins, and pipes, the drainage network is heavily polluted. In addition to waste, the large number of water plants and sand clogs the drainage system (Leclercq, Diongue 2023).

Map legend:

Department of Dakar Region
— Administrative limits of peri-urban
— Flood hazard 2018 1-2m
— Flood hazard 2018 2-3m

— Urban tissue (streets and plot limits)
— Open water body
— Open water flow
— Natural lake
— Urbanized area
— Railway
--- Highway

Greben of Rufisque
Plateau of Dakar and Plateau of Ndias
— Thiaroye aquifer extent
-·- Fracture line Rufisque
--- Fracture line Bargny
— Limestone marl Rufisque
— Sand-clay Dakar
— Clay-sand Keur Matar Gaye
— Dior sand Bambilor
— Marly limestone Bargny
— Series of Niayes
— Sand Retba Lake
— Fixed dunes
— Dunes
— N'Diass

Base layer Presqu'île du Cap Vert - Dakar,
Carte Pédologique (Office de la Recherche et Technique Outre-Mer)

[fig.1] Superposition of flood prone areas, urban infrastructure and natural water system in the Cap Vert and peri-urban Dakar. Source: elaborated by author from IRD, ORTOM, OSM, and TWB.

Three momenta of change in the peri-urban territory

A superposition of the discussed maps on floodable areas, the natural drainage system, and the urban infrastructure [fig.1] in Dakar reveals different zones of conflict [fig.2]. They can be categorized according to three explanatory flooding causes. The first cause is the widespread use of natural water flows as means of transportation for waste. Liquid waste is dispersed into natural waterflows through clandestine pipelines or open canals, made by citizens themselves. This phenomenon – or 'rinsing' strategy – can be found in other departments of the peri-urban area. This movement is initiated to prevent disease spread. Yet, solid waste disposal causes the congestion of these canals whereby water stagnation occurs. Although this waste-water drainage method offers a short-term solution for the citizens, the environmental sustainability is still at stake. The second cause implies the dwelling densification. This eventually results in a greater amount of water to be consumed and drained. This becomes even more significant when the respected area is a crucial element of the natural water system (e.g., a wetland, floodplain, riverbank, or some type of water buffering zone). Superposing the hydrological network, the densifying urban fabric, the flooded zones, the citizen initiatives, and the extent of the Thiaroye aquifer, the northern watershed appears critical. Several neighborhoods of Guédiawayé are built on former wetlands. The growing land demand in this area provoked soil hardening. The reduced possibilities of surface water infiltration cause an increase in runoff water and need for drainage systems. The water table rises due to the returning rain, reduced infiltration possibilities and water for drinking and household

activities. In 2016, *Vers un Mouvement Citoyen des Quartiers Précaires de la Banlieue de Dakar* was set up. This program included the three municipalities of Médina Gounass, Djidah Thiaroye Kao, and Wakinane Nimzath. The neighborhoods in the intervention area are essentially informal[8]. Most of them are affected by regular or permanent floods and suffer from a lack of urban planning, insufficient solid waste management, insufficient infrastructure for rainwater drainage, or problematic governance. Due to a lack of structure and resources, institutionalized actions are poorly coordinated. The involvement of the populations appears to be a credible solution to enable the fundraising for and creation of tertiary networks and the management of existing networks at street and neighborhood level. The proposed model of coordination and financing of projects allows the realization of micro-projects at different scales: individual, semi-collective and collective. These scales are precisely those that are not attainable by state projects. The third cause is the punctual or linear disruption of the natural drainage system (e.g., a river, creek, or underground stream). This phenomenon occurs where natural rivers or streams are put underground, diverted, or disrupted (e.g., 'cut through' by a road or railway). The superposition of the mobility infrastructure, soil types, urban fabric, flooded zones, and topography highlights the disruption of the natural drainage by transport infrastructure. The *demi-cuvette* of Rufisque's urban area covers a succession of north-south oriented watersheds. The central and most low-lying watersheds are marked by dense urbanization. The sprawl of housing lead to the modification and disappearance of several watercourses, redefining the limits of these watersheds. The sanitation of the city of Rufisque is characterized by an open-air canalization – dating from the colonial period. This network follows the natural logic of gravity and water drainage and is still in use, despite little maintenance. The railway and autoroute are recent infrastructural interventions that complicate Rufisque's drainage system. These infrastructures are constructed perpendicular to the gravitational drainage network. At the intersections, pipes are installed but the bottlenecks still largely hinder the natural run-off. Additionally, the stormwater that ends up on the highway flows towards the lowest areas, flooding entire neighborhoods. Since ADM does not yet have a program a centralized drainage system and ONAS is limited to the primary waste-water networks, citizens are forced to act. Through a collection of money, they are organized on neighborhood level to buy pumps and build a secondary and tertiary drainage network for stormwater and domestic water. In some cases, the overflow of the septic tank is connected.
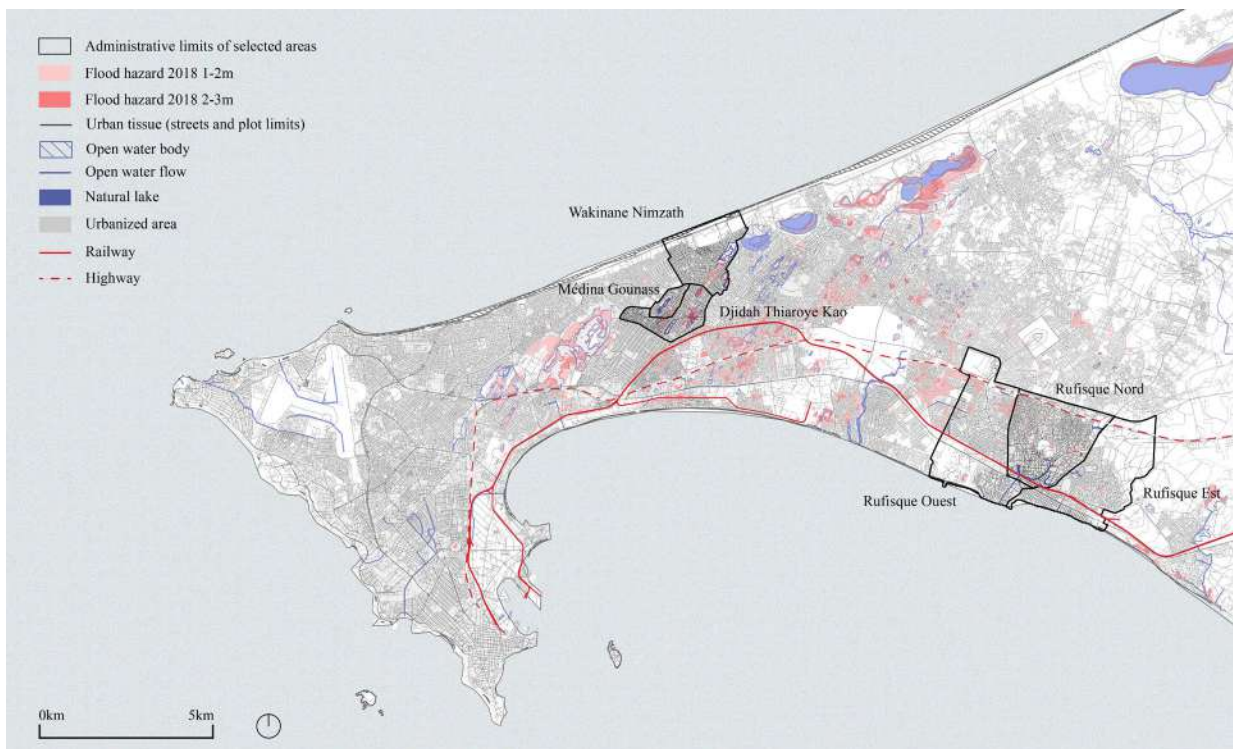
[fig.2] Peri-urban flooding palimpsest and critical zones. Source: elaborated by author, from OSM and TWB.

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8 Informal areas contain spontaneous settlements with little cadastral organization or access to public services.

Exploration of the spatial dimension of waste-water and stormwater services in Rufisque

The strata of the territory of Rufisque are further examined to identify spatial changes. The focus hereby lies on changes in the territory and changes in the drainage system itself. The identification of originally wet zones through old maps is challenging. Yet, a superposition of topography, the urban fabric, the water network, soil types, and observations from urban walks reveals that the paved flanks of the *demi-cuvette* and run-off water from the highway have problematically moistened several habited parts. Looking closer to the zone affected by flooding, the area covered by the commune of Rufisque Nord is particularly affected, revealing the consequences of the new road and railway infrastructure [fig.3]. Cut through in the north by the highway and in the south by the railway, several neighborhoods are under pressure. Atop the watershed, a large water basin collects the runoff water from the highway. Before the rainfall, water is regularly pumped away through a large pipe that meanders between the houses to the sea. It follows the bed of the natural stormwater drainage. Along this bed, the rise of groundwater and the degradation of housing is clearly visible [fig.4]. The built environment can be described as irregular and dense. The buildings have an average of two to three stories. They mainly dispose waste-water individually through septic tanks. Although the old canals are still managed by ONAS, the network does not reach most dwellings of Rufisque Nord. Due to the increasing floods, citizens are organized among themselves to create a stormwater system. The structure of their community serves as a backbone to this. The municipality of Rufisque Nord is divided into several districts, each of them guided by a delegee. This delegee is elected by the citizens and maintains an overview of the most affected zones. In district Darou Rakhmane, a sub-level – the sector – emerges. This community-level is formed to produce a secondary drainage system. The sector here contains of around 100 houses and consist of about seven streets. This is determined by a delegee in cooperation with local associations to allow smooth operation and payment. The sector has the size of one project application and execution. The access and price to the service depends on the size of the project. Little changes are observed in land use, tenure, and technology of the drainage system. Only the zones that are too wet are abandoned after years. Although the natural drainage network is part of the Thiokho watershed, human manipulations over time have pushed these limits, complicating with this the definition and determination of the scale.

[fig.3] Scale of citizen intervention in Rufisque Nord. Source: elaborated by author from OSM and Laaroubi (2007).

Water basin collecting runoff water from highway.

Waterproof walls in front of dwelling.

Stormwater pipe draining water from basin to canal towards sea.

Self-dug drainage system and connection to dwelling.

Stormwater pipe draining water from basin to canal towards sea.

Permanently flooded wasteland.

Street with underground drainage installed by residents of one sector.

Vacant dwelling, affected by the raising aquifer.

[fig.4] Observations of drainage network in Darou Rakhmane. Source: elaborated by author.

Conclusion

In Dakar, flooding issues have been pushing planning strategies towards a facilitation of urban water drainage. Over the last two decades, floods have become entrenched in water governance, encouraging management and prevention into major construction works. Together with the housing and transport infrastructures, these spatial interventions have caused an – already delicate – natural drainage system to be seriously disrupted. The main strategies applied in urban planning consider (underground) stormwater drainage systems as the nearest solution. Policies appear to be leading every drop as fast as possible towards the sea. In this way, the relationship between the landscape, the water, and urban development is characterized as one-sided and 'water-shy'. This can be metaphorically described as an outflow or 'leakage' of water – an elsewhere precious commodity – from the city. Although it offers a solution for the citizens, the environmental sustainability of this vision should be elaborated further. The 'too much' or 'too little' water in a certain place at a certain time have encouraged the hygienic 'rinsing' strategies. The example of Rufisque demonstrates that the spatial changes over time have mainly been caused by major infrastructural interventions. Institutional water drainage systems have major shortcomings, which pushes citizens into distress. As a result, an appropriate scale is being sought for local communities to set up their own drainage system. This scale is important to further explore the sustainability transition. Although government agencies work according to a strategy of gravity and natural drainage, the built environment proves to already have influenced the natural drainage system to such an extent that this is difficult to achieve. Meanwhile, citizens' initiatives have come into effect. Tracing the water flows, the peri-urban territory appears to be in a stormwater and waste-water acceleration strategy. The impact of the loss of water on the natural environment is put behind.

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Hopeful environmental stories. Limits and contradictions of ecological restoration pilot-projects in the Venice Lagoon

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Wetlands restoration projects are gaining more and more consideration and visibility given the acknowledged relevance of wet ecosystems. However, such projects often embed critical limitations, too often left unspoken, which eventually could inform and support future urbanism and landscape designs and interventions. Features as geographical proximity, ecological complementarity, partners' interchange, administrative continuity, pilot ideas, and socio-ecological justice will be discussed in regard to European Union funded pilot-projects in the Venice Lagoon, supported by the Life Program between 1999 and 2022. Through the analysis of recently completed wetlands restoration projects, the present investigation discusses their limits and contradictions by understanding the relations they establish with each other.

Introduction

Wetlands are places of paradoxes (Proulx 2022). Despite their unmatched ecological relevance, a grounded contradiction stands firmly between their vital role and contemporary neglect status (Ramsar Convention on Wetlands 1971). During the last few decades, ecological restoration projects received revived attention and grand promotion to counteract wetlands' erosive trends - as witnessed by the inauguration of the United Nations Decade on Ecosystem Restoration 2021-2030 titled "Rebuilding with Nature". This re-consideration has also interested the Venice Lagoon, the largest in the Mediterranean basin, where a renewed concern and sensibility towards its brackish marshes (*barene* in Venetian dialect, meaning "bush" or "clump of grass") has advocated for urgent actions. The precarious status of wetlands, the recognised relevance of ecological restoration projects and the challenging essence of transitional territories, all reified in the Venice Lagoon, might inform, prompt, and expand strategies on how to "design in the terrain of water" (Mathur, Da Cunha 2014).

Historically, in the Venice Lagoon, the methodological approach to design has been structured in terms of emergency policies and laws —such as the Legge Speciale per Venezia (Special Law for Venice), April 16th 1973, n. 171— or major engineering interventions, also known as "Grandi Opere", under the aegis of a "philosophy of engineering" (Vianello 2021).[1] Despite this local consolidated yet outmoded tradition, on a pan-European level, the contemporary practice of design-in-a-landscape has been shifting towards integrated, symbiotic, and fluid experiments, open to embrace the life, changes and movements of complex ecosystems and ecotones. The last fifty years saw the crucial emergence of processual-oriented design approaches such as Design with Nature (McHarg 1969; Steiner et al. 2019) and Building with Nature (van Eekelen, Bouw 2020) making Urbanism and Landscape follow Ecology "toward a more organic model of open-endedness, flexibility, resilience and adaptation, and away from a mechanistic model of stability and control" (Milligan 2015).

As Donna Haraway argues in Staying with the Trouble, "the task is to make kin in lines of inventive connection as a practice of learning to live and die well with each other in a thick present: our task is to make trouble, to stir up potent response to devastating events, as well as to settle troubled waters and rebuild quiet places" to foster "unexpected collaborations and combinations" (Haraway 2016). The present contribution draws on recently completed design exercises in the Venice Lagoon to both decode their critical limitations and understand their innovative support, reading them as some kind of "hopeful environmental stories" (Martin 2022). Such an acknowledgement is

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[1] According to ARPA (Agenzia Regionale per la Protezione Ambientale, *Regional Agency for Environmental Protection*), "Grandi Opere" include "infrastructural interventions" characterised by a high degree of planning, executive or implementation complexity and complex technical-administrative procedures (ARPA 1999). In the Venice Lagoon, Mo.S.E. (Modulo Sperimentale Elettromeccanico, *Experimental Electromechanical Module*), Piano di interventi per la ricostruzione delle strutture morfologiche mediante l'utilizzo di sedimenti provenienti dal dragaggio di canali lagunari (*Action plan for the reconstruction of morphological structures through the employment of dredged sediments*) and Piano Europa: Piano delle misure di compensazione, conservazione e riqualificazione ambientale" (*Europe Plan: Plan for environmental compensation, conservation and rehabilitation measures*) can be described as "Grandi Opere".

required to inform and lay the foundations for integrative designs with water in transitional territories.

[Fig. 1] The European Union Life and Horizon funded projects and the morphological structures planned by Consorzio Venezia Nuova in relation to the erosion and deposition patterns in the Venice Lagoon between 1970 and 2000.

Lifelines

During the past twenty-five years, in the Venice Lagoon, the European Union has funded six projects focusing on the ecological restoration of lagoon habitats (inter-tidal, sub-tidal, emerged, and submerged), four under the EU Life program and two under the Horizon 2020 program (Green Deal Call and Innovation Action). The present contribution focuses on the four EU Life program-funded projects reading them as a "cluster study" rather than as "case studies". To support this reading, the focus lies on the fluid and rhizomatic relations the projects have established rather than on their peculiarities as static and segregated objects. The projects - Life Barene (1999-2002), Life Vimine (2013-2017), Life Seresto (2014-2018) and Life Lagoon Refresh (2017-2022) - are concentrated in space (they are all located in the Northern Venice Lagoon) and time (they have been financed within the last two decades), have comparable extensions and durations and perform similar design principles. Although Life Barene inaugurated the florid season of European Union support in 1999, Life Vimine is selected as the entry point to decode the ignited relations among the others. The exercise consists of knotting and drawing lines while understanding and exploring multiple relational levels to grasp connections and ruptures (Ingold 2015). The ongoing analysis has identified six key aspects worth investigating.

Geographical proximity. As [fig. 1] reports, the four EU Life interventions have been implemented in the Northern Venice Lagoon due to its relatively good status of morphological conservation.[2] In turn, the action sites have been located in internal areas of the lagoon – where tidal currents expand more slowly, and boat traffic is relatively low. These propitious conditions have allowed the EU Life experimental interventions to rely on discrete pre-existing environmental characteristics and, therefore, to put in practice a higher degree of experimentality. Undoubtedly, worse and more damaged pre-existing conditions would have required more resistant interventions and, potentially, would have mined the results of the pilot experiments.

Ecological complementarity. As Tagliapietra states, "Human activity during the twentieth century has endangered two of the key habitats of the Lagoon of Venice, the salt marshes and the seagrass beds, for which environmental conservation and restoration programs have been put in place" (Tagliapietra et al. 2018). Even if Life projects have been developed autonomously and in different periods, they all have encompassed a planned ecological continuity and complementarity: Life Barene and Life Vimine worked with the intertidal habitat of brackish marshes, Life Seresto worked

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[2] Between 1970 and 2000, the Northern Venice Lagoon has witnessed a trend of sediment deposition in contrast with the erosive general trend occurred in the Southern Venice Lagoon (Molinaroli et al., 2009).

with the subtidal habitat of seagrass (phanerogams prairies), and Life Refresh worked with the emerged habitat of reedbeds.

Partners' interchange. As [fig. 2] presents, the projects considered report a high degree of national and international involvement. Provveditorato Interregionale per le Opere Pubbliche per il Veneto, Trentino Alto Adige e Friuli Venezia Giulia took part in all four Life projects while Comune di Venezia supported activities in Life Barene and Life Vimine.[3] However, after the conclusion of Life Barene in 2002, no public administrative body has coordinated any project ever since. Life Vimine, Life Seresto and Life Refresh were led by universities and research organizations, respectively Università di Padova, Università Ca' Foscari and ISPRA.[4] On the one hand, such a repetition of partners granted stability to the projects taken over. The established knowledge on the subject matters was implemented and carried further by those same researchers who initiated it. On the other hand, such an introvert closure has limited the potential involvement of external and innovative figures.

Administrative continuity. "However, to be successful, these pilot projects that pursue the EU's goal of halting biodiversity loss need to seek forms of medium- or long-term sustainability with the involvement of local authorities and stakeholders." (Tagliapietra et al. 2018). Following this crucial understanding of long-term engagement with local institutions, after its completion in 2017, Life Vimine coordinators and researchers have been working further to integrate the projects' interventions in the ordinary management of the Venice Lagoon public works.[5] By drawing a sound administrative route, the Vimine AFTER LIFE attempts to overcome the inherent limitations of European Life projects – the limited economic resources and schedules – to impact the very present time of the lagoon's ordinary management.

Pilot ideas. The four Life projects have been experimenting with design principles, technologies, and materials to various extents — Life Barene and Life Vimine with soil bioengineering methods applied through biodegradable components and Life Seresto and Life Refresh with, respectively, seagrasses and reedbeds widespread transplantations. The extensive implementation of "soft technologies" through hybrid engineering-with-nature approaches fits the brackish marshes' plastic behaviors and the reversibility advocated by the Special Law for Venice of 1973 (Barausse et al. 2015). However, the Life Program directives narrowly push the focus on morphological structures and ecological performances rather than elaborating on socio-ecological values at the intersection of humans and non-humans. Such projects – even though acting in space – do not integrate any spatial and aesthetic discourse or perspective.

Socio-ecological justice. Life Vimine and Life Seresto have worked together with lagoon communities of fishermen and hunters through facilitating organizations. Among the four projects, they recognized that "environmental issues cannot be separated from socio-economic issues and, often, nature restoration is not a primary prerogative" (Barausse 2023). Such projects take place in an area where people still do live and work and, among all, must try to help counteract abandonment and depopulation, systematizing approaches to these different problems and trying to bring together nature conservation and sustainable local development (Barausse 2023). Restoration is not just a matter of challenging technicalities to solve but rather a process of mutual participation, if only to foster the long-term survival of the project (Higgs 2003).

According to the elements described, the four Life projects carry along relevant traces of innovation in terms of design and planning principles, experimentation and testing, monitoring and management, fieldwork, participation, and employment — if compared to business-as-usual methods and approaches perpetrated in the Venice Lagoon. However, they still encompass

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[3] Provveditorato Interregionale per le Opere Pubbliche per il Veneto, Trentino Alto Adige e Friuli Venezia Giulia (*Interregional Superintendence of Public Works*), is today what once was Magistrato alle Acque (*Venice Water Authority*). Today is a body of the Italian Ministry of Infrastructure and Transport responsible for hydraulic safeguard, safety and protection of a large area stretching from Veneto to Friuli Venezia Giulia and Trentino Alto Adige.

[4] ISPRA (Istituto Superiore per la Protezione e la Ricerca Ambientale, *Italian Institute for Environmental Protection and Research*) acts under the supervision and guidance of the Italian Ministry for the Environment and the Protection of Land and Sea.

[5] The strategy was approved within the framework of a memorandum of understanding among Veneto Region, Interregional Superintendence of Public Works, Municipality of Venice, Consorzio di Bonifica Acque Risorgive and Università degli Studi di Padova Department of Industrial Engineering aiming at protecting the sandbanks and inland marshes of the Venice Lagoon from erosion (Regional Council Resolution no. 387 of 31 March 2020). The deliberation arrived only in March 2020 - the executive process was considerably delayed due to the Covid-19 pandemic and the administrative design process representing a unique case in the Venice Lagoon.

limitations. Ideally, investigating lines and knots of these traces of innovation means unveiling their hidden relations and deducing important lessons.
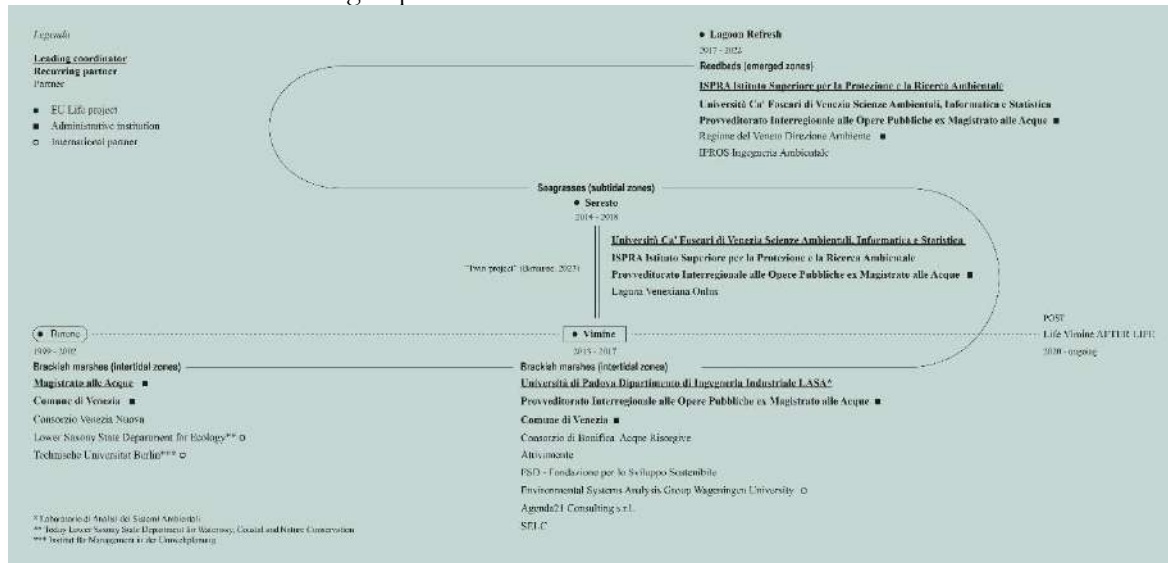
[Fig. 2] Partners and habitats of the EU Life projects — Barene, Vimine, Seresto, and Lagoon Refresh.

Limits

Deconstructing specific and situated case studies and the relations they establish with each other unveil limitations and critical points about ecological restoration projects in a broader sense. The potential discussion around limits, paradoxes and contradictions offers the opportunity to search for recent insights and suggest future landscape designs in the Venice Lagoon. The six aspects previously explored (geographical proximity, ecological complementarity, partners' interchange, administrative continuity, pilot ideas, and socio-ecological justice) inform wider concerns on the topics of space, time, and design within ecological restoration projects in wet environments.[6]

First, the relationship between micro-scale pilot projects and large-scale territorial planning. On the one hand, micro-scale experiments tend not to have a significant impact on wider systems; on the other hand, territorial planning risks dispersion and inefficiency when confronted with punctual interventions. Urbanism and Landscape disciplines must thrive for cross-scalar approaches returning to stress the importance of the intermediate scale, able to establish dialogues and mediate between micro and macro design scales. A first research question is therefore hinged on the extensions of design: what is the role of the intermediate scale?

Second, the relationship between the *longue durée* of environmental processes and the limited time of European projects. A strong contradiction characterizes the EU Life Program's ambition of supporting and restoring biodiversity proliferation while confronting tight expiring dates. Indeed, piloting and testing can be one of the preliminary possibilities of designing in a changing landscape, however, in a propaedeutic way, they must inform upscaling strategies – in space and time. A second research question is thus structured on the matter of time: how to grant continuity?

Third, the relationship between morphological and ecological restoration. Often too narrowly, restoration projects are environmental engineering-driven and oriented and their objectives remain focused on quantitative contributions to research. However, working with morphological and ecological processes should not be pursued per se only but rather incorporated into wider and more elaborated strategies. In turn, these observations inform tangential questions on the systemic absence, in European Union-funded projects, of spatial design professionals (urbanists, landscape architects, architects, designers, etc.) which indeed might require further investigation. Therefore, a third research question discusses design methodologies when it comes to restoration projects: what could be the potential role of systemic and integrated landscape design?

The analysis aims at unveiling the inherent and critical limitations of consolidated mainstream practices. At the same time, recognizing such limitations can support laying the foundation for innovatively re-thinking design projects.

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[6] Still under elaboration, the limitations are proposed in the form of open questions.

Conclusions

"Hopeful environmental stories" identifies ecological restoration projects in the Venice Lagoon that, despite their critical limitations, are fostering hope by co-design through the use, maintenance, and care of wet landscapes. In the Venice Lagoon, an inter-territorial landscape per se characterized by a high degree of complexity, contradiction, and fragility, uncountable layers of administrative management and jurisdiction contribute to such complexity. A critical reading of liminal practices from the Urbanism and Ecological perspectives is required to assess the impact of site-specific and small-scale Design with Nature projects. Although institutionalized, the EU Life projects stand transversally to the business-as-usual way of operating and designing in the lagoon landscape, sharing a resistant approach to territorial resilience. In this historically contested territory, shaped and regulated by humans, such pilot projects require careful reading and understanding, giving their unprecedented contribution in shifting the perspective on how the Venice Lagoon is read, conceived, and designed.

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III.c

Socio-ecological movements and configurations

Liquid Narratives: Exploring Socio-ecological Practices in Southern São Paulo

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In times of growing social inequality and ecological emergency, the absence of access to housing constrains poor populations to settle in fragile ecological reserves that consequently are exposed to degradation by urban expansion. Brazilian scholars focusing on land-occupation processes investigated «socio-territorial movements» (Fernandes, 2005) to describe how marginalized groups have been resisting 'through' territory, using the physical occupation of land as their main revendication tool (Haesbaert, 2012; Halvorsen, Fernandes and Torres, 2019). Yet to understand the everyday struggles emerging from these territories, studies moving beyond the notion of 'territory' to the notion of 'place' (Oslender, 2016), revealed the importance of understanding place-specific social and ecological practices to understand the evolving difficult relationship between marginalized populations and ecologies (Escobar, 2008).

Through empirically grounded research in the southern periphery of Sao Paulo, this article is an attempt to addresses these critiques using ethnographic narratives following the story of Marlene's family; the story of the Comunidade KM47 where she lives; and the story of Marsilac region where the Comunidade KM47 is located. The study of these three multi-layered stories aims to identify these place-based practices and their evolving relationship with the ecologies. How can certain ecologies and geographies change local practices of inhabiting and city-making? How can the study of these practices shed light on the broader socio-ecological crisis? This article aims to explore this by identifying three major phases in the transformation of the community-ecologies relationship. The phases of 'dependence', 'decline' and 'socio-ecological marginalisation' highlight the dynamic nature of local practices, and studying their evolution seek to be a valuable contribution to understanding the on-going socio-ecological marginalisation.

Introduction

This paper studies the place-based practice of marginalised in their process of surviving and inhabiting ecological reserves in Sao Paulo's southern periphery. The study of these practices aims to inform on the transforming relationship between marginalised community and the ecologies. Through the method of narrative ethnography, this paper portrays three multi-layered stories illustrative of the urgent socio-ecological crisis occuring in Sao Paulo. The use of ethnographic narratives – collected during my fieldwork[1] – serves as a tool and entry point for identifying, studying, and discussing practices trajectories and aiming to contribute into current academic discussions.

The stories of Marlene and her family; the story of the Comunidade KM47, her self-build neighborhood; and finally, the story of the broader region of Marsilac at the extreme south of Sao Paulo. The entangled perspectives aim to highlight the ground consequences and realities of the wider narratives on the city's transformation. Through spatially sensitive analyses and collection of empirical data, these interwoven narratives depict historical events, memories, and experiences in order to understand how certain ecologies and geographies change practices of inhabiting and city-making. Secondly, this research seeks to explore how examining these practices can enhance our understanding of the broader socio-ecological crisis.

Three aquatic journeys

In the 18th C, these large areas of *Mata Atlantica* (Atlantic forest) occupied the city's southern territory housed Tupiniquim, Tupinambá, and Guarani indigenous tribes and *aldeias* (settlements) (Fabiano, 2019). Although the indigenous inhabitants of the forest were found to have drastically transformed the alleged 'pristine' landscape (Denevan, 1992) the indigenous lived in a rather balanced relation with the local ecological system, and maintained it over centuries (Biemann and Tavares, 2014). But the imminent arrival of settlers was about to change the struggles, practices,

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[1] The empirical data in this article is based on fieldwork carried out from 6 January 2023 to 9 March 2023 in the southern and extreme southern outskirts of São Paulo in 8 communities. During this period I spent two weeks in total immersion the *Comunidade KM47*, held a workshop on 28 January 2023 entitled *Memorias de Comunidade* (Memories of Community), conducted 15 semi-structured interviews in the Comunidade KM47 and produced numerous mappings and cartographies.

and territories drastically. This region was subject to a geographical isolation imposed by the topography of the *Serra do Mar* Mountain range in the south and the hills covered by the Mata Atlantica in the north.

In 1792, the Portuguese colonisers began the two-years project of transformation of the old indigenous *trilhas* (footpaths), better known as *Caminho do Mar* (Path of the Sea). The colonizers saw the value of these indigenous paths in facilitating trade and transportation and used their engineering to remodel the landscape through the dense Atlantic Forest. This posed considerable challenges due to the rugged terrain and the need to cross rivers and valleys. Construction required the use of labour, including enslaved Africans, who were brought to Brazil for forced labour during the colonial era (Ribeiro, 2018). This instrumentalization of geographical knowledge by the colons (Porto-Gonçalves, 2010), was common practice in the region, with some parts more heavily altered than others.

This was the case for the route from the municipality of Santo Amaro to the port of Santos, which had to be travelled by donkey and took several days (Miranda, 2018) . In the part of the *Sete curvas* (the seven curves), Dona Theresa – one of the oldest inhabitants of the region – remembers how the transformation of the path included the remodeling of the road following seven curves so that the animals could overcome the high topography with their loads of resources (interview Theresa, 2023)[2]. To this day, this area preserves its name and its reputation as a dangerous escarpment.

The next major intervention in the southern region occurred in 1924, in a climate of political and economic crisis, when the city of Sao Paulo initiated a railway project linking the town of Mainrique in the southern Port to Santos. To revive the economy, the State was trying to compete with the Canadian company São Paulo Railway Light & Power, which had a monopoly on the production of electricity and on the railway trade to the coastal region (de Marchi, 1991). This monumental project caused another major landscape transformation, due to its passage through the Serra do Mar Mountain range. The construction work included deforestation, topography and excavation remodeling through 30 tunnels, 18 viaducts and a hundred retaining walls (Associação Mairiniquense de Preservação Ferroviária, 2023). During the same years, the Light & Power Company was too busy launching the project to build the city's second large water reserve to produce electricity, the Billings reserve, covering approximatively 100 km² with a capacity of 1,2 billion m³ of water (Alves *et al.*, 2010).

[fig.1] Preparation of the Serra do Mar terrain for the railway track, undated.
Source: Lavander Junior, Moisés; Mendes, Paulo Augusto from Vitrivius journal, 2017.

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[2] All the cited inhabitants interviews are based on semi-structured recorded interview was conducted in my fieldwork from 6th of January to the 20th of March 2023 while I was able to conduct a full-immersion study in the Comunidade KM47.

The railway line, completed in 1937, changed the dynamics of the Marsilac region profoundly. To supply the worksite, the main trilhas around the gigantic worksite were transformed into roads (Governo de Sao Paulo, 2003). Among this the famous Sete curvas was made into a road (interview Theresa, 2023). Simultaneously, the progressive deforestation of forest areas into agricultural zone was driven by the progressive presence of 110 000 Japanese farmers migration with most of them located in Sao Paulo agricultural lands (Hauser, 1942). In Marsilac's region, they modified the territories introducing new species of plants such as cottons, bamboos, or the introduction of rice into the local cuisine (Miranda, 2018). From 1908, these families were sent after an agreement was reached between Japan and Brazil, to ease demographic tensions in Japan, which was facing a growing population, and to assist Brazil in the coffee plantations with qualified farmers (Hauser, 1942).

During that decade, the industrialization of the city influenced the development of São Paulo's Southern region from agricultural and ecological area into large-scale reserve of raw materials. The natural richness of the area began to interest sawmills, charcoal and construction companies, set up near the construction site of the railways and linking roads to produce timber and coal used to power locomotives (Governo de Sao Paulo, 2003) .Among them a small brick factory was set up on a hilltop at the 47th kilometer of de *Estrada Engenheiro Marsilac*, named after the engineer who built the train line.

Dona Vicentinha remembers the time when hers and four families were brought by a factory owner to live on the land and work in the two newly built ovens. These workers settled and built the first *barracos[3]* (wooden precarious shacks), the *Comunidade KM47* was born. (inverview Dona Vicentinha, 2023). The owner made them dug two *caipiras* wells (countryside hand-made water wells, < 10m deep) and began to clear the surrounding area to transform the wood into charcoal, which he used to cook the bricks (inverview Dona Vicentinha, 2023). The oxen and donkeys were used to transport the freshly cut wood to the ovens, and the cooked coal to the selling point generated small tracks into the dense forest. At the time, they most probably had no idea that these small passages randomly traced would structure the future community.

Only in the 1950s, the first trace of ecological awareness appeared in the region of Marsilac with the creation of the *Curucutu Floral Reserve.* This first 'reserve' was thought as an experimental production of pines, used for the construction because of their straight trunks (Miranda, 2018). Yet, in the early 1960s due to a significant population growth and the lack of fresh water at the city-scale, the decision-makers managing the city of Sao Paulo changed their vision on Marsilac resources.

It is in this context, around 1970, that Marlene and her family arrived in southern Sao Paulo from Ceara, a largely rural region in north-eastern drylands of Brazil. They were part of a vast migration wave of 2 million people fleeing excessive drought and poverty and seeking a better economic future (Brito, 1973; Baeninger, 2005). At the time, the country was moving from an agricultural and rural society to urban and industrialized centralities (de Lima Amaral, 2013). Following the 'great trek' to the city, Marlene's family – like most of these families – didn't reach the city but had instead to occupy informally peripheral natural lands. Facing a growing inflation, the high cost of land and housings in urban center was already the object of speculation. At the time only families that had a salary four times the value of the minimum wage could rent a house in the city(de Mendonça, 1980) while the social housing production of the time could only addressed 20% of the national demand (de Mendonça, 1980). Consequently, these land-occupations became the modus operandi of city-making in Brazil were 2 millions individuals out of 8 million inhabitants (Baeninger, 2005) poor population occupied and settled – often even 'buying' land from false owners – on land they do not legally own (Rolnik, 2019).

The phenomenon didn't decreased during the 1980's, known as the 'lost decade', following a general recession in the Brazilian combining an economic crisis, inflation and mounting debts increasing inequalities through the country (Furtado, 1963) . This productive crisis did not spare Comunidade KM47, where in the early 1980's the brick factory closed down. With its departure, Zé

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[3] Literally translated as "barracks", these temporary constructions were common among soldiers, seasonal workers and shelters for newly-arrived migrants. At the time, the urbanisation of rural land was tolerated by the state, which did not prohibit it but did not produce official documents of ownership either. *Área de proteção ambiental Capivari-Monos, uma Historia,* 2018. Directed by Miranda, S.: Departamento de Unidades de Conservação da Secretaria do Meio Ambiente da Prefeitura de São Paulo.

– the young boy from one of the five original families – settled with his family in one of the old ovens (interview Zé, 2023). The wells were used to supply the families with drinking water and the animal tracks were turned into dirt streets (interview Zé, 2023). Unemployed inhabitants organized the sale of land plots to generate a revenue. The land was divided, new streets were laid out and the settlement's population began to incrementally grow (interview Zé, 2023). This initiated the urbanization of KM47 and with it the increase of sceptic pits dug into the red-porous clay soil. The presence of these pits percolated and progressively reached the community's water table, contaminating the shallowest aquifers. The discharge of grey water into the central spring also spread water pollution to the nascent river in the community. The residents, realizing the urgency, organized *mutiroes*[4] (collective actions) where men built a concrete protection around the spring to prevent further contamination of the grey water and women cleaned the spring by removing waste and other residues. These actions were unfortunately late in coming with the water table and spring already contaminated.

In 1990, while Marlene left the *Favela do Edith*, when the state offered her family 1500RS, today equivalent to 300 euros. Back then, this was proportionally worth more in comparison with the life cost, but still far from the cost of a new home. Marlene and her family arrived in the Extreme South Region, which was still a very isolated region with a landscape dominated by undulating topography densely covered by Atlantic Forest. Marlene's remembers her arrival at Comunidade KM47 as a tough moment as she had left behind a son, who was wrestling with a drug addiction, and substituted family life for a rough living on the street. Marlene's sister-in-law, who was already living in this new land-occupation in the region, lent her 500RS to buy a piece of land.

The parcel they had freshly acquired was about 25m long by 10m wide and located on the plateau of one of the numerous hills of the area. It was a favorable location for its relatively flat topography, yet on the edge of the slope, they still had to put a lot of work into cutting the dense Mata Atlantica[5]. In comparison to other families who had to excavate large amounts of red clay or backfill and terraced the slope, Marlene and her family felt privileged. Once the land was cleared, the freshly cut wood was combusted to cook. Good, straight pieces of wood were used as light columns to build their first *barraco*, a wooden shack made of light wood panels, often recycled, or relatively cheaply bought. The local lifestyle at this arrival times reminded Marlene of her life in the North-East of Brazil, as it felt rural much more than urban. A certain isolation was imposed by the difficulty of access to the community. The only connection to Sao Paulo center for the 20 families living there was the *Estrada Engenhero Marsilac*, a poorly paved road that was flooded and turned impassable during regular heavy rains.

At the time, Marlene's family could only afford to live all together in one 'room', without access to water and electricity. The room was made of wooden trunks forming a three-dimensional rectangle and was surrounded by plastic sheeting to provide partial protection from the rain. Exposure to the climate was challenging, from broiling sunshine to pouring tropical rains. At that time everyone in the Comunidade KM47 lived in barracos, as none could afford to pay for land and materials simultaneously. Besides, in land-occupations. tenure insecurity makes material investment tricky since it can be lost overnight. The barracos were scattered and connected to small paths of dirt, which would later take the name of these first inhabitants, and which they had collectively cleared by hand.

After several months after Marlene's arrival, the departure of her sister-in-law was not a strong enough signal for her to sell the land and go back on the road in search of a new community. Marlene's family had invested all they had in the purchase of this land and now only was beginning the long process of building a habitat and participating in the construction of a community. The main obstacle they encountered was that the only source of drinking water was deeply

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[4] Mutiraoes comes from the indigenous Tupi-Guarani word "moty" meaning mutual and "ayruri" meaning assistance. It is a community practice of helping one another. By working together, the community is able to accomplish major tasks, from cleaning to building to harvesting. Castro, E. B. V. d. and Morton, G. D. (2011) 'The inconstancy of the Indian soul: The encounter of catholics and cannibals in 16th-century Brazil', *(No Title)*. Stevens, J. (2018) 'Occupation & city: the proto-urbanism of urban movements in central São Paulo'.

[5] Through the years the Atlantic Forest in the state of São Paulo has lost approximately 76% of its original forest cover. SOS Mata Atlantica, O. (2023) *A Mata Atlantica é a floresta mais devasta do Brasil*. Available at: https://www.sosma.org.br/causas/mata-atlantica/ (Accessed: 31st May 2023 2023).
Since the Colonization of the region by the Portuguese to the land-occupation, dense forests of the region were perceived as obstacles to economic development, leading to widespread deforestation

contaminated. For decades the water source had provided the 20 families with a water supply, however, over the years, the families' wastewater discharges was diverted into the source, as it was the lowest point and the only system that naturally functioned as a constantly moving sewer. While the grey water travelled, as an open air-sewage, through the dirt alleys to the source; black water was directed to sceptic pits, dug by hand by each family, and over time bacteria had percolated through the permeable soils until they had reached the underground water tables. The inhabitants were forced to explore new ways of getting water and had to be extremely economical with how and when to use it. Rainwater was already considered a precious resource and was systematically collected in 100L plastic barrels placed in front of the Barraco and under the roof tin. This water was mainly used to clean the house. The lack of access to drinking water had pushed the creation of a solidarity networks facing a common battle while reinforcing the creation of a community. The water spring, although contaminated, was still used for cleaning clothes, an activity that was carried out by scrubbing on nearby rocks. This was done on sunny days to take advantage of the sun to dry the clothes. As in times long gone by in the 'modern' urban metropolis, the gathering around water brought the women of the community together and turned the spring into a social epicenter where bonds could be gradually forged. When it was possible, some of them would drive to KM49 where there was another, non-contaminated spring and fill the plastic baskets. Later, the spring of KM49 was closed off due to locals complaining about its use of spiritual stage of *macumba* rituals, a black cult of African origin that continues to play a central role in Black Brazilian communities. In any case, most of the time, Marlene's family had to buy water to drink or to cook. In such precarious situation, where not only water but also money was always scarce, everyday life highly depended on loyal solidarity networks.

[fig.2] Polluted water source at the center of Comunidade KM47.
Source: elaborated by the author, 2022.

In the community, the growing population began to deplete the water supply in dry season, forcing the inhabitants to build up alternative plans for water harvesting. The wealthier family, living in front of the urbanizing community and owning much land in the area, built an artisanal well

(approx. 100m deep). Those who could afford it dug a semi-artisanal well (approx. 50m deep) on their land. Most people – including Marlene's family – installed pumps (approx. 10m deep) at the water veins in the depths of the forest. The less fortunate dug caipira wells (less than 10m). The poorest continued to use the surface water from the spring even though they knew it was contaminated. With that, the depth of water harvesting capacities materialized a deeply divided social stratification in which richness and poverty were measured in the purity and taint of water sources.

Up to today, the state has still not officially recognized the existence of the KM47 community. The settlement structure remains invisible on official maps. Nonetheless, governmental agencies have tried to help the inhabitants of the site with the growing water scarcity of the community. The installation of a 15,000L tank was the solution found for a constant access to the blue gold. This intervention was initially very well received by the community. Yet quickly the constant passage of inhabitants inspired the local drug cartel[6] to settle their sales point at the foot of the water tank. Although access to the tank was always open to the public, the presence of dealers discouraged most of the inhabitants from using it. This unexpected turn of events was further aggravated by a storm that blew away branches and eventually broke the lid of the giant tank. In this tropical region, such a large amount of uncovered water provides ideal conditions for the spread of dengue fever and transform omnipresent local mosquitoes into dangerous carriers. Another attempt was carried around 2015, when an Arab Emirates donator inaugurated a powerful pump at the foot of the contaminated water source with a filter and taps. The intervention was set up in agreement with the local sub-prefecture, which was to be responsible for the maintenance. The machine had a technical problem within a month, and the sub-prefecture never came to carry out maintenance. The pump is today a ruin, as a symbolic monument in decay, reminding the community of the disappointment of external help. Familiar with these failed attempts, Marlene learned to rely on herself and her family, the disillusionment of an external solution and the impossibility of continuing to buy their drinking water with a growing family pushed them to explore further alternatives for drinking water. Her sons ventured deeper into the Atlantic Forest in search of water, knowing that this lush forest also drew its resources from the ground. The discovery of 'water veins' saved the family and allowed them to survive for years to come. These veins are streams that appear when the soil is full of water and disappear in the dry season. Marlene's sons dug the ground to place 4 concrete tubes and install a pump at the bottom. After a few hot summers they realized that they had to dig deeper to avoid suffering as much from the dryness. They dug three more tubes. The word spread and many families dug and installed their pumps in these vertical tunnels in the valley bottom. To connect the veins to their homes, Marlene's family installed 250m of flexible tubing to carry the water, as well as 250m of electric cable to supply the pump. Until today, every three months Marlene has to buy a new pump because of their intensive use and of the distance. This cost is a burden for the family, but a condition for their survival. When the pump breaks, they replace it within a day or two at the most, which corresponds to the water reserves they manage to stock.

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[6] In the 1990s, the rising of the violence and crime was going hand in hand with social segregation and had a strong spatial repercussion on the social stigmatization of the peripheral settlements but also in their everyday realities of living with crime. Freeman, J. P. (2003) 'City of walls: crime, segregation, and citizenship in São Paulo. Teresa PR Caldeira', *Urban Geography,* 24(2), pp. 183-184.

[fig.3] Water veins and Comunidade KM47's families.
Source: elaborated by the author, March 2023

As the family went from 5 to 10 individuals over the years, their need for water infrastructure grew. Since she settled there, Marlene's husband dug three sceptic pits within the boundaries of their property. Two houses were also built on this land, forming a cluster of houses. All three were built in concrete blocks with the long-run savings. For Marlene, they are not yet houses, but 'barracos' because they do not have a legal connection to electricity and water. The family also developed trenches with tubes to create an alternative sewage system for grey water, which earlier ran in the streets. Today, grey water passes under the street and is then redirected to the water source, which is still under contamination. Today the family, like most families, still buys water for drinking, uses rainwater to clean the barracos, and uses the pump for everything else. One lesson the family learned is how to adapt their water consumption to the local climate. Times of continuous rain are good for recharging the water table but are not suitable for washing clothes because they do not dry. Times of prolonged drought are hard times when the family saves water drastically. The strategy is to fill the tanks of one of the family members every day for his/her smaller family nucleus. Thus, Marlene receives the first 50 liters, her son and grandchildren the next 100L, her other son and daughter the next 100L and the last daughter receives the last 100L before starting the 4-day cycle again.

At the end of the millennium, regional demand for resources also changed. The transition from steam to diesel-electric trains reduced the demand for coal in the railway networks, and the total deactivation of the Santos-Sao Paulo freight train at the end of the 1990s was the final blow to the wood extraction at the city-scale for this region. The declaration of many areas of the region as highly protected ecological areas, such as the *APA Capivari-Monos (*Area of Ecological Protection*)* in 2001, named after two rivers, territorialized this new focus on the use of ecological resources. In light of these decisions, a large part of the Japanese population moved to other rural (Governo de Sao Paulo, 2003), many factories closed their doors for new extractive territories, both leaving behind many local people without jobs. The creation of the second *APA Borrore-Colonia* in 2006 reinforced the policy of protection of natural water systems.
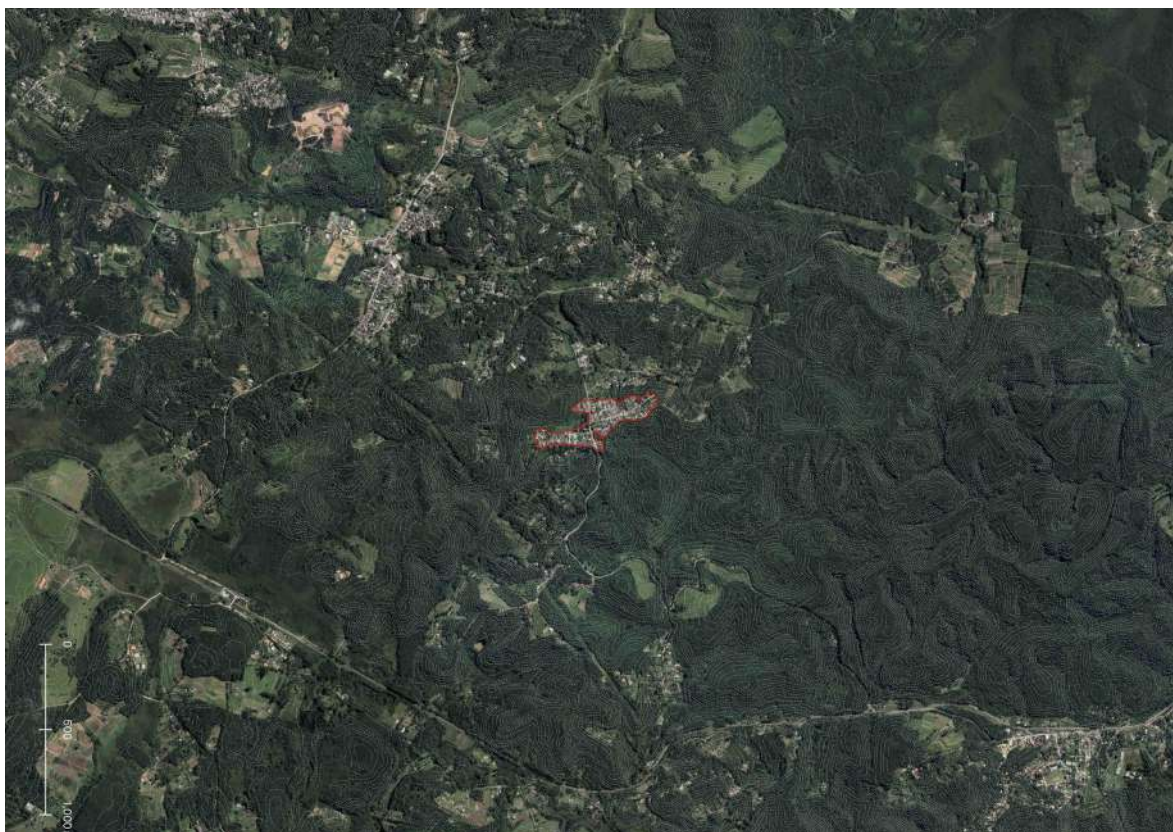
[fig.4] Aerial view of the surroundings of Comunidade KM47 (in red)
Source: Google earth, and data from Geosampa, elaborated by author, 2023.

Today, while access to water is a human right and a federal law[7], the city's water company (SABESP) claims that it cannot connect the Comunidade KM47 to the drinking water network because of existence of the 7 curves (Interview Seu Heleno). This steep altered topography, created at the time for animal transport, would be too costly to perforate for water pipes regarding the little number of inhabitants present in the community and the neighboring communities. Today, Marlene says, when water runs out, she doesn't ask anyone for help. She explains that, at this stage, it is necessary to be able to survive on your own, not to owe anything to anybody. In the community, through the years, access to water has gradually become a measure of social status. Her small children, at the age of adolescence, sometimes take three showers a day whereas Marlene will deprive herself of it by fear of shortage. She explains how her youngsters change their clothes several times a day during the hot seasons to appear fresh. Marlene, on her side, has to wait for the water veins to be full again to be able to wash all those clothes.

Up to the present, unequal access to water infrastructures generate a social hierarchy constituted by water access. Ironically, at the bottom of social standing and wealth, people dependent on the highest situated water sources, often developing skin and intestinal diseases. People owning a caipira wells (10m deep) saw their sources quickly drained by the presence of more powerful semi-artisanal wells (50m deep) and negotiated with the sub prefecture to fund a truck service to fill their tanks every week. Families dependent on pumps, in turn, are forced to invest in new structures at a lower cost but at a regular frequency, with a higher cost for families living further away from the veins. Pumps as well as their wiring furthermore risk theft as much as breakage. At the top of the

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[7] "Before 1968, municipalities were responsible for the provision of water and sanitation. Service providers were municipal water and drainage companies, each with different financial and administrative structures. (…) In 1968, the federal government launched the National Water Supply and Sanitation System, which spawned the National Water Supply and Sanitation Plan (PLANASA). PLANASA was the first federal government initiative in water and sanitation in Brazil and part of the then-military government's national urban development policy. The plan to support the national drive to universalize water and sanitation services was implemented in the 1970s and 1980s (CESBs) in every Brazilian state. According to one World Bank report, coverage of water provision among urban residents around the country expanded from 45 per cent to 95 per cent between 1970 and 1990" Oyeyinka, O. (2010) *São Paulo: a tale of two cities.* UN-HABITAT.

water-based social pyramid, families with semi artisanal 50m deep wells no longer have to suffer from the lack of water during the year, but still have to be careful during the long periods of droughts.

[fig.5] Marlene's family houses cluster and rain water tanks.
Source: elaborated by the author, March 2023

Theoretical reflexion
Brazilian scholars focusing on land-occupation processes investigated «socio-territorial movements» (Fernandes, 2005) to describe how marginalized groups have been resisting 'through' territory, using the physical occupation of land as their main revendication tool (Haesbaert, 2012; Halvorsen, Fernandes and Torres, 2019). Yet to understand the everyday struggles emerging from these territories, studies moving beyond the notion of 'territory' to the notion of 'place' (Oslender, 2016), revealed the importance of understanding place-specific social and ecological practices to understand the evolving difficult relationship between marginalized populations and ecologies (Escobar, 2008).
This reflection seeks to contribute to this academic discussion by exploring different stages of the changing relationship with ecologies. These stages do not pretend to be clearly delimited and static – they may overlap and coexist over a period of time or exist to different degrees throughout the entire process of inhabiting ecologies – but their description helps to understand different dynamics in this process of transforming nature through inhabiting.

Dependency
The first relationship established between the ecologies and the various occupants of these territories in the place-making process is one of 'dependency'.
As the stories narrate when the families arrive on these natural land-occupations, the survival of the families highly depends on the resources they find and their level of knowledge about how to use them. For the first few decades, the existence of the KM47 community depended entirely on how, as a group, they managed to develop a responsible extraction of these ecologies. This has led to the creation of solidarity networks, community practices such as mutirões, and the emergence of social centers such as the water source. On the other hand, the "development" of the Marsilac region is also totally based on the exploitation of ecological resources. From the transformation of the trilhas into trade routes, to the agriculturalization of the Mata Atlantica with the introduction of new

populations, to the development of mega-infrastructures such as city-scale water reservoirs, and gigantic dams to produce electricity, and finally the label of these areas as 'ecological reserves' to produce and extract drinking water.

This first stage of dependence presupposes a moment when, despite the inequalities[8] present, resources seem to be present in relative sufficiency[9] for the precarious populations and the State, or at least do not generate direct conflict over resources between these different actors. This stage of dependence is synonymous with the creation of place-making, and through it, a moment where communities acknowledge the importance of ecologies. This represents a major distinction between shared responsibility and care of the ecologies from the community perspective, while the large-scale actors are just extracting without considering the consequences. This is in line with Martinez-Alier's research on the 'environmentalism of the poor' highlighting how through their battles to keep resources alive, precarious populations understand their connection to and dependence on these resources (Martinez-Alier, 2002). This stage of dependence is therefore a time of 'adaptive strategies' (Fagan, 1995) where the communities learn to live with resources and develop conditioned practices for using and living with them.

Decline

The second phase in the transformation of this relationship is the 'decline' phase, due to the gradual depletion of ecological resources.

Over the years, the gradual deterioration of water resources has led to a serious scarcity, which has been very costly for families. While this phase continued to depend on the ecology for its survival, it has led to a new socio-ecological relationship. For the community, this loss of access to such a vital resource generated a shift from shared dependence and mutual responsibility to a dynamic of competitive and hierarchical resource extraction. At the broader scale, the rapid growing of the city negative ecological impacts from the industrialization as city-scale water contamination, air pollution and multiple effects from the large-scale deforestation (de Fatima Andrade *et al.*, 2017) with on the frontline of these pollutions the precarious communities depending on them. This phase illustrates how, when resources become limited or polluted, the unequal access to coping mechanisms deepens uneven exposure to scarcity, leading to inner-community social division.

This phase of decline echoes of the "tragedy of the commons", where the over-exploitation of a resource is created because individual interests are more important than the well-being of the community. As a result, the common resource is over-exploited, affecting everyone (Ostrom, 1990; Hardin, 1968). This individualization occurs when the community is at a more advanced stage of urbanisation. This level of urbanity also brings the possibility of having water at home via a pump, which creates a new distance between the ecologies and the families, as well as between the families themselves. Finally, this decline is aggravated by the lack of perspectives for families living on land-occupation. This insecurity of tenure, omnipresent on the peripheral settlements, leads to an acceleration of ecological degradation by families faced with immediate problems and no perspectives.

Socio-ecological marginalisation

The last phase of the transforming relationship between community and ecologies is the 'socio-ecological marginalisation'[10]

In the case of the families in Comunidade KM47, this socio-ecological marginalisation is reflected in multiple exposures to polluted water and all the social issues emerging from it. This transformation is perceptible by the transition from a scarcity of resources to ecologies that are

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[8] It has to be said that the 'dependencies' were drastically different, from the KM47 families struggling to survive and create a habitat, to the large-scale companies carrying out massive extractions to control the wealth and its distribution.

[9] Not to minimize the fact that these first moments of land-occupation are extremely difficult. These people face constant hardship, forced to live on land that is difficult to inhabit, without access to any of their most basic rights or to the infrastructure of a "dignified dwelling". The idea here in speaking of "relative sufficiency" is rather to describe a first stage of place-making which, in comparison with subsequent stages, has abundant natural resources present on site.

[10] I develop this concept to designates a twofold marginalisation: on the one hand a social marginalisation, where the poor are forced to build by themselves their neighbourhoods creating marginalised communities and occupying lands with no infrastructure; on the other hand, an ecological marginalisation, where the ecological areas are exposed to massive degradation by self-help urban development. This research develops the concept of 'socio- ecological margins' to designate the particular territories constructed from this twofold marginalisation and located at the margins of cities.

becoming a source of danger for the inhabitants which deepens the rejection of the ecologies. the Comunidade KM47, the combination of the above phenomena – unequal access to cop mechanisms, increasing pressure on resources and loss of social ties – generates a socio-ecologi hierarchy within the community. At the city-scale the socio-ecological margins include more th 1.7 million (Martins, 2005) poor individuals occupying water reserves in the southern periphery São Paulo. The daily rapid pollution of Sao Paulo's dense water network threatens the provision millions of Brazilians with fresh water and food production. Degradation of water syste influences water cycles as well as directly influencing the Mata Atlantica's biome, one of the world heritage hotspots (UNESCO, 1994). In this last phase, the dynamics of dou marginalisation become more pronounced through the years. The more the communities dest the ecologies, the more they are exposed to 'natural' disasters such as landslides, droughts, floodi or extreme pollution, as in the case of KM47. The presence of these communities in th ecological reserves conditions them to illegality (Martins, 2005) and crystallizes public opinion: the one hand, the defenders of the right to the city are fighting so that these populations can stay the peripheries; on the other hand, the defenders of the ecology are fighting to save the v ecosystems (Martins, 2006).This phase of socio-ecological marginalisation for the communities often a moment of power battles with the State. At that stage, the communities – mostly perce nature as an enemy[11], a barrier to modernization and integration into the city – try to urbanize much their settlement to be recognized as an "urban area" and be regularized. On the other ha the State doesn't want to recognize all these areas as 'urban', knowing that it would condemn remaining ecologies to depletion or even more pollution.

[fig.6] Sceptic pit dig by family of Comunidade KM47.
Source: elaborated by the author, March 2023

Conclusion

This article seeks to contribute to discussion on the importance of understanding place-spec social and ecological practices in relation to the evolving difficult relationship between marginali

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[11] A phrase that one often here on these socio-ecological margins from the inhabitants is "Tudo aqui era mato" (everything here was bush), as historian Janes Jorges puts it: "the *Mato* is the city's negotiating front ".Jorge, J. (2020) 'Morar no extremo sul de São Paulo: sociedade e natureza na região da Guarapiranga em meados do século 20', *Cadernos CEDES,* 40, pp. 266-275. .

populations and ecologies. In order to accomplish that, this article followed three multi-layered stories in an attempt to identify the place-based practices of marginalised communities attempting to inhabit ecological reserves. The aim was to explore how certain ecologies and geographies change practices of inhabiting and city-making. Secondly, this research aimed to explore how examining these practices could enhance our understanding of the broader socio-ecological crisis. The study of practices has demonstrated the need to understand their ever-changing nature, trajectories, and phasing.

Studying the dynamism of practices has allowed to identify three major phases in the change in the relationship between communities and ecologies. This research has exposed that in the first phase of 'dependency', communities become entirely dependent on ecologies and develop networks of mutual solidarity and shared responsibility. In the second phase of "decline", a shift operates from shared dependence and mutual responsibility over the ecologies to a dynamic of competitive and hierarchical resource extraction. The phase of 'decline' came also with unequal access to coping mechanisms generating uneven exposure to scarcity, leading to social division.

Finally, the phase of 'socio-ecological marginalisation' came with the transition from a scarcity of resources to ecologies that became a source of danger, generating a rejection of nature and a socio-ecological hierarchy within the community. This research argues that study of these practices' dynamics is a path to be further investigated to better address the phenomenon of socio-ecological marginalisation.

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The open spaces of housing estates, as laboratories of the living
An exploration of the Bijlmer district in Amsterdam and the Cité Modèle in Brussels

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If the current ecological crisis is both a crisis of our human societies and a crisis of living beings, it is also, and above all, according to Baptiste Morizot, a crisis of our relationship with living beings. Although this crisis is directly linked to the abysmal disappearance of many species, it is also closely linked to the way in which we humans occupy and inhabit the Earth.

The aim of this article is to identify, through field experiments, the multiple ways in which the question of the living in the urban environment can be addressed.

This article is part of a research project that attempts to reveal the potential of singular places in the Second Belt of Brussels, the open spaces of public housing estates, by looking more closely at how they offer posts for observing the living in the urban environment but also places for experimentation around multiple coalitions.

The hypothesis is that the ongoing project and processes dynamic on these open spaces can draw renewed attention to a specific architectural heritage as well as provide better care and better relations with all species that coexist, while also giving a political voice to all living beings through new coalitions.

To do this, we will look at two specific sites: the Bijlmer district in Amsterdam and the Cité Modèle in Brussels. Observation work conducted in the field and meetings with key actors have enabled us to better understand the dynamics at work on each of these sites.

Prelude

"Tuesday 4 April 2023. We are at the Cité Modèle in Laeken, a municipality in the north of the Brussels Region. Two days of participatory work are being organised by the urban planning offices Latitude and Dear Pigs to help the Cité Modèle non-profit organisation restructure the Cité's vegetable garden.

A few people are already at work, shovel in hand. Davide is supervising the workshop. Sophie is a resident of the housing estate. She is an experienced gardener with a whole series of sophisticated tools labelled with her name and she likes to know where her food comes from. She is interested in permaculture, in contrast to the elderly Marcel, who starts by conscientiously ploughing his plot. Four young residents of the housing estate, aged between 13 and 16, are there to help in exchange for a small fee. They are on holiday and it is Ramadan, but they carry kilos of paving stones recovered from Brussels city warehouses. Thimothée and Kafui, both part of the Cité Modèle organisation, are also there to give a hand. The plots have been allocated. The objective of these two days is to delimit the individual plots. Part of the vegetable garden is dedicated to a more collective appropriation.

My shovel sinks into the soil like butter. Twenty centimetres of rich black earth composes the first layer of the garden. Then comes sandier soil with scattered rubble, probably from old excavations. The first layer is teeming with long, fat worms. They are the primary beneficiaries of this garden. They work in the shadows. Sophie tells me that there will inevitably be some collateral damage and asks me to save them as much as possible. They are essential to the good quality of the soil. The fruit trees, old varieties, draw on this soil. There are birds, too. Their song heralds spring and mixes with the sound of the drills coming from the high-rise flats under renovation.

What is at stake between these different actors? What do we all have in common that day? Between a sharing of knowledge where each one learns from the other (despite certain perceptible tensions) and this daily practice of caring for the Earth?"

Living cities

This everyday narrative is being written and woven by a multitude of human and non-human lives that exist side by side in a context of unprecedented crisis. If the current ecological crisis is both a crisis of our human societies and a crisis of the living, it is also, and above all, according to Baptiste Morizot, a crisis of our 'relationship with the living'[1]. Although directly linked to the abysmal disappearance of many species, it is also closely linked to the way in which humans use the land and soil, inhabit the Earth, with particularly endemic urbanisation and soil artificialisation[2]. But what do we mean by 'living'? Beyond its original meaning, where the living pertains to any organism or life form that possesses or shows the characteristics of life or being alive, the term 'living' refers to other dimensions that go beyond biology, such as philosophy and political ecology (Buyck, 2022). These dimensions have been studied by a prolific literature emanating from the ecological humanities in recent decades, questioning our ways of being in the world and other ways of making the world. These disciplines are now widely inviting us to rethink our relationship with the living, with a view to overcoming the "nature-culture gap" on which our Western societies have been built. The relationship with the living institutes a relationship of dependence between living beings and their environment, and between living beings themselves. Situated narratives, true stories, "stories of place, stories of the living, indigenous stories, stories of ecosystems" (Lanaspeze, Schaffner, 2004), belonging, attachment and commitment to place are all ways in which ecological humanities are rethinking our attachment to the living. While these reflections are primarily articulated from primary natural terrains, Freya Mathews reminds us that "we tend to imagine connection with nature as something that happens in the bush, but exciting new research is examining belonging and interactions with nature in the city" (Mathews, 2000). The urbanised space might also be the right place for this reconciliation with all the entities that populate the

[1] Morizot B. (2020), Ways of Being alive, translated by Andrew Brown , Wiley
[2] Today, we notice a weakening of natural systems in cities. The expansion of territories affects the very ecology of landscapes, causes the destruction and fragmentation of natural vegetation, and implies an increase in temperatures, the degradation of air and water quality, and the sealing of surfaces. Soil degradation leads to the disruption of ecological balances and the destruction of ecosystems. To counteract the loss of biodiversity and soil artificialisation, recent policies ('no net land take' compensation measures), supported by the European Union, aim to curb land consumption by 2050 and attempt to regulate the impact of new construction on soil artificialisation.

world. Indeed, nature also thrives where we least expect it, in brownfields, on roofs and underground. But how do urban planning and landscape practices deal with these issues in the urban environment today? Are they able to initiate these relationships, these reconnections in view of a reconciliation?

For the second year running, 'living cities' is the theme of the Europan3 competition presenting it as a "new paradigm, in which new kinds of synergies can be considered between the environmental, biological, social, economic, cultural and political dimensions. This paradigm leads us to think in terms of co-evolution and interactions, and to work with regenerative project dynamics, combining metabolic and inclusive vitalities."

The last landscape and architecture biennial in Versailles (BAP 2022), entitled 'The Precedence of the Living', also shows the topicality of this concept in relation to the fields of urban planning and landscape. The biennial's co-curator, Gilles Clément, a radical figure in French thinking on the living, reminds us of the importance of including the living in a wider debate, in order to design landscape and cities from a living perspective. But Clément also underlines our ignorance of living things and agrees with the theses of Morizot and Muratet on our blindness and inability to name living things: "we still don't know much about natural genius, about how to deal with it, how to live with it, how to dialogue, initiate and develop with animal and plant diversity."4 On the one hand, the last two sessions of Europan invite us to think about the city and the landscape collectively from the viewpoint of the living in all its dimensions; on the other, it is an admission of our ignorance of the living and an invitation to a certain humility and, ultimately, to better understanding.

The aim of this article is therefore to identify, through two case studies, the multiple ways of dealing with the 'living' in urban environments, but also the sticking points and the limits faced by certain projects or processes.

To do this, we will take a look at two specific sites: the Bijlmer district in Amsterdam and the Cité Modèle in Brussels, both distinct examples of modernist heritage. We will first look at the case of the Bijlmer food forest, a pioneering project led by a group of activist artists based in Amsterdam. This project, initiated in 2018, applies the principles of multispecies urbanism as defined by Debra Solomon, the founder of Urbaniahoeve, a social lab for urban agriculture that produces food forests in the public space and provides related education and training with locals, in and for their own communities. We will then look at the Cité Modèle, an icon of modern architecture whose open spaces and living soil have been the subject of several landscape experiments initiated by different actors.

Ongoing observation work is being carried out in each of these places and meetings with key players have enabled us to gain a better understanding of the dynamics at work. For the Bijlmer, a reflection is being carried out by means of walks, drawings and writings with architecture, landscape and urban design students from the Amsterdam Academy of Architecture (AHK) to reveal the potential at Bijlmer of coexistence. For the Cité Modèle, besides talking to Gilles Clément, we have been actively engaging with the site through a garden workshop. In both cases, we will therefore try to describe how these ongoing social and spatial experiments propose multiple ways of being in relation with the living (1) by considering the natural potential of these places where humans and non-humans live side by side, (2) by the construction and transmission of a shared narrative, and (3) by the daily care accorded to these everyday spaces.

Learning from Bijlmer

"She was raised to be the ultimate solution for the polluted, dilapidated, and crowded cities. A modern city expansion in its purest form: large dwellings arranged in high-rise flats, placed in a lush and green environment. A strict segregation of programme would guarantee a quiet and clean neighbourhood with an abundance of leisure possibilities. It would be the safest living environment

3 https://www.europan-europe.eu/fr/
4 Gilles Clément, conversation with the author, Paris, 3 June 2022.

in the country, as the motorized traffic – lifted high above the ground – was completely isolated from pedestrians and cyclists" (Oostendorp, Sieswerda, 2010).5

The Bijlmer district has an eventful history. Designed according to the principles of the CIAM, it represents the modern city of emancipation in Amsterdam in the 1960s. To build the Bijlmer, new ground was created. A total of 11.5 million cubic metres of soil from the Vinkenveen and Muiderzand lakes were deposited on the peaty soil of the Bijlmermeerpolder. The original plan, designed by Siegfried Nassuth, was organised around housing blocks in a honeycomb pattern set in a large expanse of 'green' and recreational space [fig.1&2].

Over the past fifty years, the Bijlmer has undergone significant spatial and social changes, although the overall structure of the landscape has remained relatively intact. The food forest project is a pioneering one in the sense that it has developed a process where many actors have been involved around food practices and what its authors call 'multispecies' urbanism.
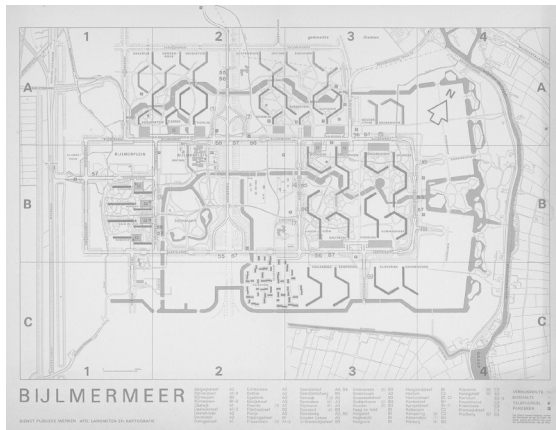
[fig.1] Bijlmermeer original plan – Source: City of Amsterdam Archive
[fig.2] The construction of the Bijlmer – Source: City of Amsterdam Archive

The food forest

The project was initiated by Urbaniahoeve, an organization founded by Debra Solomon and Renate Nollen in 2018 and developed by the Amsterdam Zuidoost Food Forest Community of Practice in collaboration with the City of Amsterdam. The project is based on the spatial structure of the neighbourhood and its surface area. Indeed, the project area covers more than 55 hectares of open space between two structuring green corridors, the Bijlmerweide in the east and the Nelson Mandela Park in the west. This minimum surface is necessary to prevent the loss of less urban, sometimes rare, mostly forest species that are sensitive to the reduction of their territory. The 55 hectares consist of open spaces of different natures: the existing pocket forests, the meadow turfs, the water banks, the pedestrian meadows, the educational food forest and micro-environments linked to the architecture, such as the heart of the honeycomb buildings6.

The project is also part of a wider academic reflection by Debra Solomon on multispecies urbanism. Solomon presents this type of urbanism as a philosophy in which a city gives priority to the care of nature and ecology, and where humans are not alone, but are part of a reciprocal multispecies relationship with the urban landscape they live in. The Amsterdam Zuidoost food forest proposes to test this type of multispecies urbanism and to work on this reconnection through the creation of a forest that would short-circuit the system of dependence on the food network linked to mass distribution. The project is based on the observation that the Bijlmer's

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5 The authors rely on fiction, taking an exemplary building and personifying it through the different phases of its life: "For the benefit of the narrative we have condensed these events and tell the story of one exemplary building." See Wouter Oostendorp and Jouke Sieswerda, 2010, *Interpreting Modernism: How an Amsterdam housing development changes when Suriname gains independence.* in Journeys: How travelling fruit, ideas and buildings rearrange our environment, CCA

6 Sites larger than 53 hectares are necessary to prevent the rapid loss of area-sensitive species. Joscha Beninde, Michael Veith and Axel Hochkirch, "Biodiversity in cities needs space: a meta-analysis of factors determining intra-urban biodiversity variation", *Ecology Letters* (2015) 18: 581–592.

precarious populations are the most vulnerable to health problems linked to processed food, which industry moreover aggravates the climate crisis and the loss of biodiversity and fails to provide healthy food. These populations face a form of environmental and food injustice linked to mass distribution. Beyond its local scope, the project thus calls for a radical change in our agricultural and food systems based on a vision and spatial practices rooted locally.

To implement the food forest, work was carried out with all the local associations involved in urban gardening, health and education. The project is also supported by the City of Amsterdam, which has developed a growing interest in soil and soil remediation in recent years.

[fig.3] A wild meadow in the K district of the Bijlmer, by the author
[fig.4] Vegetable garden in the K district of the Bijlmer, by the author

Pedagogy of the living

The food forest is therefore intended for both humans and non-humans through the variety of food it offers [fig.3&4]. The humus in the soil is reconstituted to encourage the presence of microorganisms. Edible species have been planted, such as berry bushes (raspberries, blackcurrants, currants), fruit trees (apples, pears) and nut trees. But the forest is also based on a collection of spontaneous edible plants that cover the Bijlmer soil: wild rocket (Diplotaxis tenuifolia), purslane (portulaca oleracea L.), garlic (alliaria petoliata), not to mention the many nettles (urtica).

During a site visit with the students of the Amsterdam Academy of Architecture (AHK)7, Debra Solomon invites us to pick and taste these different plants (with the exception of nettles). In doing so, she brings to our attention, by calling on our various senses, what has become invisible to us. This educational work is also carried out with the municipal services in charge of the maintenance of the green spaces in order to set up an ambitious plan of differentiated management8. Despite proven positive results (in terms of soil quality, increase in biodiversity, the improvement of the plant layers), its application is facing difficulties in the long term. The lack of commitment of the authorities on a daily basis and the lack of training of the gardeners who maintain the open spaces undermine the work in the long term. Mowing in the wrong place can have catastrophic consequences for the maintenance of certain biotopes as it can destroy natural habitats and therefore destroy all the work done upstream by the "community of praxis" committed to change. Over the past ten years, this community formed around the inhabitants of the Bijlmer has evolved and its members have changed. Debra Solomon is the link between the different members, but she is also responsible for the success of such a project. Every month, she visits the site, pruning shears in hand, to eradicate the giant hogweed, an invasive and phototoxic plant, or to specify future mowing plans. She takes on the role of artist, researcher, mediator and gardener. For Gilles

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[7] The students were enrolled in the 02 b course on ecology and reflection, where the Bijlmer food forest has been introduced to the students as a field of research for the completion of a collective section representing different stories of cohabitation.

[8] The differentiated management of green spaces consists in *not* managing and maintaining all the green spaces of a community in the same way and with the same intensity. For example, you can have a mowing plan defining areas that are mechanically mowed, others that are manually mowed, and others still that are left untouched.

Clément, the gardener guarantees the maintenance and improvement of biodiversity. But to guarantee this attention, an attachment to the place, to the soil, is necessary. Through her involvement over such a long time and with so few means, Debra Solomon is taking a very radical stance at the Bijlmer.

Despite the difficulties it faces, the project seems to be increasingly anchored in its territory, transforming it in a sustainable way. Firstly, by the daily care given to this everyday nature. Secondly, by the importance of the community, which seems to give a voice to the living, by forming and reforming 'communities of praxis' and by clarifying knowledge about the living. The Bijlmer project is thus based on an innovative practice, that of a concerted multispecies urbanism and of an artistic practice in wasteland.

Brussels, the 'green city' of the twentieth-century Belt

We now turn to Brussels and to the broader framework of the thesis in which this article is set. Brussels has inherited what is known as the 'twentieth-century Belt'[9], a space straddling Flanders and Brussels, neither strictly a suburb nor a periphery. This particular fabric refers to a city-nature ideal through the fine interweaving of its built-up and open spaces, alongside the large nature reserves. It offers, through its fragmented condition, a field for observing urban biodiversity.

In this Belt, my interest is in districts similar to the Bijlmer, where architecture is inseparable from landscape [fig.5]. These outdoor open spaces are linked to the public housing heritage that was once built on strong ideology. Their surface area represents 353 hectares[10] over the whole region, i.e. 4% of its total surface area, but they have not yet been recognised for their biodiversity potential, as most are classified as 'areas under vegetation cover' by the Nature Plan[11] and as 'low density areas' by the Regional Land Use Plan[12].

If the landscape of the garden cities in the early 20th century carried a fertile landscape discourse, the 'green space' of the Athens Charter, on the other hand, "reduces the vegetal presence to a spot, a coloured surface whose destination is so diverse that it becomes indeterminate" (Mathis 2021). It is only since the late 1970s, with the work of Paul Duvigneaud in Brussels and the emergence of the 'urban ecosystem', that "the way we look at plants has changed. It has become part of a social and natural whole that must be taken into account" (Mathis 2021). In this open and green city, originally planned for recreation and leisure, we now find spaces that can be shared with all forms of living beings and where radical practices are emerging.

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[9] Leloutre, Cavalieri, Dehaene, Atlas de la couronne du XXème siècle. In 2019, LABO RUIMTE (Departement Omgeving and Team Vlaams Bouwmeester), in collaboration with the Brussels Region (perspective.brussels and bouwmeester maître architecte), launched an analytical and prospective research project on the qualitative transformation of the built fabric in the 20th century crown in Brussels and the surrounding area. The 20th century ring road is a strip of land straddling the two regions, between 2.5 km inside and 5 km outside the boundaries of the Brussels Region. This atypical stretch of land presents a number of urban and social challenges in terms of mobility, the environment and health, but also in terms of quality and affordability.

[10] Information given by BRAT - Bloc paysage in the Inventory of Open Spaces, study launched by SLRB-Bruxelles Environnement in 2021, third CA presentation. As an element of comparison, we could take ZSC II, which is made up of 15 partial Natura 2000 zones covering both public and private open green spaces. This *Zone Spéciale de Conservation* lies between Molenbeek-Geleytsbeek to the north and Linkebeek-Verrewinkelbeek to the south. The 10-hectare Kinsendael Krikenput nature reserve is part of this area. It's easy to see why these nature reserves, made up of former quarries and farmland, have been partly renaturalised to benefit biodiversity.

[11] Plan Nature, 2015.

[12] Plan Régional d'Affectation du Sol (PRAS).
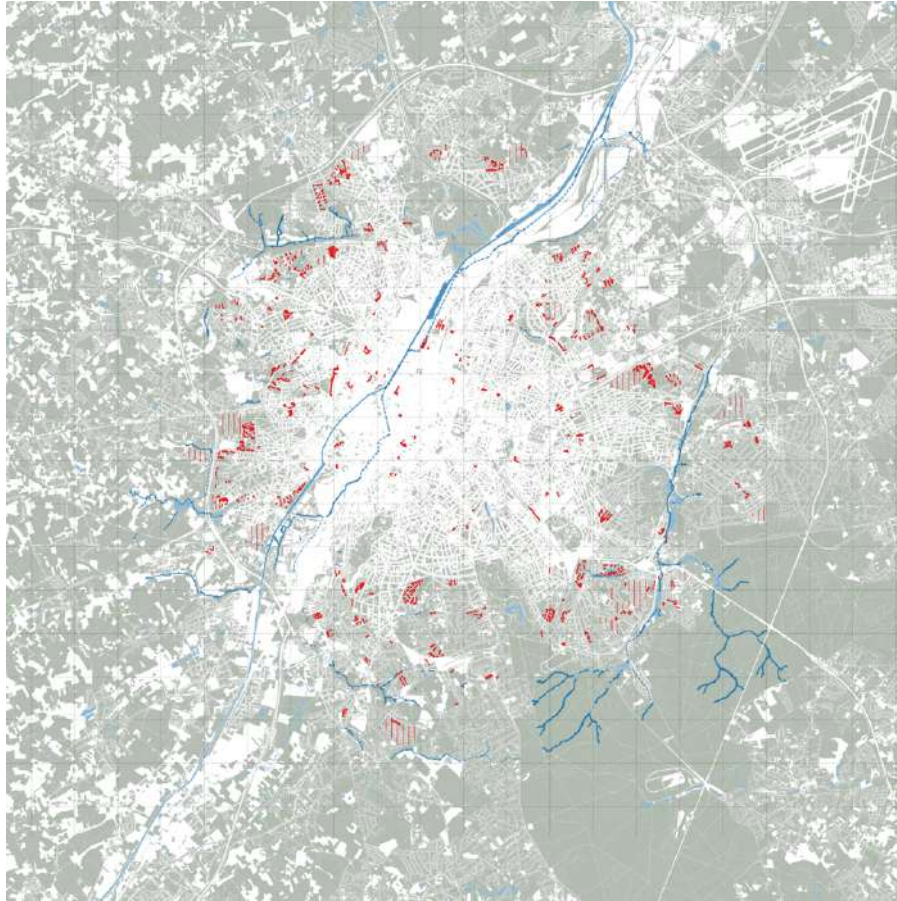
[fig.5] Identification of social housing sites in the Green Belt of Brussels. Here, the different shades of green are set at the same level to create a mass effect and highlight the major urban continuities.
Source: "elaborated by the author" from the Brussels Housing Corporation (SLRB), 2013 / NGI Top10Vector v5.4 (2019) 01/10/2019

Cité Modèle

The Cité Modèle is part of that network of open spaces intertwined with public housing that composes the green belt of Brussels. But before delving into the site's current status, it is important to understand its genesis. As an icon of post-war urban planning in Brussels, the Cité Modèle is one of the largest social housing sites in the region, with more than 1,000 housing units for 2,000 inhabitants. It has been and still is the subject of several research studies and articles in the field of urban sociology and architectural history, but the open landscape and its topicality have been little studied until now13.

This 17 ha site is located on the formerly agricultural Heysel Plateau, near the Dieleghem Forest and the Laerbeek Forest, both of which are classified as Natura 2000. Although the 55 hectares of critical mass are not reached here as in the Bijlmer, the 17 hectares constitute a potential link in the reinforcement of the green and blue corridors. The Cité Modèle housing estate was intended to be a showcase for the post-war housing revival, a project that the socialist deputy Fernand Brunfaut wanted for the 1958 World's Fair. This modernist complex was designed from 1956 onwards by a group of architects: Renaat Braem, as leader of the group and strong believer "that the city, by its intimidating external monumentality and its inner serenity, would reorganize social relations and thus generate a new, more liberated human.", Victor Coolens, Jean Van Doosselaere, Raymond Stenier (of the Structures group), Émile Parent (of the L'Équerre group) and René Panis. Inspired

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13 Morgane Bos's article looks at the open spaces of the Cité Modèle from a historical perspective, questioning Clément's project in the context of a modern heritage legacy. Bos, Morgane. Contemporary continuity of an introverted heritage site. The case of the Cité Modèle of Heysel (Brussels, Belgium).17th DOCOMOMO Conférence 2022 : Modern Design: Social Commitment & Quality of Life (Valencia, Spain , du 06/09/2022 au 09/09/2022)

by the Athens Charter, the Cité Modèle is composed of vast buildings, oriented East-West, mostly raised on pillars, and benefiting from abundant sunlight.

The surrounding landscape was designed by the architects and follows an orthonormal logic reinforcing the architectural dimension of the site, despite its accentuated topography. The pedestrian paths are in red cast concrete and follow the main lines of the site and buildings. The green spaces make up the remaining part of this plan. If the construction of the roads and the first profiling and grassing of the surroundings were only carried out on part of the site around 1965–66, most of the planting was only done in the early 1970s.

The archival work carried out within the Foyer Laekenois, the housing corporation in charge of the Cité, has made it possible to find the specifications for the surroundings dating from 1974 and the list of original plantations. The choice of species is mainly exotic and is rooted in the aesthetics of the 1970s and in floral art. There are a large number of cotoneaster horizontalis, rosa rugosa and dwarf mountain pine (pinus mugo muglus). Particular attention was paid to the lawns and their maintenance: everything was done to obtain a beautiful 'carpet of grass'. In the original design, the surroundings are therefore considered as undefined green spaces, designed with two layers: a tree layer and a large expanse of lawn.

The photos taken at the time of the construction [fig. 6] show a stripped, extremely bare area. The violence done to the soil by the excavation and embankment work carried out on the entire site, destroying a large part of the biological richness present in the soil, seems to be representative of the paradox of urbanisation: that of the development of a place in which to live, aiming first and foremost at its artificialisation to the detriment of its natural qualities and its ecosystemic richness. Today, the aim is to reverse this destructive process in favour of an inhabited environment that gives more space to biodiversity, which would allow us to link up with the living beyond the quantitative issue. In the Cité Modèle, "the relationship with life could become the basis of a social contract to be reinvented" (Fleury, Prévot-Julliard, 2019)

[fig.6] The construction of the Cité Modèle – Source: City of Brussels Archive

As a counterpoint to the history of the architectural model that represents the 'model city', as in the Bijlmer with its moments of grandeur and decadence, we can identify other stories that contribute to shaping the 'living thickness' of the Cité. Two stories of neighbouring, almost adjoining places, which echo the process started in the Bijlmer by starting from the existing, introducing new planted layers and relying on communities of inhabitants. Two stories that give us a glimpse of the possibility of a renewed relationship with the living in the Cité Modèle: Gilles Clément's well-known project Jardin de l'Arbre à Ballon, and the Potager Modèle, a recent initiative to revive the Cité's former vegetable garden.

Jardin de l'Arbre à Ballon

In 2005, three years after publishing his book on the 'garden in movement'14, Gilles Clément was invited to create a work of art on the site of the Cité Modèle as part of an artistic subsidy financed

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14 Clément G, 2006, le Jardin en mouvement, Sens & Tonka.

by the Brussels Housing Corporation (SLRB), the 101% artistic (subsidy). For Clément , this was an opportunity to implement the main principles of the 'garden in movement' in Brussels, which consists in "combining formal aesthetics with the balance of an ecosystem. To preserve the existing diversity, to increase it, to use the energy specific to the species, not to spend unnecessary energy on the contrary. Do as much as possible with as little as possible"[15].

The proposed project suggests going through a new piece of landscape, experiencing nature in the city in a new way. The main interest of the garden is to open up the site on its southern edge by a generously planted garden staircase. From the start, Gilles Clément wanted to link the Cité's cultural centre, la Maison de la Création, a local anchor in the life of the Cité, to everyday spaces such as the nearby supermarket. "For me, it was obvious that the importance of this cultural centre, which brings together the inhabitants whenever possible, had to be highlighted. From a social point of view, it seemed very useful and successful. Then, to link the plateau with the built architecture and what was below: a supermarket, things that were accessible but by taking detours. So why not go straight there? This allowed me to talk about the Arbre à Ballon, to cross the embankment in a different way, and I made this proposal for a new axis with a 21-metre-wide staircase, but which is not a staircase that you cross directly, or a classic staircase which you climb in a straight line."[16]

With the Jardin de l'Arbre à Ballon, Clément attempts to implement landscape principles in the name of diversity, and thus to change management methods. The staircase-garden is the support of a new biotope, "with large cracks that are planted and that force us to meet the living plant". The introduction of melliferous plants suggests that small insects, bees, butterflies and birds will come and settle there and gather food. Indeed, the species chosen, unlike the original species, refer to a new plant world with a differentiated management. There are many pennisetum, evoking the free landscapes of the coast although some trimmed boxtrees lend a certain rigour to the garden. This project, through the plant palette and management method it proposes, seems to illustrate the shift from a domesticated to a wilder nature within urbanised environments, offering more room for biodiversity and more room for encounters between human non-human living beings. Following a relatively classic implementation process (with a permit application and a tender to choose the contractor), the project failed to benefit from the establishment of a strong community of inhabitants involved in the project's realisation. Only a few workshops were organised with children in the company of Gilles Clément to better understand the dynamics of movement in public space.

For several years now, a co-management structure has been set up between Les Jeunes Jardiniers (a private gardening company trained in differentiated management practices, in charge of the meadows and plantations) and the green space maintenance team of the City of Brussels (in charge of the dolomite paths). The renovation of the staircase-garden is, according to the SLRB[17], necessary to repair the paths but also to replace perennials that have reached the end of their life cycle. Isn't this renovation going against the concept of a 'garden in movement'? Should the landscape project be fixed to the detriment of the living? In his book Éloge des vagabondes[18], Gilles Clément reminds us of his aversion to any forms of conservatism by considering the multiplicity of encounters and the diversity of beings as a wealth added to the territory. In his own way, Clément has tried to establish a "shared territory" where humans and non-humans could perhaps better co-exist. But it is primarily a spatial and botanical vision that is put forward and the aesthetic experience seems to take precedence today over the co-evolutionary dimension, which seems to be the central challenge to the recent dynamics launched in the Potager Modèle.

Potager Modèle

The Potager Modèle is located about fifty metres from the Jardin de l'Arbre à Ballon. Initiated in 2012 as part of the sustainable neighbourhood citizen initiative, it is now part of the 'climate call for projects' launched by the City of Brussels in 2022. The current initiative is based on the existing vegetable garden, which had fallen into disuse due to a lack of active forces and a lack of visibility. The project was initiated by the non-profit organisation Cité Modèle with some inhabitants who

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[15] Gilles Clément, conversation with the author, Paris, 3 June 2022.
[16] Ibid.
[17] Marc Florin, SLRB landscape architect, conversation with the author, 13th may 2022.
[18] Clément G, 2023, Eloge des vagabondes, Robert laffon

were initially involved in the original vegetable garden. The ambition of the Potager Modèle is to go beyond a collective vegetable garden project and to respond to multiple challenges linked to sustainable food, rainwater management, biodiversity in green spaces, reduction of heat islands and the reuse of solid and organic resources. Several dimensions have been highlighted by the organisation, including the biological dimension (through "the diversification of vegetal spaces and the implementation of devices to increase the presence of insects and biodiversity") and the social dimension (through "a co-creation and participatory training approach at all stages of the project"). Despite its relatively small size compared to the Bijlmer's 53 hectares, it is reminiscent in some respects of the food forest project in that it aims to establish a hyper-local food chain and to enhance the value of the green and blue landscapes both for better social inclusion and to improve biodiversity.

The project aims to train the future gardeners of the Cité Modèle to guarantee the long-term maintenance of the garden. Two days on site allowed me to measure the potential of the place not only in terms of its ecological dimension but also in terms of its educational and social dimensions. The project starts from what is already there by paying attention to the existing fruit trees, the orientation of the Sun, and the setbacks from the existing ground floors. It relies on local associations and on a community of residents who do not necessarily know each other but who have a common objective: to share a piece of land, to connect to the ground, in contrast to most of the housing in the estate, which seems to belong to the sky, to the horizon. Although there are tensions and visions sometimes diverge, alliances are also emerging.

Unlike the Jardin de l'Arbre à Ballon, the figure of the landscape designer does not exist here. The collective of urban planners and architects who support the process, formed around the Latitudes and Dallas collectives, do not seem to claim ownership of the project but rather advocate its co-construction with a view to sharing and transmission. These ambitions can be found in Gilles Clément's garden, with a stronger social construction here.

Discussion

In this article, we described the attempt of Bijlmer food forest and the two gardens of the *cité modèle* to build a better relationship with the living, without opposing human interest with 'nature'. Both projects reveal the importance of somewhat marginal processes that bypass conventional project management procedures, on the one hand, and the importance of ongoing, long-term management, on the other. They also reveal the fragility of our (human) link to the living in urban contexts.

But how to ensure the continuity of this type of project? And how to define the role of landscape?

We should certainly mention the timid but ongoing drive in Brussels to go beyond current technical planning instruments, such as the regional Plan for Sustainable development (PRD) (2013) and the regional nature Plan (Plan Nature) (2016) and adopt an approach that is both forward-looking and sustainable. The study *Les espaces (ou)verts du logements* carried out by the SLRB and Brussels Environment three years ago aimed to reveal the importance of this heritage, its fragmentation and the difficulty of managing it from a mainly technical angle (land ownership, maintenance). Although the results could not be disseminated, it did reveal a need for a better knowledge of this heritage and questioned the ecological role of open spaces linked to housing. A number of pilot sites were then chosen to test more innovative types of management. This is an important step in a more general process that should not be limited to the ecological management of the living, but should focus on the links and relationships that need to be built, by inviting the residents of these housing to get a better feel for the natural spaces they inhabit, through care and knowledge.

The discipline of landscape is at the heart of these issues, although it manifests itself very differently depending on the case study presented in this article. The Projet de l'Arbre à Ballon is above all a project with a strong aesthetic, a structuring design that organises encounters through form. The Potager Modèle and the Bijlmer food forest, on the other hand, are firstly based on the strong involvement of local residents. They define a framework within which an aesthetic can emerge. These projects and practices of the 'living' in urban situations reflect Jean-Marc Besse's notion of 'boundary objects'. "In terms of development, the logic of the landscape is in fact what the sociology of science and technology has called 'frontier objects': objects with uncertain contours that enable different social worlds to meet. Landscape creates a space where multiple disciplinary

knowledge, heterogeneous rationalities and diverse interests meet and sometimes clash in a process of defining what is the place of intervention and therefore the spatial response that is developed there" (Jean-Marc Besse, 2018). Therefore, the landscape allows us to work on our interdependencies without always opposing a priori the interests of humans and those of 'nature'.

Indeed, these case studies are not the stories of territories that need to be defended against building projects in the name of biodiversity, as can be the case with certain brownfield sites in Brussels. The stake here is not the defense of an exceptional biodiversity, but the initiation of an encounter with the living through the project of landscape in its broadest sense.

In both cases, a new narrative is being written, one that overcomes the old modern ideology. There is reason to be hopeful that these places can become "places of exchange, co-learning and biodiversity"[19] by taking better care of this fragile nature we all belong to. In other words, by enhancing the value of our modern built heritage, where a new contract between human and non-human must be found. The processes followed at the Bijlmer food forest and at the Cité Modèle make it possible to set up a shared landscape laboratory for the benefit of all forms of life, bypassing the more traditional procedures of urban design and drawing on strong, multidisciplinary expertise.

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[19] Taking care of living environments could promote inclusion by transforming marginalised spaces into places of exchange, co-learning and biodiversity. This could allow new inclusive narratives of inhabited environments across scales and generations, promoting new forms of participatory democracy. EUROPAN 7

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Co-creation of natural third places in European cities: Community gardens in Krakow and Brussels

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This paper investigates the role of community gardens as natural third places in facilitating socio-ecological transitions in Central and Western European cities. With over 70% of the population residing in urban areas, the study recognizes the need for sustainable practices and alternative modes of production. By a mixed method, the research aims to explore the functions and appropriations of community gardens and their impact on urban transitions. The study encompasses three stages: mapping community gardens, conducting qualitative case studies, and mixed-method analysis. Through participatory mapping, typologies of community gardens in Brussels and Krakow will be developed. The subsequent stage involves qualitative analysis, ethnographies, and in-depth interviews with stakeholders to understand their role. An experimental project will be conducted in Krakow, followed by producing recommendations. Shedding light on interactions between professionals, inhabitants, and the environment, the study provides tools for co-creating community gardens and advancing socio-ecological transitions.

Understanding Functions, Practices, and Socio-Political Dimensions of Community Gardens in Diverse European Contexts

Urbanization has become a global phenomenon, and cities are now the primary laboratories for change, as stated by Haëntjens (2008). In today's world, cities serve as hubs of innovation and environmental concerns, with a heightened sensitivity to urban areas. Consequently, there is a growing need to simultaneously consider climate, urbanism, and nature. The epoch of the Urban Anthropocene has led Western societies, known for having the largest ecological footprints relative to their population, to face the challenge of reducing their environmental impacts through socio-ecological transitions (Bourg, 1996).

Socio-ecological transitions involve the transformation of resource-intensive production systems, particularly those reliant on fossil fuels, towards more sustainable modes of production that utilize renewable resources (Hopkins, 2010; Grandjean, Le Teno, 2015). Originating in the Netherlands in the late 1990s, Transition studies focus on achieving a balance between environmental protection, social cohesion, and economic viability (Schlossberg, Anderson, 2012; Coenen et al., 2012). These transitions affect not only the organization of production systems but also lifestyle changes (Maresca, Dujin, 2014). By exploring socio-ecological transitions, we delve into the relationship between societies and their environment or territory, with a comprehensive understanding of the social construction and practical appropriation of living spaces (Lussault, 2014).

Addressing sustainability challenges requires the collaboration of various stakeholders beyond local government, as decisions made by different individuals and organizations influence the future on a daily basis. To engage multiple stakeholders effectively, it is important to view everyone as decision-makers contributing their perspectives and positions.

While current transition research provides insights into past transitions and case studies, it seems to be less effective in designing real interventions (Zolfagharian, Walrave et al., 2019). This research aims to bridge the gap between social sciences and design research, aligning with Simon's (1969) concept of design science. By adopting a mixed-method approach, the study will focus on designing interventions that combine the traditional top-down approach with a bottom-up perspective.

To design effective transitions, the study centers around the concept of a natural third place, which allows for the co-creation of urban spaces with nature. The concept of the third place, as described by Oldenburg (1991), typically pertains to spaces dedicated to individual social capital building and the production of relational assets. Suire (2013) emphasizes the significance of territorial embedding for the success and performance of third places. Therefore, building mutually beneficial connections among actors within a city is crucial. Previous studies on third places have mainly

focused on externalities and assumptions, neglecting the collection of qualitative and quantitative data (Besson, 2018). Thus, the mixed-method approach employed in this study will contribute to filling the gap in current scientific research. Furthermore, the exploration of natural third places will be conducted through an examination of Community Gardens (CGs).

The history of CGs traces back to the "Green guerillas" of New York, led by Liz Christy, in 1974. Gardening is used as an urban planning tool in the ongoing urban transition movement. CGs have been associated with guerrilla gardening, where they serve as a tool for protesting against urban policies and advocating for alternative ideologies proposed by city dwellers themselves (Cangelosi, 2015). These gardens aim to achieve a more egalitarian distribution of environmental amenities and improve accessibility for populations excluded from traditional public spaces. Through the sharing of resources and practices, CGs foster new solidarities within neighborhoods and initiate alternative forms of governance.

Influenced by the United States, the emergence of CGs in Europe took place in the late 1990s. CGs provide an opportunity to reintroduce urban nature into the urban fabric: whether at the base of building, in the heart of a neighborhood, or on wasteland awaiting real estate development, the ephemeral nature of these gardens does not hinder their multiplication throughout the territory (Schmelzkopf 1995, Ferris et al. 2001, Lawson 2005, Baudry 2010). CGs serve various purposes, including being instruments of sustainable city projects (D'Andréa and Tozzi, 2014), contributors to nature in the city (Blanc, 2013), builders of social ties (Demailly, 2014; Dolley, 2020; Wonjin Jeong, 2021), temporary land occupation projects, and forms of urban agriculture (Aubry et al., 2014). They are valued for their roles in producing economic, social, cultural, environmental, and landscape amenities. However, the multifunctional nature of gardens presents a contradictory dimension, as different stakeholders attribute varying expected functions to CGs (Wegmuller and Duchemin, 2010). This study aims to explore CGs as complex urban entities that embody various political, social, and technical challenges. By examining the practices, processes, and space management of CGs, a deeper understanding of the challenges towards socio-ecological transitions can be achieved.

To comprehend these processes, the study incorporates a comparative analysis on a European scale. While research on CGs has primarily focused on the United States and Western Europe, their popularity is growing throughout the European Union (Goda et al., 2015; Borčić et al., 2016; Spilková, 2017; Van der Jagt et al., 2017). Therefore, it is crucial to diversify research by considering different geographical, social, and political contexts. This study will explore CGs in Belgium and Poland, as both countries are situated at different stages of socio-ecological transition. There have been scientific studies on green areas in some cities of Poland, Warsaw, and Poznan for instance, looking at green infrastructure (Giedrych, 2014), urban agriculture (Szulczewska, 2014), and allotment gardens (Szkup, 2020). However, as of now, there are no studies articulating the motivations of key individuals driving initiatives in the city of Krakow. On the other hand, Brussels CGs have been already explored in terms of social movement practices (Cangelosi, 2015) and connection with the urban agriculture concept (Visser et al., 2016; Zitouni et al., 2018). Even more, both of the city's CGs have never been explored in comparison.

Comparing Krakow and Brussels will shed light on the differences and similarities in social, political, and ecological aspects. The comparison between Western and Eastern contexts allows for the production of empirical evidence on socio-ecological transition practices through the observation of CGs as natural "third places" for communities. The distinct socio-historical contexts of the two cities contribute to different governance and perceptions of CGs, not only among public authorities and green management but also among inhabitants. Brussels' CGs predominantly emerge from bottom-up practices driven by social movements (Zitouni et al., 2018), while in Krakow, the practices seem to be more assimilated with top-down approaches. These differences in context and approach shape the functions and appropriations of CGs. To better understand the motivations and mechanisms behind the co-creation of such green urban spaces, it is essential to delve deeper into these contexts and explore the specific case studies of Krakow and Brussels.

Krakow, the second-largest city in Poland and the capital of the Lesser Poland Voivodeship, presents a unique context with its important historical urban and architectural complex listed as a World Heritage site. The city's green spaces, as outlined in the Directions of Development and Management of Green Areas in Krakow 2019–2030 (KRiZTZ), are facing challenges such as an

uneven distribution and a lack of public green spaces. The emergence of new projects, like the Salwator garden[1], demonstrates the potential for CGs to contribute to the development of green areas in the city.

On the other hand, Brussels, the capital of Belgium and the administrative capital of Europe, offers a different socio-political context. Composed of nineteen communes, each with its own administrative structure, Brussels faces pressure from property developers due to its administrative boundaries. The city has a well-defined green network program that aims to preserve and develop biodiversity by linking different spaces. CGs in Brussels often emerge through bottom-up practices, driven by social movements and challenging urban policies (Zitouni et al., 2018).

By studying these two cities, we can gain insights into the governance, perceptions, and functions of CGs in diverse contexts. Understanding the motivations and mechanisms behind the co-creation of green urban spaces in Krakow and Brussels will contribute to a comprehensive understanding of the potential for CGs to facilitate socio-ecological transitions. Moreover, it will provide empirical evidence and practical knowledge that can be used to inform policy decisions, urban planning strategies, and community engagement initiatives in other cities facing similar challenges and opportunities.

Navigating the Three Stages of Inquiry in Exploring Community Gardens
This research project will consist of three main stages designed to answer the main research questions. Each stage will have specific aims to develop a comprehensive understanding of the research topic. The comparative study will run parallel to the entire research plan. The work plan is outlined in Table 1, detailing the methodology and steps to be taken during the research project [tab.1]. The stages will be conducted chronologically, while also considering the seasonal schedule.

Stages	Specific aim	Methodology	Procedures
1. Mapping and Typologies of CGs	Identify the implementation of community gardens in European cities context.	a) Mapping: - Desk research Analysis - Partcipatory mapping of CG in Krakow and Brussels	- Data collection of governmental documents and - media review - Field observation of CG - Web mapping (uMap)
		b) Typologies - Qualitative comparative spatial analysis - Quantized data	- Multidimensional table realization - Quantitative data production - Sampling
2. Cases Studies and Experimental Project	Analyze the socio-ecological transitions attitudes and practices in community gardens of Brussels and Krakow.	a) Case Studies: - Ethnography - Semi-structured in-depth and go-alongs interviews	- Interview protocol - Visual data collection - Discourses collection
		b) Experimental Project: - Participatory action research - Semi-structured in-depth and go-alongs interviews	- Workshop realization - Interview protocol - Visual data collection - Discourses collection
3. Recommendations	Determine the role of community gardens as natural third places in socio-ecological context, to establish co- created recommendations.	Analysis: - Mixed-method analysis - Comparative analysis	- Qualitative and quantitative analysis (coding with Dedoose) - Redaction of guideline report - Discussion of implications and areas of future research

Table 1: Work plan of the research.

Stage 1: Mapping and Typologies of Community Gardens
The primary objective of this stage is to identify and classify CGs in Brussels and Krakow. The process aims to uncover the connections between community gardens and other green spaces in

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[1] The Salwator garden was established in 2018. It is inspired by permaculture and urban gardening. More information can be found at the following link https://www.facebook.com/SalwatorGarden

both cities, while exploring the social, economic, political, and environmental factors that contribute to the emergence of CGs. Stage 1 will be divided into two procedures: mapping and typologies.

Mapping (1.a): The initial step of the research involves creating a database of CGs in both cities. This will be achieved through desk research and informal interviews. Desk research will involve collecting data from official documents, local greenery sources, ecological and food associations, local media, and scientific publications. Informal interviews with inhabitants will complement the desk research, verifying, confirming, and expanding the existing mapping. Participatory mapping, facilitated through the online platform uMap, will be utilized to engage local communities, and incorporate their values and knowledge into the representation of their living spaces.

Typologies (1.b): As CGs display a wide range of forms, sizes, and temporal dynamics, developing typologies becomes essential. These typologies will assist in understanding the diversity and functions of CGs, utilizing existing taxonomies from scientific literature. The typologies will be instrumental in selecting case studies for Stage 2.

Stage 2: Case Studies and Experimental Project
Stage 2 aims to extend and experiment with the findings from Stage 1. It comprises the selection of case studies and the implementation of an experimental project.

Case Studies (2.a): Based on the data collected in Stage 1, the author will select at least two case studies in each city, considering different localities, practices, and social capital. The selection will be guided by the developed typologies and contribute to the existing scientific literature on CGs, providing insights into the attitudes and practices of inhabitants in community garden development.

Experimental Project (2.b): The "Experiment Community Garden" will be developed through participatory action research, involving non-researchers in the research process. The project will be implemented on the Jagiellonian University Campus, engaging UJ multinational students (through the Erasmus program) and neighborhood inhabitants. Stakeholder participation throughout the research process will ensure the internal validity of information, knowledge quality, and sustainability of the actions undertaken.

Stage 3: Recommendations
The final stage focuses on providing recommendations for further research on the co-creation of CGs within the theoretical framework of natural third places. Building upon the analysis of Stages 1 and 2, this stage will outline principles for achieving quality urban design. The recommendations will consider the interests of CG users, as well as developers and designers of natural third places. The research data collected in each city will enable a clear understanding of the research topic, accompanied by explanatory illustrations. The impact of the study may also lead to the production of a design guide applicable at local, national, and European levels.

Throughout the research, a comparative analysis will be conducted to compare the characteristics and diversity of approaches towards CGs as natural third places in Brussels and Krakow. This analysis will encompass political perspectives, including discourses, ecological social movements, and urban policies. Additionally, the analysis will explore social practices and attitudes towards nature in different contexts, enhancing the understanding of natural third place perceptions in European cities. The findings from the comparative study will contribute to the development of an appropriate design guide at the European scale.

Harnessing a Mixed-Method Approach in Investigating Community Gardens
To comprehensively address the research questions and explore the complex phenomenon of socio-ecological transition in CGs as natural third places, a mixed-method approach will be employed. The combination of qualitative and quantitative methods enhances the understanding of research problems and complex phenomena more effectively than either approach alone. According to Creswell and Plano Clark (2011), a mixed-method study involves the collection and analysis of both qualitative and quantitative data separately to address the research questions. This approach allows for the integration of the strengths of both methodologies, advancing the scholarly conversation and providing a complete picture of the research phenomenon.

In this study, an exploratory mixed-method research (MMR) design will be used to develop the concept of natural third places on a European scale. The research will employ a concurrent exploratory design, where qualitative and quantitative data will be collected and analysed independently in separate strands to answer the research questions. The methodology consists of three stages, each building upon the previous one [fig.1].
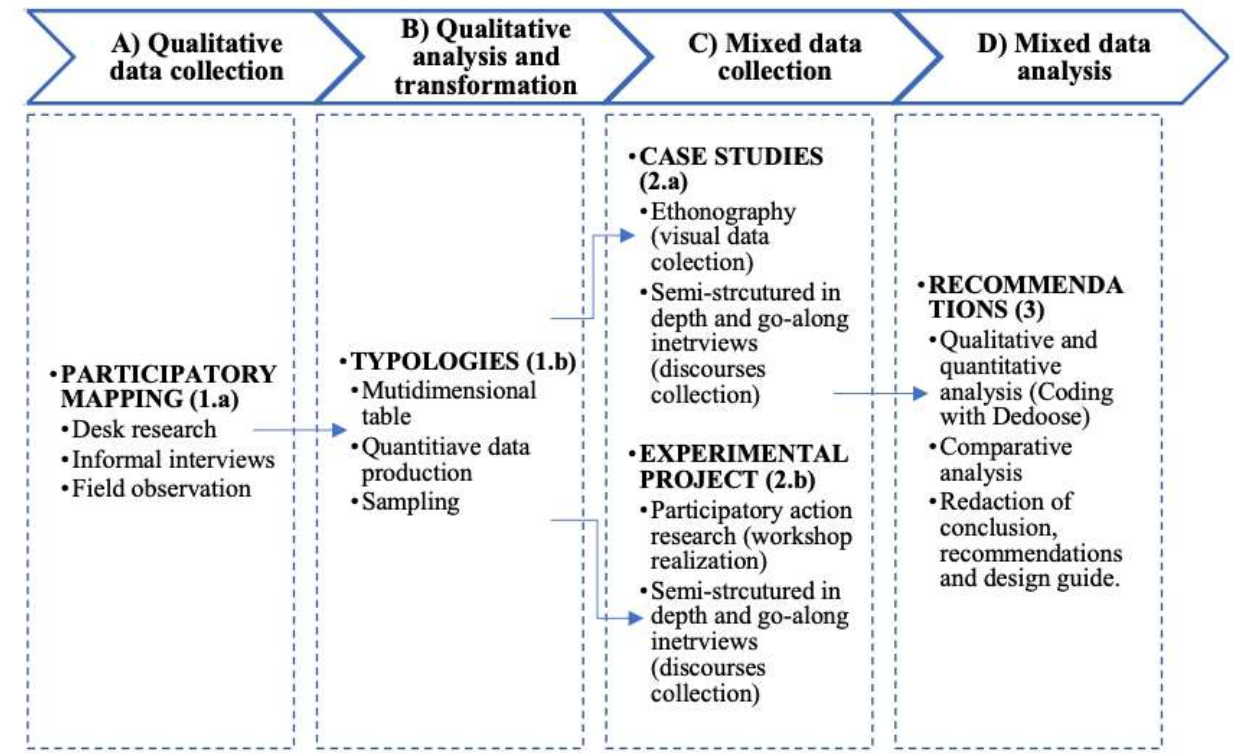

Figure 1: Mixed-method Multistrand Design.

Qualitative Data Collection

The first stage focuses on qualitative data collection. A participatory mapping process will be initiated to map the CGs using the uMap online platform, which allows for the creation of an interactive and collaborative online map on an OpenStreetMap (OSM) background. This participatory mapping will involve desk research, field observations, and informal interviews. Desk research will involve analyzing media, official documents, and scholarly publications related to community gardens using internet research and specific keywords. Field observations and informal interviews with local residents will be conducted to validate the findings and gather narrative descriptions from CG users. Visual data such as photographs will also be integrated into the web mapping process.

Qualitative Analysis and Transformation

The data collected in the first stage will contribute to the development of typologies, which will help categorize and understand the different functions and appropriations of CGs based on their territories. Social, environmental, economic, and political attributes of each garden will be identified and combined to create type criteria. The relevant types will be selected to clarify and answer the specific research questions. The typologies will be coded in a multidimensional table. Additionally, the qualitative data will be quantized by transforming the qualitative typologies into quantitative data using binary variables (e.g., 1 for "present" and 0 for "absent"). This transformation will simplify the integration of qualitative data into the experimental project and provide numerical values alongside narrative descriptions.

Mixed Data Collection

Stage 2 involves the collection of mixed data from case studies (2.a) and the experimental project (2.b). Case studies will be selected based on the qualitative analysis conducted in the previous stage. Qualitative methods, specifically ethnography, will be employed to observe and explore CG case studies in different cities. Ethnography allows the researcher to both participate in everyday life and

observe from a distance, capturing visual and narrative data. Semi-structured in-depth interviews and "go-along" interviews will be conducted to understand the behaviors and practices of participants, providing a deeper understanding of the lived experiences in CGs. The number of interviews conducted will depend on data saturation, where new insights are no longer obtained.

The quantized qualitative data analysis developed in the typologies will be integrated into an experimental project. The independent and dependent variables will be assigned based on the results of Stage 1. The experiment project will follow a participatory action research approach, involving students from multiple nationalities, local students, and neighborhood inhabitants. The project will have two phases: empathizing with participants' personal insights and defining their objectives regarding the design of CG projects, and developing prototypes for testing and learning in action. The qualitative method will ensure the integration and observation of participants' personal experiences throughout the project.

Mixed Data Analysis
In the final stage, the author will analyze the results of both qualitative and quantitative data. All collected data will be coded using Dedoose software, a web-based application for organizing research data. Data triangulation will be employed to gain a deeper understanding of the research phenomenon. The results of the mixed-method analysis will contribute to the development of conclusions and recommendations. This meta-inference will assist the author in creating a design guide report based on visual results, supporting the dissemination of the project.

Given the qualitative dominance of the methodology, ethical considerations are essential. The rights, values, needs, and desires of each informant will be respected throughout the research process. Safeguards will be implemented to protect the rights of informants, including clear articulation of research objectives, obtaining writing permission, informing participants about data collection devices and activities, providing verbatim transcriptions and interpretations, and considering the interests and wishes of participants when reporting data.

Embarking on the Exploration: Unveiling First Results of the Initial Stage
The initial stage of our research has yielded promising findings, shedding light on the functions and appropriations of CGs as natural third places. Through an immersive qualitative data collection and analysis process, we have gained valuable insights into these transformative spaces. Our exploration encompassed participatory mapping, desk research, field observations, and informal interviews, resulting in a rich dataset comprising narrative descriptions, visual data, and contextual information. In Brussels, the participatory mapping process, successfully finalized with the assistance of CG practitioners, resulted in the monitoring of 203 CGs [fig.2]. The mapping exercise visually represented the distribution of existing CGs across the city. In Krakow, the mapping process is ongoing, with 16 CGs currently being monitored [fig.3]., providing valuable insights into the unique characteristics of CGs in this context.
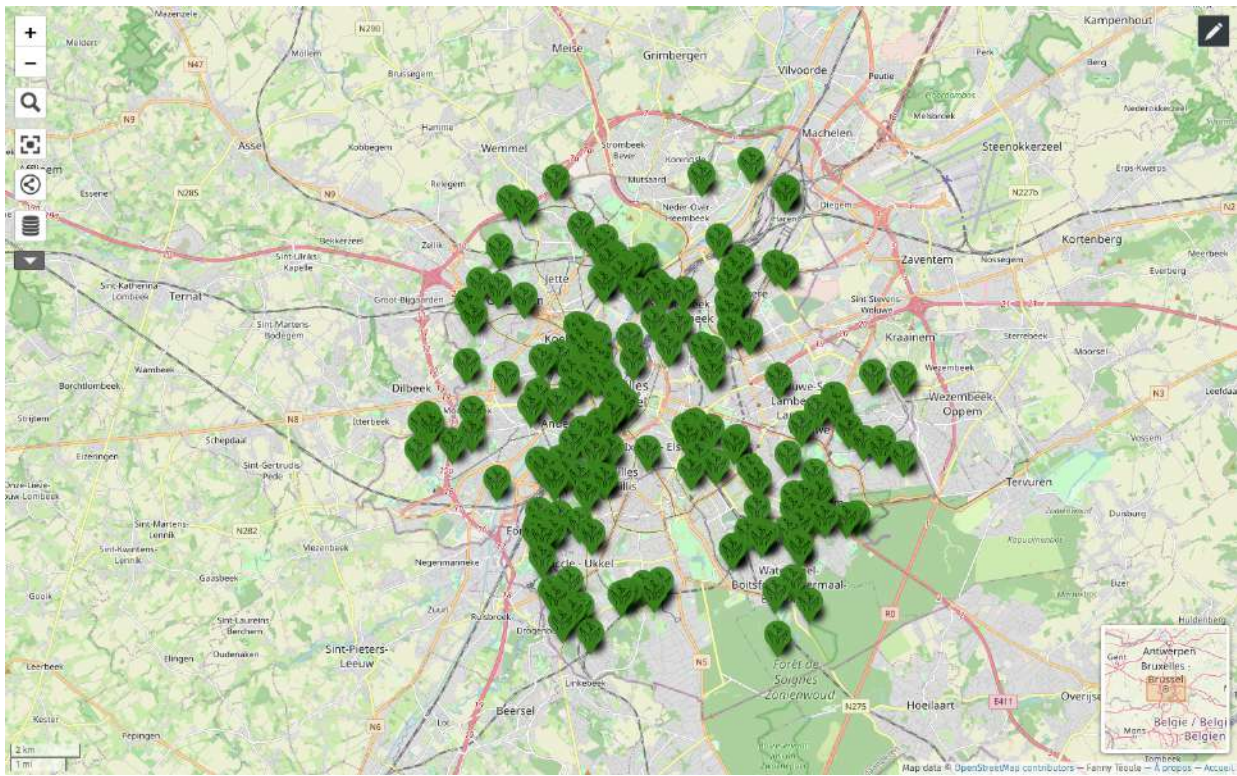
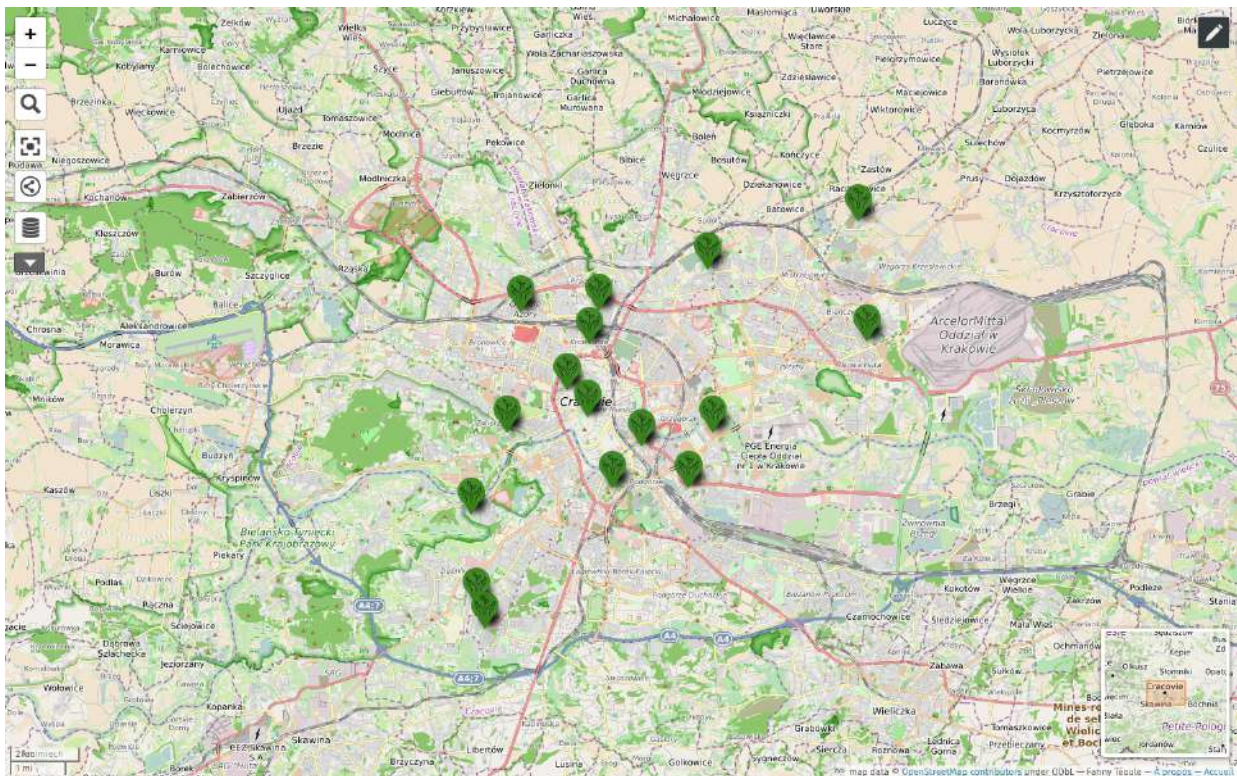Figure 2: Participatory mapping of community gardens in Brussels. Source: uMap, Fanny Téoule.

Figure 3: Participatory mapping of community gardens in Krakow. Source: uMap, Fanny Téoule.

The involvement of CG practitioners in the mapping process ensured the accuracy and comprehensiveness of the collected data, enhancing the reliability of our findings. Additionally, an online survey targeting CG practitioners was conducted to gather additional insights, perspectives, and practices related to CGs. This survey provided valuable input and complemented our qualitative data collection efforts, enriching our dataset and providing a broader range of perspectives.

Brussels has a longer history and more established infrastructure in community gardening, with a significant growth in the number of CGs since the 2000s. In contrast, Krakow faced challenges due

to the impact of communism on urban agriculture, resulting in a delayed growth of CGs. However, both cities recognize the importance of CGs in promoting social cohesion, environmental sustainability, and food security. They provide supportive networks, involve municipal support and citizen participation, and emphasize inclusivity, education, and environmental awareness. Brussels exhibits stronger social and community-building aspects, while Krakow focuses more on environmental and educational aspects. Additionally, CGs in Brussels benefit from specific regulations that protect them from development pressures, whereas CGs in Krakow lack explicit recognition and legal protection.

Due to the limited availability of data on CGs, we recognized the need to gather additional insights from practitioners in the field. To address this gap, we conducted an online survey targeting CG practitioners. The survey aimed to gather information on their experiences, perspectives, and practices related to CGs. By engaging directly with practitioners, we sought to enhance our understanding of the intricate dynamics and nuances associated with these spaces. The online survey provided us with valuable input and allowed us to gather a broader range of perspectives from different geographical locations. The responses complemented our qualitative data collection efforts, enriching our dataset and providing a more comprehensive view of community gardens in Central and Western European cities.

The qualitative analysis has played a pivotal role in our research, facilitating the development of typologies that categorize CGs based on their social, environmental, economic, and political attributes. This typology framework provides a robust foundation for our future investigations, enabling us to understand the diverse manifestations of CGs and their unique characteristics and contributions. The typologies for CGs have been developed based on distinct emergence reasons, management factors, locator factors, and functions. The emergence reasons identified encompass food security (Hagey and al., 2013), educational (Blair, 2009), social (Wakefield et al., 2007), environmental cities (Langemeyer and al., 2017), and economic aspects (Burley and al., 2011)., which exert influence on the goals, outcomes, and stakeholders involved in CG initiatives. The management factors identified include top-down (Zhang and al., 2022), bottom-up (Janst al., 2020; Derlukwiczn and al, 2021), hybrid (Towopeus and al., 2020; Faehnle, 2014), and collaborative (Momen, 2020; Van de Meene and al., 2020) approaches. The selection of a particular management approach significantly impacts the success and long-term viability of CG projects, each with its own inherent benefits and limitations. In terms of locator factors, five distinct categories were identified: rooftop (Wong and al., 2003; Benis and al., 2018), street (Zabret and al., 2015; Im, 2019), courtyard (Knight and al., 2021; Lee, 2015), wasteland (Gasperi and al., 2016; McGuire and al., 2022), and campus gardens (Ridgeway and al., 2015; Adam and al., 2023). Each category offers unique advantages and potential applications for CGs, as substantiated by scientific research. Lastly, the functions of CGs were classified into four categories: cultural (Wakefield et al., 2007), community-building (Hagey and al., 2013), therapeutic (Soga and al., 2017), and natural habitat (Cabral and al., 2017). These functions highlight the diverse benefits and potential applications of CGs within the context of sustainable urban practices.

It is therefore crucial to overlap these categories to comprehensively address the multifaceted aspects of urban sustainability. By integrating and focusing on the socio-ecological features, we can enhance the understanding and implementation of CGs as catalysts for socio-ecological transitions. These gardens can contribute to sustainable urban practices, promoting environmental stewardship, social well-being, and economic resilience in cities. Thus, the typology of socio-ecological transition integrates sustainable infrastructure, circular economy, social equity, biodiversity and ecosystem services, and education and awareness. By closely CGs and their components, we can effectively address and understand the typology of socio-ecological transition. The diverse elements within CGs, such as sustainable infrastructure, resource efficiency, social inclusivity, biodiversity support, and educational initiatives, provide tangible examples of how these typology features can be implemented on a local scale. Through the study and analysis of CGs, we gain valuable insights into the practical application and effectiveness of the socio-ecological transition typology, further advancing our understanding of sustainable urban practices.

These initial findings and the typologies developed based on qualitative analysis provide a robust foundation for further investigations. The quantization process of qualitative data enhances their accessibility and applicability in subsequent stages of our research. The selection of case studies for

the mixed data collection stage has been informed by these initial findings, allowing for a deeper exploration of specific aspects and nuances of CGs.

In conclusion, the initial results have shed light on the transformative power of CGs as natural third places. These findings highlight their potential to foster socio-ecological transitions and contribute to sustainable urban practices. Building upon this foundation, our research will continue to delve deeper into the intricate dynamics and nuances of CGs through in-depth interviews, go-along interviews, and ethnographic observations. By further unraveling the complexities of these spaces, we aim to contribute to the creation of thriving socio-ecological communities and the advancement of sustainable urban practices.

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Contesting urban space: socio-ecological questions and the revisiting of the Brussels' counterproject

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This paper compares the historical case of the urban redevelopment project for the Maelbeek Valley in the 1970s with the current development for the Josaphat site in Brussels, by focusing on alternative designs proposed by urban activists. By juxtaposing both cases, the role of alternative design proposals in discussions on urban development, the social and ecological claims that centered urban debates and the organization of citizen participation within urban development procedures will be analyzed. The aim of this research is to gain new insights in current social and ecological urban questions by comparing a historical and contemporary case and combining historical research with design research. This paper draws on literature from the fields of architectural history, urban history and ecological urbanism and uses archival resources for case study research.

Introduction

Brussels' urban development is severely shaken up by a debate concerning the Josaphat site, a vacant and rewilded area, or *friche*, in the north of Brussels, where the Brussels Capital Region (BCR) plans to develop a mixed neighborhood including housing, commerce, schools and a park (Perspective Brussels, 2018). The adopted planning procedure has been widely contested by the Brussels' citizens, because of its undemocratic nature and because the site has over the years grown into a highly biodiverse area, which is crucial in times of climate urgency (BRAL & Natagora, 2021). To bolster these claims, neighborhood committees have associated with institutionalized nature and citizens' organizations in Brussels and organized many public actions, such as petitions, demonstrations, and press conferences. Moreover, the neighborhood committees and citizens' organizations have published a manifesto in 2021, in which they addressed the regional government with the proposal to co-create the development plan for the site. As a starting point for the discussions, five alternative designs were proposed (BRAL & Natagora, 2021). While discussions on the development of the site are ongoing, having caused a fracture within the regional government (BELGA, 2023), a building permit for over five hundred housing units was granted in April 2023 (RV & SVG, 2023).

The heavy contestation against large-scale urban development projects is not new to Brussels. Being referred to as 'the city of 100 action committees' (Demey, 1992), Brussels is known for its active citizen participation, that originated in the 1960s as a reaction to the massive destruction of the historical urban tissue and was inspired by the global revolts of 1968 and sociologists Henri Lefebvre (1968) and Manuel Castells (1972) arguing for 'the right to the city' (Lagrou, 2003). New citizens' organizations representing neighborhood residents, such as Atelier de Recherches et d'Action Urbaines (ARAU) and Inter-Environnement Bruxelles (IEB) took the lead in the discussions (Demey, 1992). In many western cities a more democratic city planning was attempted through 'advocacy planning', whereby experts seek to represent urban groups and communities that are traditionally not included in the urban planning processes (Peatty, 1968). Moreover, the emerging post-modernist architectural tradition focused on more user-based architecture, dismissing the architect as the top figure (Doucet, 2013). In Brussels, this led to a close collaboration between architectural institutions La Cambre and Archives d'Architecture Moderne (AAM), citizens' organizations ARAU and IEB and neighborhood committees, who were linked by architect and professor Maurice Culot. In this collaboration advocacy planning was pursued by the creation of alternative design proposals called 'counterprojects' (Corijn et al., 2023). Though the creation of counterprojects was a common tool in the Reconstruction of the European City paradigm propagated by architect Léon Krier, the collaboration between different actors was unique to Brussels (Doucet, 2013). According to Krier and Culot, counterprojects found their way into the public debate in Brussels because 'urban form' and 'urban struggle' are inseparable (Krier and Culot, 1980). Counterprojects were extensively researched by Isabelle Doucet, who argues that "in the form of a drawing-manifesto, counterprojects functioned as a critical-theoretical tool for architecture: namely,

between a critical statement and a concrete vision for the future" (Doucet, 2013, p. 235). Acting as provocateurs (Delevoy *et al.,*, 1975), the projects aimed to stimulate debates and negotiations by demonstrating alternative designs. The '*ligne claire'* was the graphic language, because it could be easily reproduced in black and white in newspapers or magazines. Furthermore, axonometric projections were preferred because of their ability to convey projects effectively in a single drawing, particularly useful for political decision-making (Culot, 1984). Additional models, perspective and sectional drawings made it easier to communicate the counterprojects through press conferences, publications, seminars and neighbourhood tours (Schoonbrodt, 1984). The designs often pictured citizens as active users of the city and promoted the reconstructed city as a social meeting place (Doucet, 2015). Increasingly inspired by the traditional European city, the designs depict an urban form that was cohesive and familiar to the inhabitants (Delevoy *et al.*, 1978). Counterprojects thus clearly connected a disciplinary critique to real-world activism (Doucet, 2015).

One of the early examples of counterprojects dealt with the renovation project for the Maelbeek Valley, taking place during the 1970s. This renovation project stirred region-wide discussions on the urban development of Brussels, reminding us to the Josaphat case. The Maelbeek Valley was equally considered as a strategic development zone for the Brussels region, fitting into a large-scale network of urban highways, the development of the housing stock, and the creation of an ecological network (Danneels, 2021).
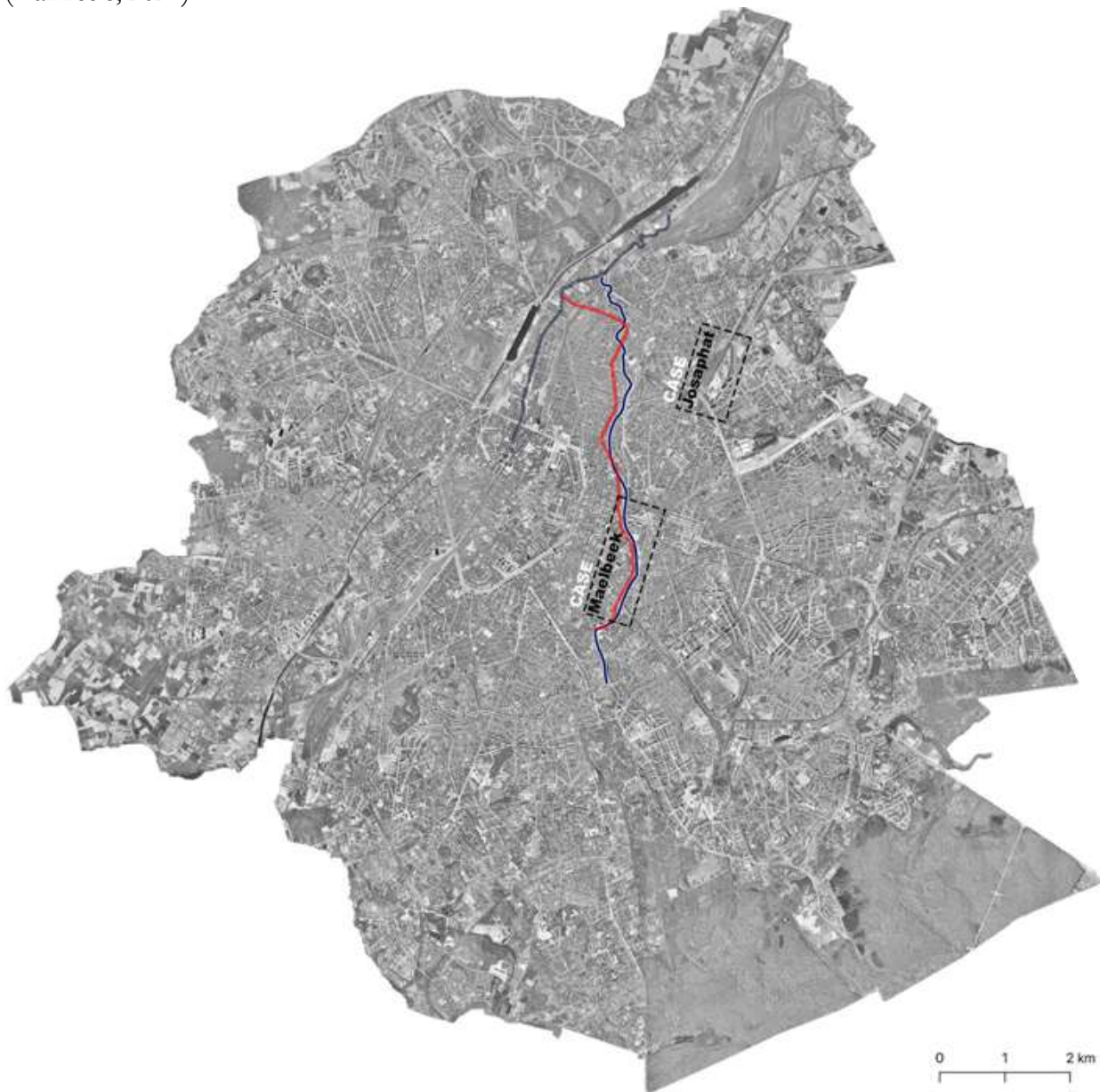
[fig.1] The Maelbeek Valley and Friche Josaphat cases situated in the Brussels-Capital Region. Retraced route of the disappeared Maelbeek stream (blue) in relation to the planned expressway (red) included in Plan Groupe Alpha/BSRO of 1971. Source: Orthophoto 1971 from UrbIS, further elaborated by the authors.

By juxtaposing the renovation of the Maelbeek Valley with the Josaphat development plan [fig.1], this paper tries to understand how design is mobilized in discussions on the city's urban development and which wider contexts surround these discussions. Firstly, the use and agency of alternative designs in urban development questions in Brussels will be analyzed. Afterwards, this paper will dive into the social and ecological claims that centered these debates and designs. Finally, an evaluation will be made of how citizens participated in these debates. By adopting a 'history of the present' approach, often used in urban design research and ecological urbanism (De Block, 2016; Adams, 2018; Danneels, 2021), this paper aims to get insights in today's urban development context as well as learn from how urban struggles were tackled in the past. This paper fits into a larger research project that links contemporary design research to historical research, exploring the role of history in understanding and addressing current debates in urban development. First, the historical case for the renovation of the Maelbeek Valley will be explained, followed by the case of the Josaphat site. Afterwards, both cases will be compared based on the use of the alternative designs in the discussions, the balance between social and ecological claims and the degree of citizen participation. The paper will be closed with a conclusion, posing questions for debate and further research.

Retrieving the origins in the Maelbeek Valley

The Maelbeek Valley was the first area subject to cross-municipal discussion, for which a long iterative process of development plans and counterprojects took place. Following a logic of functional zoning, the Maelbeek Valley was intended to become a strategic express way [fig.2]. This construction would obliterate more than 30 building blocks, bypass the few remaining green areas in the valley and transform lively squares into traffic interchanges (*Wonen-TA/BK*, 1975)*, all leading to expropriation of over four thousand original inhabitants (Het Laatste Nieuws, 1977). What was envisioned as a 'green corridor' by urban planners and landscape architects (De Beule, Périlleux and Silvestre, 2017), would become an asphalted barrier.

[fig.2] The design of the expressway as part of the Main Road Network of 1971. The plan requires the expropriation (dotted hatch) of entire building blocks in Schaerbeek, Etterbeek and Ixelles.
Source: BSO-D via De Beule, Périlleux and Silvestre, 2017, p.360

ARAU, IEB and a newly formed association of neighborhood committees opposed this top-down urbanism which was, according to Danneels (2021, p. 228), "the starting point of a counterculture for which Brussels is still known today". Together with the neighborhood committees, architecture students of Culot developed several counterprojects for the Maelbeek Valley. Levy and Mierop first demonstrated the excessive social and financial costs of the expressway (*Wonen-TA/BK*, 1975), but seem to take the street renovation as an opportunity to rehabilitate the existing urban morphology and reintroduce green spaces and ponds benefitting the residents [fig.3]. Student P. Lefebvre alternatively used a manifesto-like approach resembling the London AA School and Archigram, by depicting a naked woman as a metaphor for a viaduct [fig.4/5], arguing that alluring architectural images do not necessarily offer socio-economic beneficial guarantees to the population (Delevoy *et al.*, 1975; Doucet, 2015).
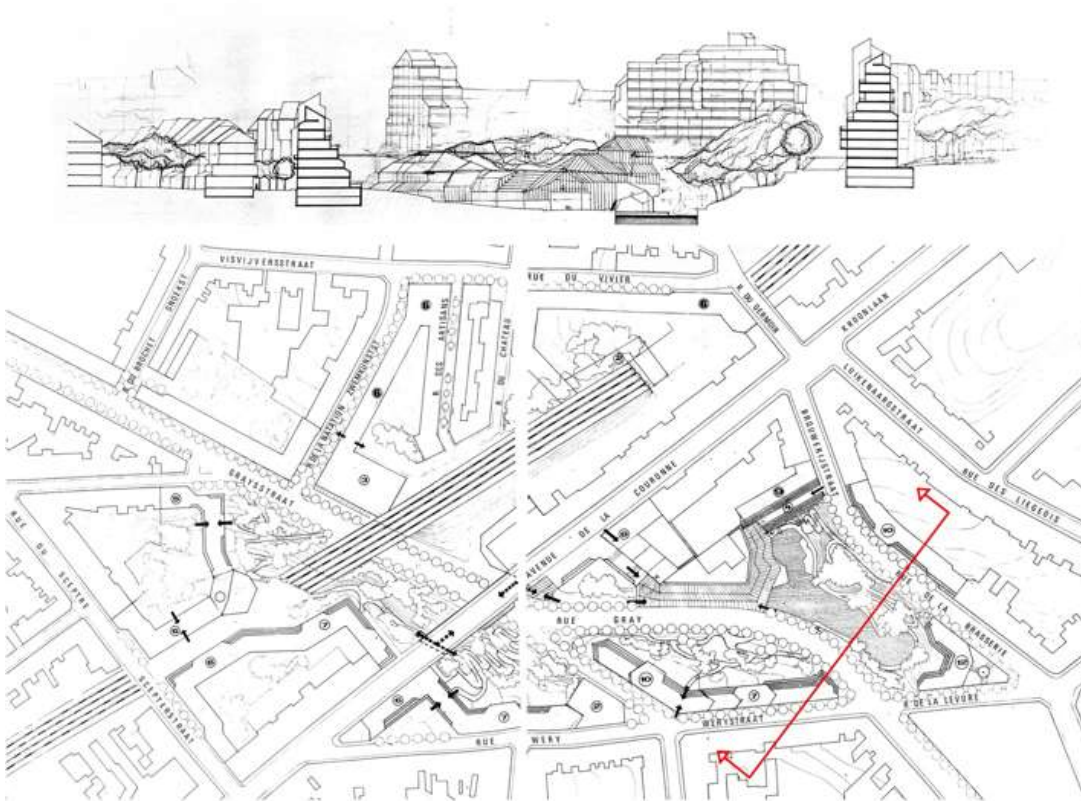
[fig.3] Early counterproject (1971-1973) by M. Culot's students Mierop and Levy for a renewed urban morphology if a widening of Rue Gray would be implemented. Source: La Cambre, Atelier M.Culot et M. Pesleux, Projet d'aménagement de la vallée du Maelbeek 1971-1973, retrieved at CIVA, Brussels
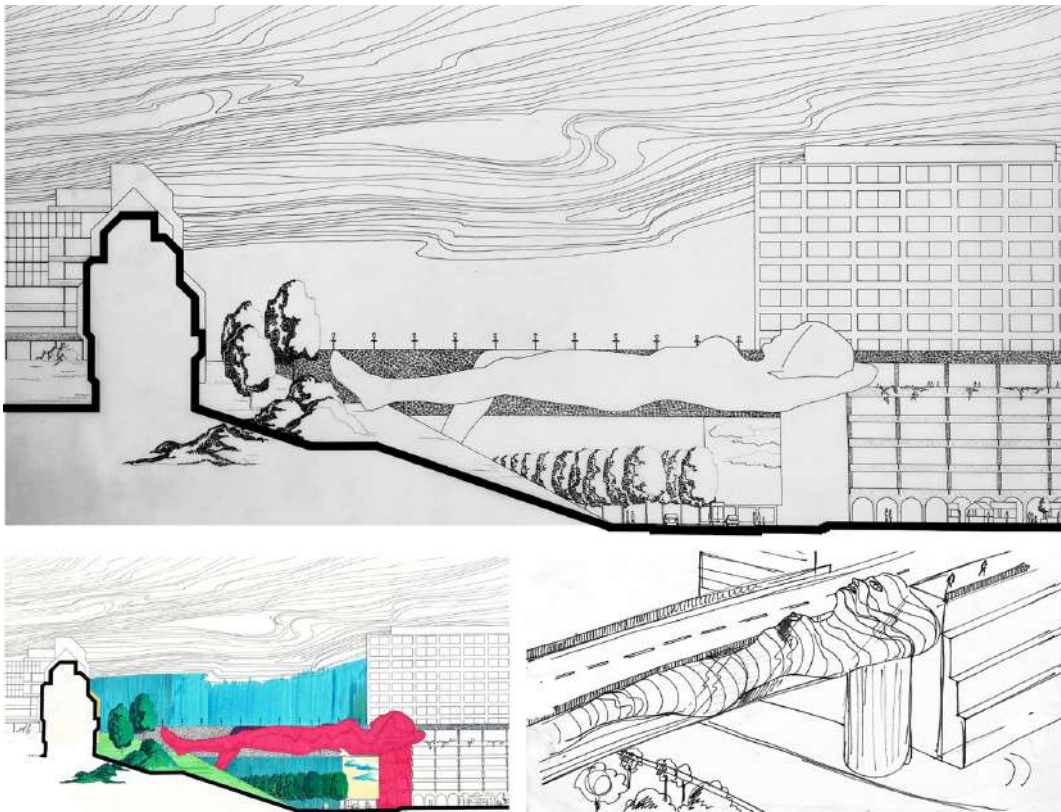

[fig.4] Lefebvre's surreal counterproject for a new bridge over Rue Gray in the framework of the counterproject displayed in fig.2. The women, referring to the imposed urban development plans, metaphorically implies that alluring architectural images do not guarantee any socio-economic measurements benefitting the local population. Source: La Cambre, Atelier M.Culot et M. Pesleux, Projet d'aménagement de la vallée du Maelbeek 1971-1973, retrieved at CIVA, Brussels

COUPES - TYPES

jarret   mollet   poitrine   tête
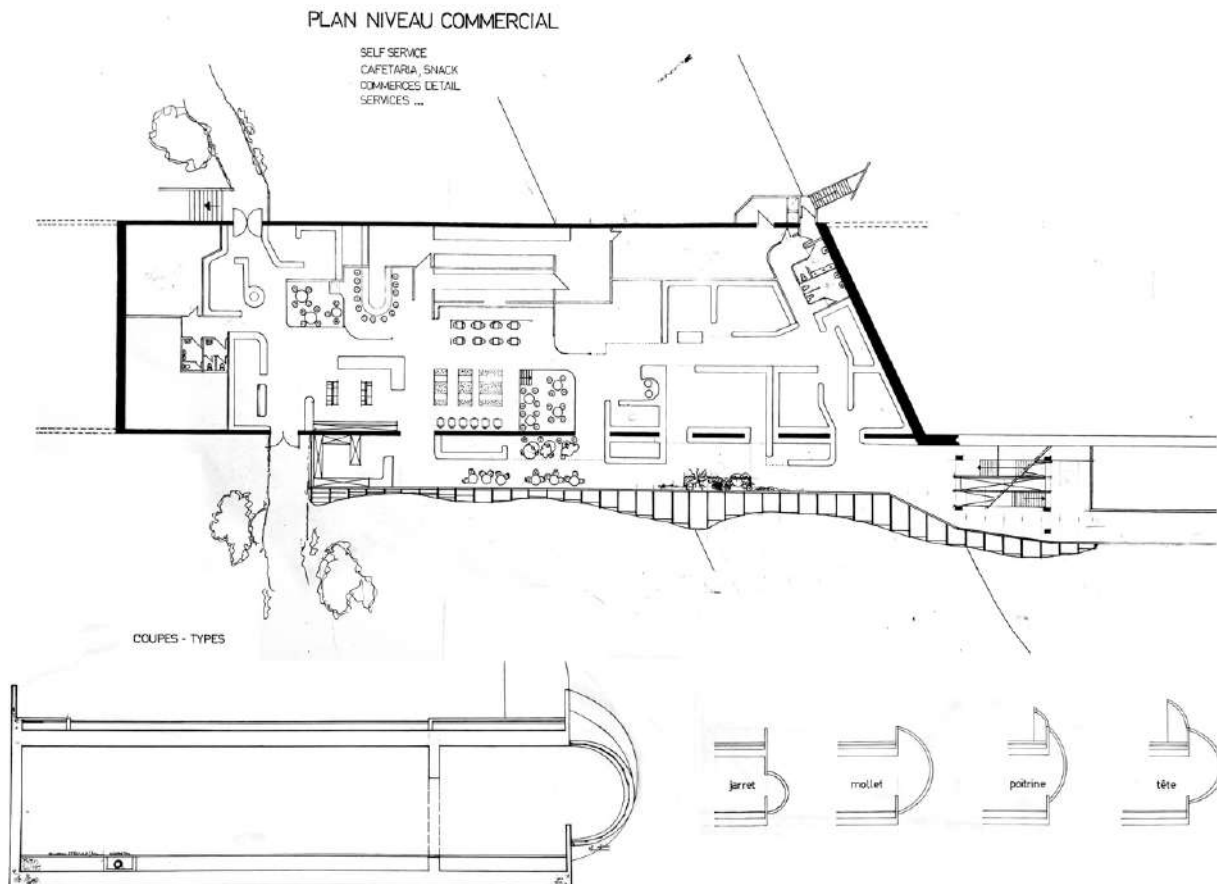
[fig.5] The new bridge with its depiction of a naked woman integrates commercial functions within its
structure. Source: La Cambre, Atelier M.Culot et M. Pesleux, Projet d'aménagement
de la vallée du Maelbeek 1971-1973, retrieved at CIVA, Brussels

ARAU presented a more realistic counterproject advocating for housing renovation, the extension
of Leopold Park, and the potential integration of the European institutions around the Luxemburg
station. Together with IEB, they fueled the public debate with press conferences, publications, tours,
and aimed to establish a dialogue with decision makers. In response, the roundtable of the Maelbeek
was established by the alderman of urbanism, seeking consensus between the responsible decision
makers of the Agglomeration and the municipalities, experts, and the action committees. This
roundtable resulted in a more social, economic, and ecological vision for the renovation of the
Maelbeek Valley and eventually a compromised plan [fig.6] that abolished the express way, included
housing renovation and greenery, but still proposed to widen the traffic road (Agglomération de
Bruxelles, 1973).
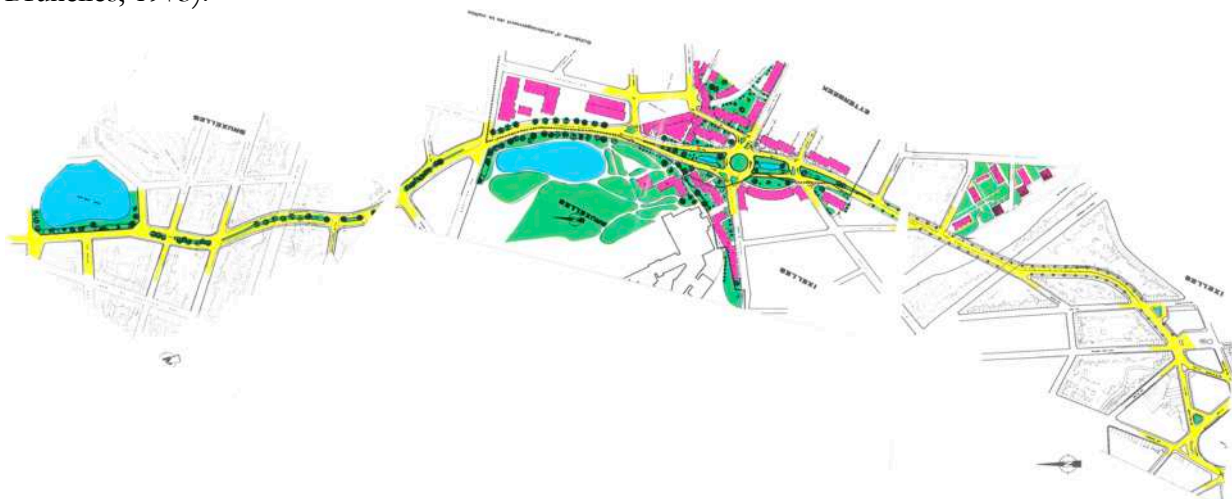
[fig.6] Compromised plan for the redevelopment after the first set of Maelbeek roundtables of 1973. Source:
Agglomération de Bruxelles, 1973, retrieved at CIVA, Brussels

Despite these efforts, a plan to construct the European institution offices in the valley was launched [fig.7], trespassing designated housing areas, and neglecting the promised social housing (*Wonen-TA/BK*, 1975). Together with new plans for road infrastructure [fig.8], this was again contested by IEB, ARAU and the neighborhood committees with counterprojects advocating for a better integration of the European institutions into the historical urban fabric, guaranteeing mixed functions and neighborhood parks [fig.9] (Conférence de Presse IEB, 1976). Multiple roundtable discussions on the developments in the Maelbeek Valley followed thereafter.

At the beginning of the 1980s, IEB and AAM opposed the expansion of the European institutions with a counterproject [fig.10] proposing to relocate them to a brownfield north of the city, preventing the city centre from housing evictions and a European "ghetto" (d'Helft & Gérard, 1982). This brownfield was the former Josaphat station and the current Josaphat *friche*. This proposal illustrates a shift in perception of vacant land in the region, which in recent years became increasingly appreciated for its ecological potential.
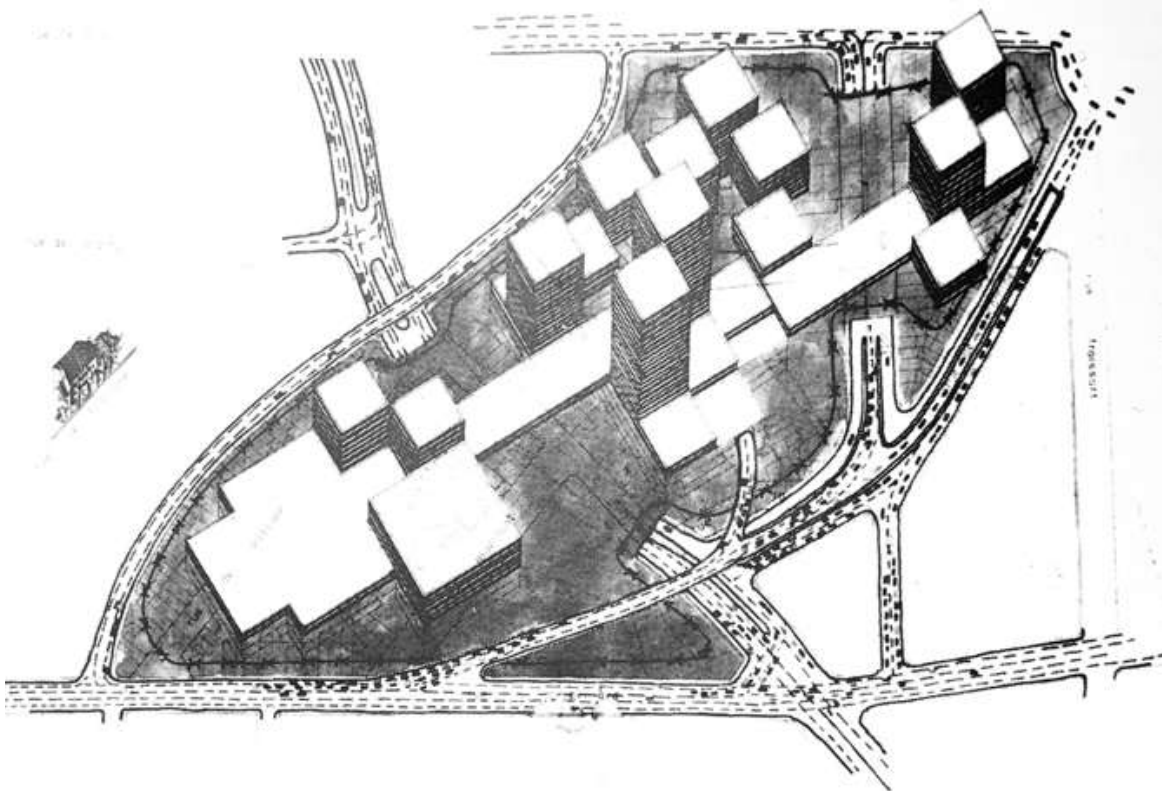
[fig.7] Modernistic plan layout for the new office zone for European Economic Community (EEC). The monofunctional plan would erase and cover the historical urban fabric around the Chaussée D'Etterbeek. Source: Actualité A+ 11. 1974, Centre de documentation

[fig.8] The dystopian photocollage rejecting the planned viaduct in the Rue Belliard axes north of Parc Leopold. Source: Press conference dossier of IEB in March 1976, retrieved in CIVA, Brussels
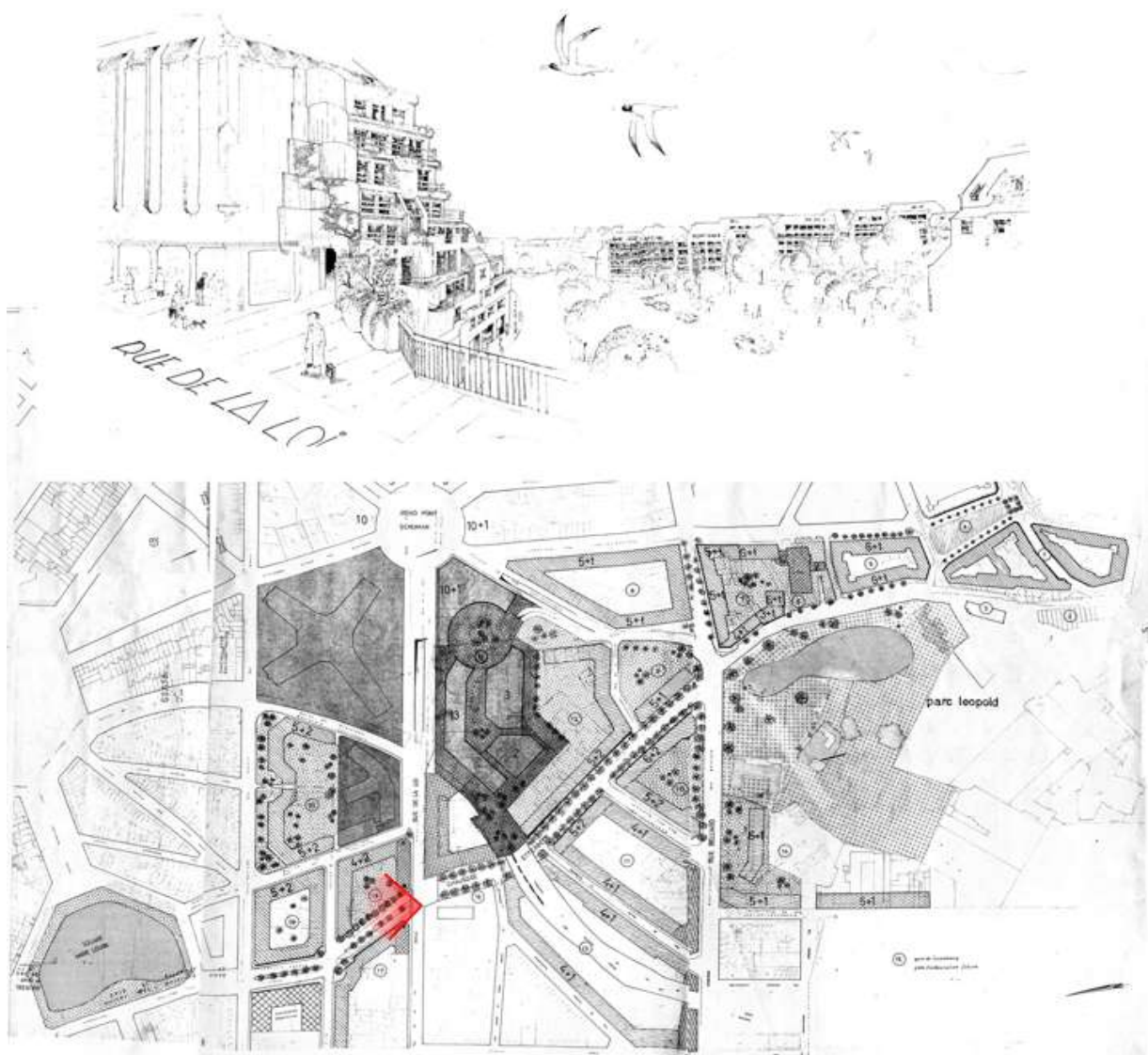
[fig.9] Alternative proposal for the expansion of the EEC and the rehabilitation of the building blocks on both sides of the Chaussée D'Etterbeek by IEB & Groupement des Comités du Maelbeek. The position of the perspective drawing is indicated on the plan (red). Source: IEB & Groupement des Comités du Maelbeek, 8 juin 1976, retrieved in CIVA, Brussels
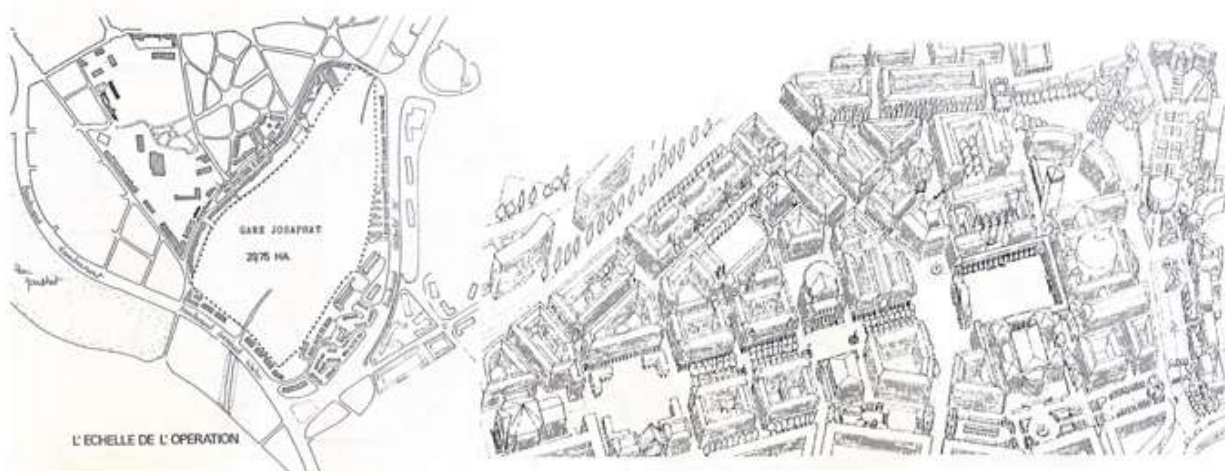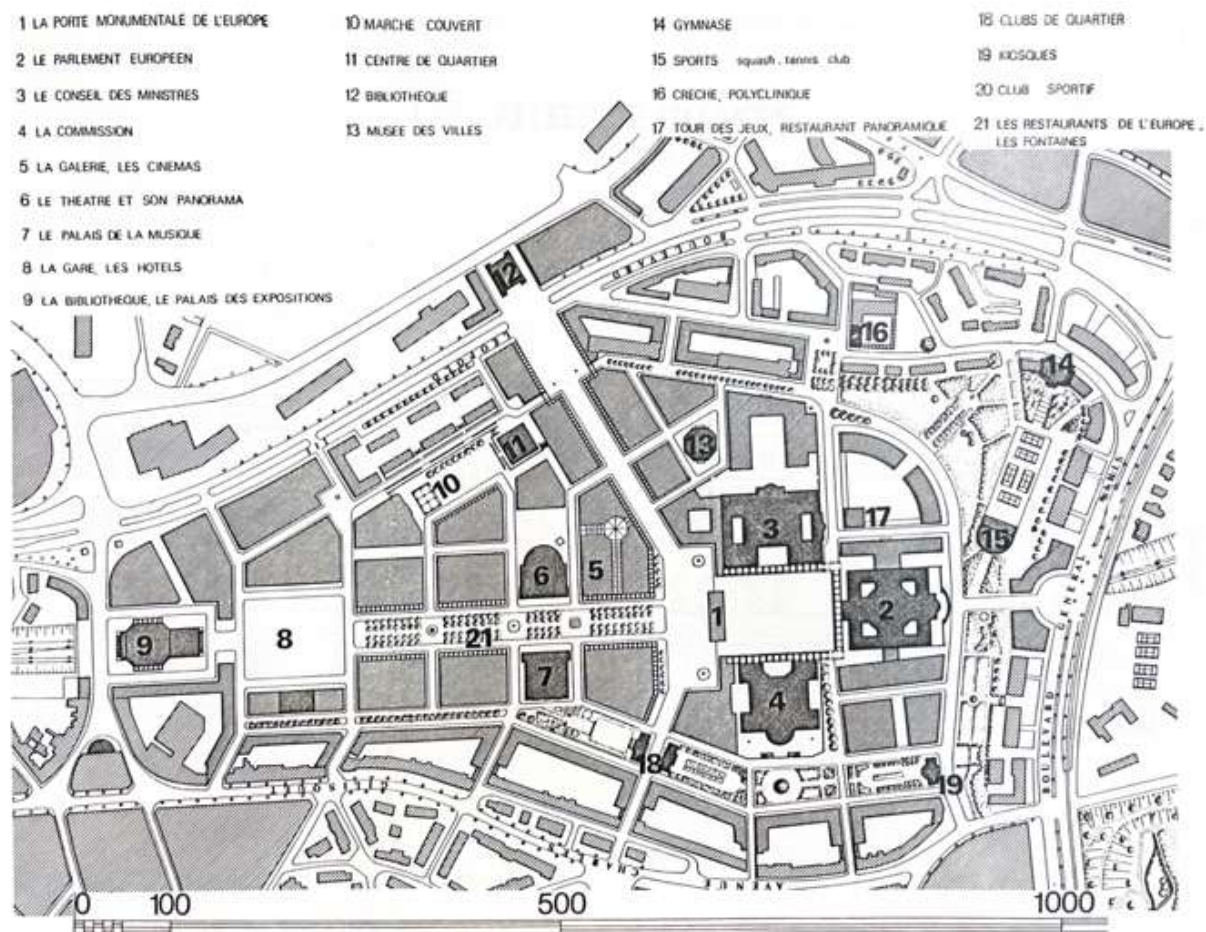
[fig.10] The counterproject of D'Helft and Gerard, on behalf of IEB and the united Maelbeek committees, for the relocation of the EEC onto railway station of Josaphat. Source: 'Extension CEE: Voici l'Alternative Josaphat' 1982, retrieved in CIVA, Brussels

Visualizing alternative futures today: Plan B Josaphat

Now the Josaphat site has become a vast natural area, because of its sandy soil and varied pollination due to the passing trains (Bergers et al., 2023), which made action committees consider the site as a public good with important ecological values, such as biodiversity and mitigation of heat stress and flooding. The region acquired the site in 2014 with the aim of answering the regional need for affordable and social housing, schools, and green spaces (Bergers et al., 2023) and framed it in 2018 as one of the ten 'strategic' regional development plans called 'Plans d'Aménagement Directeur (PAD). Neighbourhood committees and citizens' organizations opposed these PADs [fig.11], because they perceived the belated consultation procedure as undemocratic and because the PADs would exploit precious green and open spaces, for the creation of offices and unaffordable housing (Scohier and Marsin, 2020). After the publication of the first development plan in 2019 [fig.12], the

process of public enquiry allowed citizens to massively express their objection, leading to a negative advice to proceed with the plan by the advisory council, which is composed of experts and open to citizens (BRAL & NATAGORA et al., 2021).
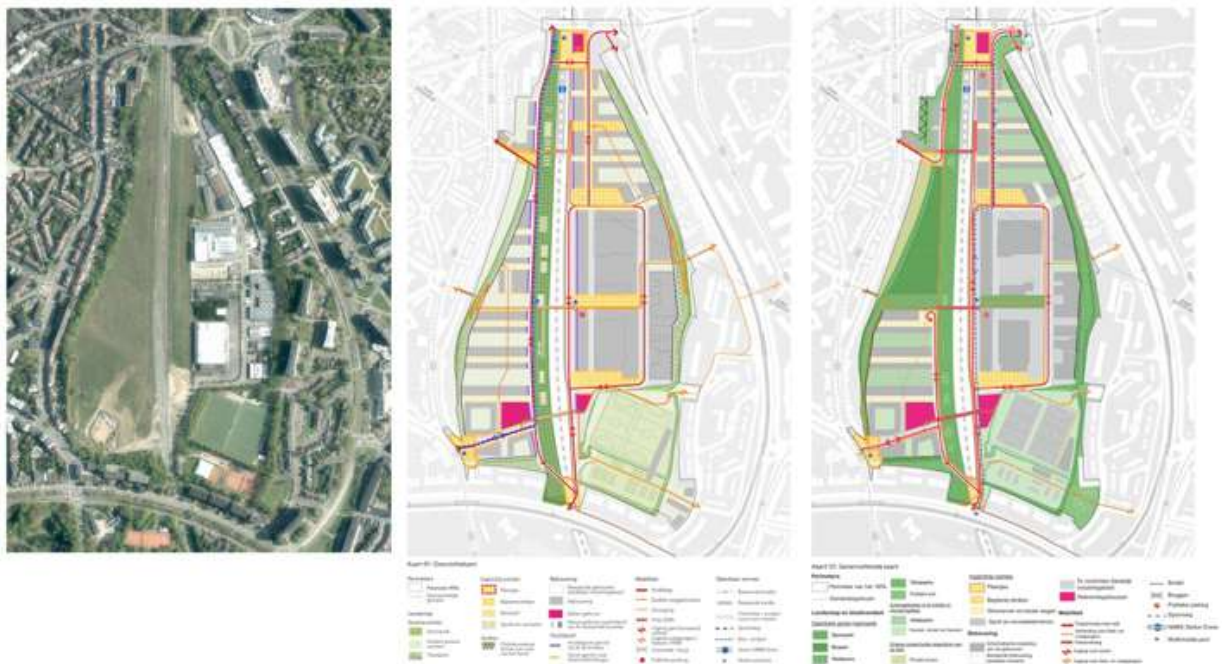
[fig.11] Comparison of the PAD/RPA Josaphat between the first version (2019) and the revised version (2021). From 1.600 housing units (public housing for sale: 18%, social housing for sale: 22%, social housing for rent: 5%,) to 1.194 dwellings (public housing for sale: 18%, social housing for sale: 5%, social housing for rent: 22 %.), the revised version includes a 'Biopark' of 1,3ha northwest of the central railroad. Source: UrbIS, Strategisch Luik RPA Josaphat 2019, Strategisch Luik RPA Josaphat 2021

[fig.12] The planned construction phasing within the first PAD. Source: Beliris, 2019

While awaiting a revised plan, institutionalized citizens' organizations, neighborhood committees and nature associations jointly launched 'Manifesto Plan B Josaphat', proposing five alternative designs with a different focus, but a shared objective of leaving the existing natural area unbuilt (BRAL & NATAGORA et al., 2021). The local action committee proposed to preserve the *friche* as a natural park, focusing on education and recreation (Sauvons la friche Josaphat), while nature organization Natagora displayed the *friche a*s a natural area within a simplified zoning plan. More systematic frameworks to integrate the built program, through densification and rehabilitation, while preserving the ecological value were proposed by Team Leopold III [fig.13] and E. Diez (BRAL &

507

NATAGORA et al., 2021; 'I love Josaphat', 2021). J. Bergers (2023) presented a 'more-than-human' landscape structure, portraying different habitat types formed by ecological succession zones and 'places of encounter' through the interplay of architectural and landscape elements.

[fig.13] The counterproposal 'I Love Josaphat' of Team Leopold III (Jeroen Beerten and Karel Bruyland) seeks to balance the build and ecological claims on site. Source: Team Leopold III, 2021

Following the unfavorable advice, though without reacting to the Plan B or initiating dialogue, the regional authorities altered the plan by modifying a part of the site into a biopark, calling it "a multifunctional neighborhood, answering the ecological challenges and the need for affordable housing" (Perspective Brussels, 2021). This modification was inadequate according to the public consultation and the public debate continued, resulting in more confrontational action methods by the action committees such as petitions and demonstrations (Sauvons la friche Josaphat, no dat). Moreover, governmental discussions came to a dead end as the socialist parties argue to proceed with construction to tackle the housing crisis, whereas the green parties want to cease the development plan (BELGA & BRUZZ, 2023). As the official PAD procedure could not lead to consensus, the responsibilities were handed over to the regional development companies who proceeded with the development plans and proposed a masterplan for over five hundred housing units [fig.14] in April 2023 (RV & SVG, 2023), which is perceived by citizens' organizations as an act against the democratic procedures (BRAL, 2023).
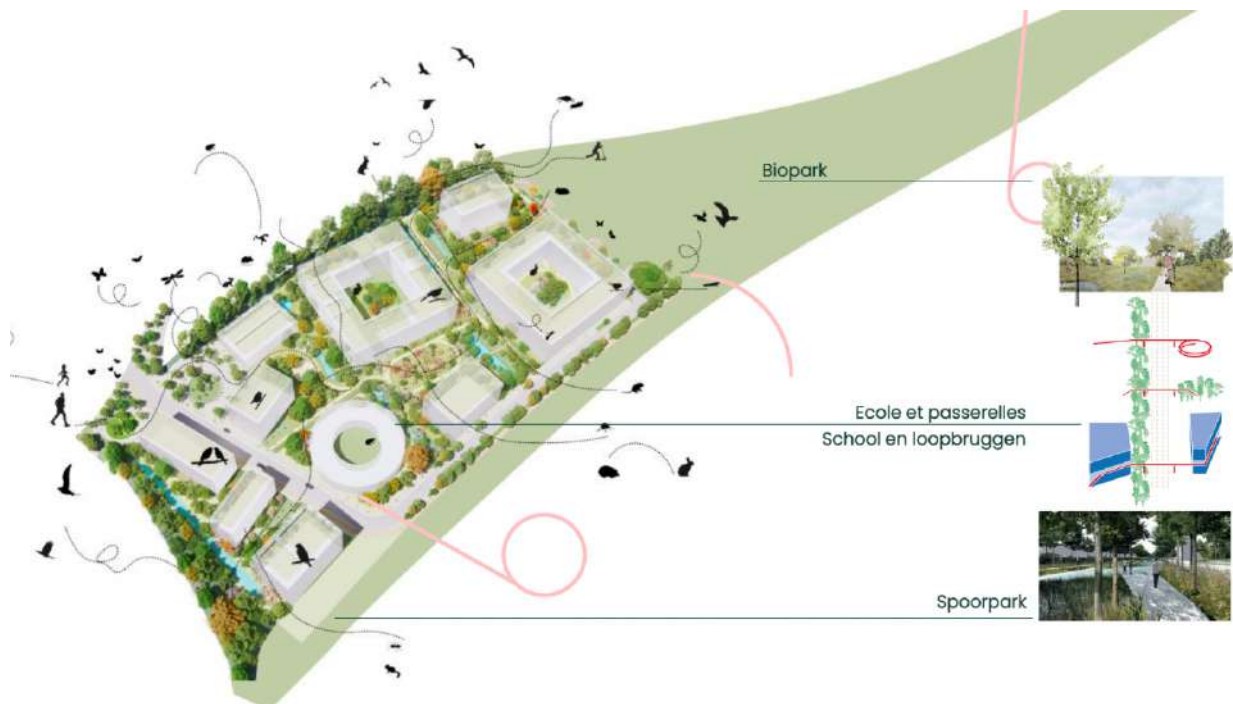
[fig.14] Masterplan for the 1st phase construction, bypassing the PAD procedure. The birdview image highlights the 'added' natural value. Source: Eiffage-Axa via Josaphat.be, April 2023

Tracing Historical-Contemporary Intersections and Contrasts

Activist Designs: Shaping Urban Plans Through Collaborative Counterprojects
Both the Maelbeek and Josaphat case show how action groups succeeded in influencing the public debate and eventually the development plans of public authorities through their site-specific analyses and alternative designs addressing the social and environmental challenges. In the case of the Maelbeek valley, the first counterprojects were developed in student ateliers at the architectural school, where internal debates on the socio-political circumstances in relationship to architecture and city planning seemed commonplace. From the different student projects it is noticeable that the counterprojects not only criticized the imposed road construction plans, but also used socio-political arguments (see P. Lefebvre provocative design reacting to the plans of colleague-students B. Levy and C. Mierop). Their design efforts proved to be especially impactful when collaborating with ARAU, IEB and neighborhood groups in the Maelbeek Valley. While these collaborations seemed pivotal in the past, for Josaphat collaborations of a different kind took place, in which architectural theory and academics in general did not have such a prominent role. Looking at the past, it be hypothesized that collaborations with influential architectural or academic figures could strengthen the argumentation and dissemination of alternative designs. Moreover, in the 1970s counterproposals by ARAU and IEB were widely spread in the media. While today the Josaphat case is also a hot topic in the media, there seems to be no room for the alternative designs of the Plan B.
When analyzing the designs of the counterproposals, the changes within drawing tools and representation techniques are undeniable. Technological advancements, such as GIS and digital drawing, opened a range of opportunities to communicate projects to the professions, authorities, and the public. The sober use of black lines and hatched plans, perspectives and axonometric plans found in the discourse of the 1970s and 80s have been replaced with expressive colored, rendered, perfectioned, atmospheric imagery. Nevertheless, several parallels can be drawn between the historical and contemporary cases. Firstly, axonometric and eye-height perspectives have stayed the clearest ways to communicate plans to the wider public. Secondly, in both cases multiple design scenarios for specific sites were developed, which illustrates that there is no single suitable option. Finally, social and environmental concerns are emphasized by incorporating natural or human subjects in many of the three-dimensional drawings. With the emergence of digital tools, the reflection should be made that there is no longer an equal distribution of resources of activist groups compared to the commercial sector. In a sense, the analogous techniques of the past allowed a fight with equal weapons. Action groups today largely lack this expertise, the budget, and the time to be

able to compete with high-end (multidisciplinary) teams producing convincing designs and visualisations.

Nuancing social and environmental paradigms then and now

The Manifesto Plan B Josaphat's spatial focus was on the ecological value and opportunities, rather than creating concrete urban design schemes. The ecological rationale proves to be at the top of the action committees' agendas, informed by the environmental sciences and their ominous predictions for cities worldwide. In the case of the Maelbeek Valley, the main concern of the residents was to defend their living environment. They aimed to protect their neighborhood from functionalist and capitalist urbanism, which would replace housing with office buildings and prioritize car traffic. In the proceedings of the first roundtables, many references are made to the original structure of the river valley. While its function as a natural corridor was celebrated, its deterioration of the residential areas through flooding was also emphasized with a call for new water collectors. The roundtable also proposed strategies for creating a mixed-use neighborhood through housing renovation, the creation of additional (social) housing, and the promotion of local commerce and artisanship. This would go in parallel with the revegetation of the valley, reintroduction of ponds and improved pedestrian accessibility (Agglomération de Bruxelles, 1973). The environmental concerns are also present in the claims for a more humane living environment by creating public parks and green courtyards, which would also enrich the region's fauna and flora (ARAU, 1984). The importance of mixed-use neighborhoods propagated within historical counterprojects aligns with the current urbanism discourse of the BCR and is exemplified by the development plans for the Josaphat site as a mixed-use and green neighborhood (Eiffage-Axa, 2023). According to activists, citizens' organizations and green political parties, the benefits of biodiversity preservation and mitigating heat stress and flooding outweigh the limited number of proposed social housing units. While the Maelbeek Valley case highlighted the coexistence of social and environmental arguments, the Josaphat case revealed a direct opposition between mixed-use development and ecology. The argumentation to reject green space-only scenarios to tackle the social housing crisis on the Josaphat site is also underpinned by the economic costs of deviating from existing plans. Economic drivers are decisive in both cases, where the financial benefits of road and office construction were prioritised over housing expropriations in the Maelbeek Valley (Conférence de Presse IEB, 1976), the development of the Josaphat district should valorise the land acquisition and studies made.

From comparing the Maelbeek and Josaphat cases it can be concluded that the environmental and ecological discourse has evolved significantly over the past 50 years. In the case of the Maelbeek, environmental concerns were framed within the functional and aesthetical amelioration of the urban landscape, benefiting its residents. And whereas solutions for flood prevention were sought in engineering, for the Josaphat case, the green space is considered as a solution for water collection and infiltration. Moreover, proposals such as the 1980 plan by B. D'Helft and A. Gerard to relocate the European institutions to a vacant area, would no longer fit into today's rationale of action committees, which now has a stronger ecological focus. Today, action committees argue to preserve vacant city areas, to protect animal and plant species on the site and mitigate climate change effects.

A seat at the table: official instruments for citizen consultation and participation

In the 1970s, public participation was not officially part of the urban planning procedures. However, citizens found a way to make their claims heard in the planning process of the Maelbeek Valley. The roundtable initiated by the alderman of urbanism of the Brussels Agglomeration was a response to the heavy contestation of citizens' organizations and neighborhood committees (Agglomération de Bruxelles, 1973). They acquired a seat at the table, but, having no decision-making power, they relied on support from other members of the roundtable. According to the political opportunity structure approach within social movement research, the receptiveness of the political system, including "the informal strategies of the political elites" (Van der Heijden, 1997, p. 30) are an influential to the success of a social movement. In this case, the informal strategies adopted by the alderman of urbanism, were clearly favorable towards the citizens' organizations. In 1979, an official consultation process was adopted in the region in the format of public enquiry and an advisory council, which was considered a victory (Doucet, 2015). For Josaphat, these participatory procedures resulted in unfavorable advice for the development plans. Afterwards, however, a further democratic process

was avoided. And while for the case of the Maelbeek Valley, the roundtable was a format for discussion, the request for a dialogue expressed by the Manifesto Plan B Josaphat remained unanswered by the regional authorities. While citizens' organizations like ARAU, IEB and BRAL have over the years developed expertise and political embeddedness (Bergers et al., 2023), this institutionalization did not necessarily lead to a better integration of citizens' concerns. Firstly, because the consultation procedure is too limited and comes late into the process, and secondly because citizens' organisations are still not welcomed by many governmental councils (BRAL, 2021). The late stage of communicating development plans has always been a frustration of citizens. During the 1970s, plans were a *fait accompli* once they reached the inhabitants. Therefore, the roundtable of the Maelbeek can be considered as a pioneering case in changing this pattern. It is important to note that citizen participation is not only measured by roundtables and consultation procedures. According to the political opportunity structure paradigm, a lack of access points to the political decision-making process results in a higher number of unconventional actions (Van der Heijden, 1997). Both cases show an iterative process of unconventional actions, such as petitions, press conferences, demonstrations and of course the counterprojects, and conventional participation through the roundtable discussions and public consultation procedures. Eventually, in both cases the initial development plans were revised and adopted elements proposed by the citizens. For the Maelbeek Valley, the express way was taken out of the development plan in 1973 and for the Josaphat site, increased attention was paid to biodiversity in the format of a biopark in the second proposal and later by proposing to safeguard part of the *friche* and create a lower density. These revised plans might not have met the expectations of the citizens, but they were certainly influenced by the citizens' claims.

Conclusions

From the comparison between the Maelbeek Valley and the Josaphat site can be concluded that, though both cases are situated in a specific political, economic, social, and ecological context, there are many resemblances. Firstly, in both cases, activists grouped together to counter the development plans that were proposed by the regional authorities and driven by economic logic. Design has proven to be a useful tool for activists to invoke a public debate. Even if the alternative designs were not intended to be built, they put claims on the table and provided opportunities to revise development plans. Secondly, the citizens' organizations addressed environmental and ecological aspects, which was not always emphasized in literature on the Maelbeek Valley. Nevertheless, perceptions of 'the environmental' and 'the ecological' have evolved over the past decades, and now take a much more prominent role in the argumentation of citizens and the public debate, shown by the Josaphat case. When it comes to participation, a lack of access to the political decision-making process was experienced then and now. Even now that citizen participation and consultation is officially incorporated in planning procedures, citizens' perspectives are still insufficiently recognized, driving them to resort to more public actions. Could it then be argued that older instruments for participation such as the roundtables, answering directly to the actions of citizens' organizations, the predecessors of the advisory committees, were more effective? The main aim of this paper was to create a dialogue between the past and the present debates within the urban development of Brussels. While only preliminary conclusions can be made, as the research on both cases is still in an early stage, the comparison shows that by revisiting historical cases, new perspectives and insights can be gained to look at urban questions today. This paper argues that more understanding of the tensions that typify the urban development of Brussels can be gained from juxtaposing historical cases, with more recent ones, specifically regarding social and ecological tensions which have thus far been underrepresented in the academic literature. Moreover, this paper wants to open the discussion on the role of design in researching urban questions. From this research can be concluded that alternative design is a tool for entering the public discussion on urban development processes. However, it can never be seen as an isolated element. Upcoming research will further investigate the role of design in a wide range of historical, contested developments in Brussels and prospectively incorporate gained knowledge within design research on a contemporary case with competing social and ecological claims.

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BEYOND METROPOLIZATION

Exploring new hybrids

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