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Landscape Quality and Brownfield Regeneration: A Community Investigation Approach Inspired by Landscape Preference Studies

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ABSTRACT *Increasing emphasis is given to brownfield regeneration across Europe. However, many local actors consider landscape quality as a secondary issue in the regeneration process. The present research investigated community sensitivity to landscape quality in the context of brownfield regeneration. This analysis was conducted in six post-industrial neighbourhoods situated in Wallonia (Belgium). The investigation method was inspired by landscape preference studies (LPS) and complemented with a qualitative case study approach. This method produced valuable insight into local community expectations regarding landscape management in the context of brownfield regeneration. The results presented in this paper suggest that perceived landscape quality influences community evaluation of regeneration schemes and reveal an unpredicted preference of certain community groups for post-industrial aesthetics. The findings also suggest that higher landscape quality in brownfield regeneration increases the attractiveness and liveability of a locality.*

KEY WORDS: Brownfield regeneration, landscape quality, landscape preferences, local community, post-industrial landscapes

1. Introduction

Brownfield regeneration is an issue that has been rising in importance across Europe. Globalisation of the economy and deindustrialisation have generated important land-use changes, leaving underused and derelict sites in numerous towns and regions. The growth of the service sector and the subsequent downsizing of companies have further contributed to producing an important legacy of vacant industrial sites across the continent (Cabernet Coordination Team, 2006).

In areas of economic decline, the immediate needs of local actors and communities relate to job opportunities. As a consequence, priority in brownfield regeneration is often given to productive and commercial after-uses. Accordingly, mono-functional

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and economically orientated regeneration schemes tend to ignore the ecological, historical and aesthetic functionality inherent in these sites (Ling *et al.*, 2007). If landscape quality and the impact of a development scheme on a wider landscape setting are regularly evaluated for treasured landscapes (in the context of the 'environmental impact assessment' procedures), landscape quality is most often considered as a second range issue in the context of brownfield regeneration in which new landscapes must be restored or recreated (Collier & Scott, 2008).

In the current paper, 'landscape quality' does not refer to intrinsic qualities but rather to human perceptions of landscapes, following the European Landscape Convention (COE, 2000). Various authors have highlighted that the local landscape affects psychological well-being (Galindo & Rodriguez, 2000), neighbourhood satisfaction and 'sense of place' (Cheng *et al.*, 2003; Lee *et al.*, 2008; Stedman, 2003). Accordingly, perceived landscape quality could play an important role in ensuring successful brownfield regeneration in the sense that it is positively perceived by local communities and contributes to local liveability. Various studies have highlighted that conversely, regeneration programmes that do not integrate local community views or do not maintain and enhance a sense of place are likely to prompt harmful reactions, from the boycotting of regenerated spaces to vandalism or un-civic behaviours (e.g. Orueta, 2007; Sharp *et al.*, 2005; Smith, 1996). Even when negative community reactions are not acute, a depressing atmosphere could, in the long term, harm a wide area surrounding disliked regenerated sites, in the same way that industrial brownfields affect the attractiveness of their surroundings (Letombe & Zuindeau, 2001). Conversely, landscape quality could increase the attractiveness of a regenerated site and therefore play a role in the regeneration of a wider area. Economic studies indeed suggest that the perceived quality of landscapes is correlated with the attractiveness and economic values of a local area (e.g. Halleux, 2005; Henneberry & Halleux, 2008).

Regarding local communities, brownfield regeneration schemes are thus faced with a two-stage challenge. First, they must be acceptable at the time of the regeneration process. Second, they also must be appreciated over the long-term. According to Dixon (2007), developers are now well aware that a regeneration project must be socially acceptable to limit the risk of local protests and complete the scheme in a reasonable timeframe. By contrast, long-term appreciation remains much less of a concern for the property industry. In addition, this issue remains limited to theoretical contributions.

Following Lafortezza *et al.*, who argue that "brownfield remediation requires special attention to ecological and visual preference effects because these areas are often derelict, undervalued, or misunderstood" (2008, p. 258), this paper takes the view that community perceptions of landscape quality must be systematically investigated and integrated in the regeneration schemes. As Karjalainen underlines, "public preferences can be silent knowledge that influences the mind of the planner or decision maker, but a more systematic approach would nevertheless be needed" (2006, p. 25). In line with the concept of 'multifunctionality' promoted by Ling *et al.* (2007), such an investigation of public preferences would require the consideration of a wide range of issues, including general evolution of community landscape values, the cultural heritage dimension, local landscape specificities and the need for green spaces.

From this perspective, the present research investigated community landscape perceptions in six industrial neighbourhoods situated in Wallonia (Belgium), in relation to the regenerated brownfield sites present in these neighbourhoods. This investigation was based on a survey method that combines both a quantitative and qualitative approach. On the one hand, a survey method inspired by the so-called 'landscape preference studies' (LPS) enables a systematic investigation of community landscape preferences. On the other hand, a case study approach provides qualitative information that supports interpretative analysis of the statistical results. We expected this method to be an appropriate means of evaluating whether landscape quality is important in brownfield regeneration and to produce valuable input about community perceptions of the local regeneration processes.

2. Landscape Preference Studies

Public landscape perceptions are studied in many fields of research such as psychology, geography, the social sciences, the environmental sciences. Research methods and approaches vary according to disciplines and research questions but are typically divided into three categories: psychophysical, cognitive, and phenomenological approaches (Karjalainen, 2006). The phenomenological approach concentrates on the experiences of people in the landscape rather than on the quality of the landscape (Karjalainen, 2006). The psychophysical and cognitive approaches can both be named as 'landscape preference studies' (LPS). In this paper, however, 'LPS' only refers to the psychophysical approach. The psychophysical approach is indeed more relevant than the cognitive approach in producing concrete knowledge for planning and management purposes (Ruddel *et al*., 1989).

Psychophysical approaches have originally focused on connections between features of the landscape and preferences observed through statistical analyses. Many studies thus describe the characteristics of preferred and less preferred landscapes. Progressively more attention has also been given to the influence of the social and cultural profile of respondents, confirming the subjective nature of landscape perception (e.g. Daniel, 2001; Galindo & Rodriguez, 2000; Tress *et al*., 2001). Landscape preferences indeed arise from people cognitively coding the scenes differently, according to personal experience, educational background and various other individual parameters like expectations for what a place could offer (e.g. Coeterier, 1996; Kaltenborn & Bjerke, 2002; Sevenant & Antrop, 2009; Surova & Pinto-Correia, 2008). Concretely, LPS typically consist of surveys, questionnaires or interviews using photographs or computer visualisations to investigate public preferences. When photographs are used, they may represent landscapes as they currently appear or they may be altered to present prospective scenarios. In some cases interviewees are asked to rank-order photos to express their preference. In other cases they are asked to assess the quality of landscapes on a numerical rating scale. The use of visuals rather than actual scenes raises methodological questions. However, many studies have highlighted that photographs are acceptable substitutes to on-site visits if they include most of the visual elements of the landscapes (Karjalainen, 2006).

In terms of research setting, LPS initially focused on rural landscapes, green spaces and forests (e.g. Coeterier, 1996; Roovers *et al*., 2002; Surova & Pinto-

Correia, 2008). They were later applied to urban public spaces and built environments, although these applications were often focused on the presence and benefits of nature in urbanised environments (e.g. Chon & Shafer, 2009; Kaplan & Austin, 2004; Mudrak, 1983; Sullivan & Lovell, 2006). More recently, Tweed and Sutherland (2007) developed a methodology to investigate assessment processes of heritage values in 'historical urban areas'. Lafortezza *et al*. (2008) investigated visual preference in relation to ecological dimensions of brownfield regeneration. Finally, LPS have also been successfully used to answer concrete planning questions. For example, Ellis *et al*. (2006) explored the mediating effect of trees and shrubs on the relationship between retail land-uses and neighbourhood satisfaction. Given this evolution, LPS could be used to investigate the impact of landscape quality on perceptions in the context of brownfield regeneration.

LPS are, however, subject to some limitations that have been reported in the literature. The first limitation is that they are not necessarily applicable to areas different from those for which they were developed (Hitchmough & Bonugli, 1997; Karjalainen, 2006). Rather than a limitation, we considered this place-dependency as an indicator of the methodological strength of LPS. If LPS are place-dependent, they could indeed be used to inform local regeneration plans and policies. Another limitation of LPS is that they do not explain why people like or dislike given landscape features (Karjalainen, 2006). If respondents' personal attributes (e.g., gender, age, socio-economic level, etc.) can provide hypotheses to guide interpretative analysis of the statistical results, it becomes necessary to further investigate a particular people–place relationship to understand neighbourhood effects on preferences. For this reason we chose to complement LPS with a more qualitative case study approach. For quite some time, qualitative research has been treated as complementary to quantitative studies; the sociologists of the Chicago School employed both 'case study' and 'statistical' methods (Hammersley & Atkinson, 1995). Qualitative data may be used for preparing quantitative research design and/or during analysis phases (Flyvbjerg, 2006; Lilford & Braunholtz, 2003). Various authors have highlighted that qualitative approaches such as applied ethnography and case study method can provide helpful insights for such an interpretative analysis and are increasingly used in the field of urban planning and regeneration (Collier & Scott, 2008; Maginn, 2007; Murtagh, 1999; Teller, 2007). When the processes under study have similar aims and are situated in broadly similar localities, it is possible to conduct comparative case study analyses and produce 'analytical generalisations' (Yin, 2009).

3. Research Setting: A Comparative Case Study Approach

The six neighbourhoods that were investigated are located in Wallonia, Belgium. Wallonia has experienced an evolution similar to many other European regions. Industry grew rapidly throughout the nineteenth and early twentieth centuries. From the late 1950s onwards, industrial activities experienced a structural process of decline, leaving numerous industrial sites vacant and derelict. In the mid-1990s, the Regional Authority adopted specific tools and procedures aimed at stimulating urban regeneration (Fraser & Marechal, 2003). However, the revitalisation of brownfield sites and their deprived surroundings presents a

substantial challenge for Walloon planners and decision-makers (Halleux & Lambotte, 2008).

Three of these six neighbourhoods include former industrial sites that have been razed and cleaned-up, but remained underused; these include the following: Ans, Trooz and Seraing (see Table 1 for a description of the three 'underused' sites). The other three neighbourhoods include the following fully regenerated brownfields: Liege, Court-St-Etienne and Courcelles (see Table 2 for a description of the three 'fully regenerated' sites).

The three 'underused' regenerated sites (Table 1) were selected because they are illustrative of the typical economically orientated regeneration strategy applied in Wallonia. The sites are typically cleaned-up and then proposed as an industrial or business park to private companies. The landscape restoration strategy is typically very limited. According to the developer of these sites, who was interviewed prior to this research, these three sites had little success amongst private companies compared with industrial parks developed on greenfields. The three fully regenerated sites (Table 2) were selected because the applied regeneration strategy was not, or at least not only, economically orientated. Other land-uses were proposed, such as recreational, commercial or residential functions. Furthermore, they proposed variant approaches in terms of landscape restoration.

There is not a single way to conduct case study research; rather, a combination of methods can be used (e.g. unstructured interviews, direct observation, collection of documents and artefacts) (Stake, 1995; Yin, 2009). For the six regenerated sites, a systematic analysis of the regeneration process was performed by reviewing official documents, reports and the local press, as well as conducting preliminary interviews with local planners and developers. This approach was used to gather comparable information on former industrial activity, site accessibility, proposed after-uses, type of neighbourhood, level of landscape quality for the different brownfield regeneration cases. This case study approach was later complemented with qualitative information from the open questions asked during the survey.

The three neighbourhoods that include underused sites (Table 1) are located in the urban region of Liege. They are all mixed-use residential areas. One neighbourhood (Ans) is relatively prosperous while the other two neighbourhoods (Seraing and Trooz) are more disadvantaged. In the three neighbourhoods, the brownfield regeneration was economically orientated. In the first case (Ans), the regeneration scheme consists of a business park given the excellent location and potential of the site. In the other two cases (Seraing and Trooz), the regeneration scheme consists of a traditional industrial park given the lower accessibility and prevailing industrial context of the sites. In the three cases, former industrial buildings were razed, the soil was cleaned-up and the land was partially serviced. In Ans, the site remains empty. In Seraing and Trooz, industrial buildings have been constructed, but large parts of the sites remained unoccupied, as very few firms have chosen to invest in these locations. Regarding landscape quality, very slight greening measures were implemented on these three sites, such as a few young trees planted along the main road of the sites.

The three fully regenerated sites are located in Liege (Belle-Ile), Court-St-Etienne (Henricot) and Courcelles (Perrier-Chenoit) (Table 2). The Liege site, previously a water pipeline plant, was redeveloped into a mixed-use area including a shopping

Table 1. Key features of underused sites

Municipality	Ans	Seraing	Trooz
Name and size of the site	Grand Bazar 6 ha	LD 5 ha	Prayon 11 ha
Location	Periurban neighbourhood in the outskirts of Liege	Industrial district in the Liege industrial suburb	Industrial district in the Liege industrial suburb
Accessibility	High—close to motorway and Liege airport	Very low—local roads	Medium —along an important (regional) transit route
Former use	Supermarket warehouses	Steelworks	Zinc processing works
After use	Business park	Industrial park	Industrial park
Developer	Public—economic development agency	Public—economic development agency	Public—economic development agency
Actual landscape	All buildings have been demolished except for one on the street front, reused as a business incubator. A road was created to develop the rest of the site, which has, however, remained empty for a while. The actual landscape of the site is typical of abandoned land, with spontaneous vegetation and some litter. A detention pond is present at the back of the site, but the water is full of algae and detritus.	The industrial plant has been completely demolished. A road has been created to allow the redevelopment of the site. Most of the site is empty, covered by spontaneous vegetation. In the background, steelworks located down in the valley are visible. Only two companies have bought a plot and have built shed-style industrial buildings.	The industrial buildings have been completely demolished, except for one chimney. A road has been created through the site and a few private companies have bought and built shed-style industrial buildings. Unbuilt spaces are not landscaped and fly tipping gives the site a filthy general image. At the back of the site, there is a river; however, it is not accessible from the site (due to the presence of a wall and buildings).
Type of neighbourhood	The site is located in a mixed-use residential urban neighbourhood but at the moment it is only accessible by one street. The population is mainly prosperous. Some inhabitants use the site for walking or for other outdoor activities.	The site is surrounded by a mixed-use residential urban neighbourhood. The population is mainly deprived. Inhabitants often pass through the site or visit the fruits and vegetables grocery established on the site.	The site is located at the entrance of the locality. The area at the front of the site is a mixed-use area with housing and economic activities. At the back of the site, on the other side of the river, is also a residential area, from which the site is highly visible.

(*continued*)

Table 1. (*Continued*)

Municipality	Ans	Seraing	Trooz
			The population is mainly deprived. A few inhabitants use the site to have a walk.
Qualitative information gathered during the survey	Traffic in the street where the entrance to the site is located is perceived as very important. Local inhabitants previously fished in the detention pond, but there are now no fish due to the poor state of the water.	Steel works that remain active and visible from the site and the neighbourhood are perceived as polluting.	The former industrial chimney present on the site is used by a company located on the site, and thus generates dust and smoke.
Photographs			
			
			

mall, a business park and public green spaces. In Court-St-Etienne, a former steelworks was regenerated into a multifunctional project, including a supermarket, a school, new housings and small businesses (e.g. a carpentry shop and an automotive repair shop). In Courcelles, the regenerated site was made from a coal tip transformed into a park with sport and leisure facilities. Regarding the landscape quality, Belle-Ile was designed on the basis of a high landscape quality standard. The situation is more heterogeneous on the Henricot site, where attempts to improve the landscape quality were limited to specific areas. Perrier-Chenoit is less 'urban' than the other sites and is almost completely dedicated to green amenities.

Table 2. Key features of fully regenerated sites

Municipality	Court-St-Etienne	Liege	Courcelles
Name and size of the site	Henricot 25 ha	Belle-Ile 13 ha	Perrier-Chenoit 40 ha
Location	Town centre of a small town in Walloon Brabant	Peri-central site enclosed by waterways and urban neighbourhoods	Industrial district in the Charleroi industrial suburb
Accessibility	Medium —one side of the site is along an important (regional) transit road	Very high—motorway, railway, bus, cycling/pedestrian network in the vicinity.	Very low—by local roads
Former use	Steelworks	Water pipeline factory	Coal tip
After use	New urban neighbourhood	Shopping mall, business park, green spaces	Green leisure park
Developer	Public-private—Local Authority and private developers	Private developer	Public—Regional Authorities
Actual landscape	New buildings house a supermarket and 160 new dwellings, including social housing. Special attention has been paid to architectural quality of the buildings. Some industrial buildings were conserved and now house a school, cultural NGOs and cultural activities. A stream crossing the site has been reclaimed and green footpaths created alongside. Substantial efforts were made to develop landscape quality.	The shopping mall, the buildings of the business park and other architectural features were designed following a coherent scheme. In the surrounding green spaces, all open to the public, particular attention has been paid to the landscape design. The site is delimited by two waterways and is bordered by a line of mature trees, constituting additional added value for the site.	The park was developed to create different pedestrian links between the areas surrounding the site. The park also includes two football grounds, a cafeteria, a sports track, squares with benches, playgrounds, etc. A significant proportion of these facilities are now damaged, and the site looks abandoned and derelict. At the time of regeneration conducted by the regional authorities, local authorities were designated as responsible for the long-term maintenance of the site, which is apparently not ensured.

(*continued*)

Table 2. (*Continued*)

Municipality	Court-St-Etienne	Liege	Courcelles
Type of neighbourhood	The site is located in the centre of the locality, characterised by a mix of uses. The established population is mainly middle-class. The population who settle in the new housing developed on the site is a mix of wealthy populations and disadvantaged populations.	The site is located between two residential urban neighbourhoods. Access from these neighbourhoods to the site has been facilitated. The population of these neighbourhoods are very mixed, with a middle-class dominant character.	The site is surrounded by residential urban areas and many entrances have been created all around to facilitate access to the site. The population is dominantly disadvantaged working-class.
Qualitative information gathered during the survey	Recently established inhabitants perceive a certain lack of conviviality in the neighbourhood.	The green spaces surrounding the shopping mall are frequented for fishing, taking a walk or eating a sandwich at lunch time.	Before regeneration, this coal tip was generating dust throughout the neighbourhood, creating a considerable nuisance.
Photographs			
			
			

4. Survey Questionnaire

The research was based on a survey method inspired by both LPS and qualitative research. The questionnaire included both closed and open-ended questions. It made use of photographs, including digitally altered photographs for certain sites, to elicit community landscape perceptions and expectations in relation to local brownfield regeneration. Additional information on age, gender, personal and parental, status, level of education and profession were also systematically collected.

The survey was performed in the six neighbourhoods by researchers, who questioned respondents in the field. The initial objective was to reach 100 respondents in each neighbourhood. Seven days were spent in each neighbourhood, from 10.00 to 19.00 during the week and from 14.00 to 17.00 during the weekend, to reach both the working and non-working population. To ensure a random selection of respondents, we interviewed every third person who passed a particular point in the survey area. This location was selected as the point where the maximum number of persons passes. When someone declined the interview, the count recommenced. In some neighbourhoods, due to very low activity in open spaces, it was necessary to interview every person. In some neighbourhoods it was also necessary to ring the doorbells (within a perimeter of 500 meters surrounding each site). Due to the size of some neighbourhoods, the number of 100 interviewees was not reached. Altogether, after the elimination of non-valid subjects, a sample of 460 respondents ($n = 460$) was conserved across the six neighbourhoods: 18.5% in Liege ($n = 85$), 16.1% in Court-St-Etienne ($n = 74$), 13.5% in Courcelles ($n = 62$), 9.3% in Ans ($n = 43$), 21.3% in Trooz ($n = 98$) and 21.3% in Seraing ($n = 98$).

For the research questions addressed in this paper, only three parts of the questionnaire and associated results were studied. The first part concerns neighbourhoods with underused sites (Table 1). The first question addressed the overall perception of the site, as follows: ''If you think about this site, what are the main characteristics that cross your mind?'' (Q1). The aim of this question was to investigate whether landscape issues were spontaneously considered and mentioned by local communities, and if so, their importance. Respondents were also asked to react to photomontages proposing an improvement of the landscape quality of the local regenerated site. Question Q2 was then formulated as follows: ''Please look at these simulated views of the site; if the site was regenerated that way, do you think it would improve the quality of life in your neighbourhood?'' Following Coeterier (1996), respondents often complained about the restricted view of the normal format of photographs (because of difficulties in understanding the proposed landscape); therefore, the current study made use of panoramic views. We systematically developed a set of different views corresponding to the 'key points' of the sites (main entrance, inner road, outdoor pedestrian spaces, and any feature specific to the site, such as a detention pond in Ans or a stream in Trooz). The photographs were altered with Adobe Photoshop software. The initial landscape quality was very low in the three sites (Table 1). The proposed alterations were made in accordance with the plans of the developer, who wanted to develop a business park in Ans, and industrial parks in Seraing and Trooz. Photomontages were characterised by a rather high landscape quality for the Ans case (Table 3), because as business parks must be attractive to firms, they require a high level of landscape amenities to ensure their

Table 3. Photomontages sets for the three underused sites

Photomontages sets- Ans	Photomontages sets- Seraing	Photomontages sets-Trooz
		

image (Burton & Rymsa-Fitschen, 2008). Regarding the industrial parks in Seraing and Trooz, photomontages suggested an intermediary quality level (Table 3), between the existing situation and the high quality level suggested for Ans.

The second part of the survey concerns the three neighbourhoods with fully regenerated sites (Table 2). Respondents were invited to evaluate the local regeneration scheme using a five-point scale, as follows: "Could you give your opinion on the regeneration scheme using a scale from 1 (very bad) to 5 (very good)?" (Q3). They were also asked to formulate their opinion about its positive and negative aspects through the following open question: "Could you mention three positive aspects and three negative aspects of the regeneration scheme?" (Q4). This exercise was an opportunity to test community attitudes towards fully completed regeneration schemes, considering that they are not automatically positive. These questions were also aimed at investigating whether landscape issues are spontaneously mentioned and their importance to respondents.

The third part concerns all six neighbourhoods. A set of five landscape styles typical of brownfield regeneration schemes was presented to respondents. They were asked to identify which style they preferred (Q5) and to explain why (Q6). The last question was completely open. Each landscape style was presented on a stand-alone sheet including several photographs of the regenerated site to encourage respondents to assess an 'overall' landscape style rather than specific attributes or scenery aspects. Respondents could manipulate the sheets as needed. They were not informed of the location of the five proposed schemes. The five proposed landscape styles included

the three fully regenerated Walloon sites (Table 2). In the neighbourhoods where these fully regenerated sites were located, the local landscape style was not included in the surveys. This methodological choice was justified by the fact that landscape evaluations are strongly correlated with familiarity (Karjalainen, 2006; Penning-Rowsell, 1982). In these cases, a replacement site was presented (Table 4). We integrated a 'nice and tidy' model of a business park, that is, a landscape style that was not yet present in the proposed schemes. The three regenerated Walloon sites were complemented by two German sites located in the Ruhr valley, Duisburg and Castrop-Rauxel (Table 4). The Duisburg landscape park is a rather conservationist regeneration scheme in which disused blast furnaces are conserved and integrated into a large green space. The selection of this site aimed to investigate respondents' sensitivity to regeneration approaches based on conservation of industrial aesthetics, an approach that is not available in the Walloon sample. As built heritage is acknowledged to maintain and enhance a local sense of place and to contribute to sustainable development of landscape (Vileniske, 2008), it was considered as a possible key factor in perceived landscape quality of regeneration schemes. The Castrop-Rauxel business park is a more interventionist approach, mixing contemporary modern office buildings and some industrial remains, integrated into publicly accessible green spaces. This mixed approach, combining enhancement of the industrial past and actual economic development, was also expected to complete the sample of proposed landscape styles.

5. Results of the Survey

5.1. Preferences in the Three Neighbourhoods with Underused Sites (Q1 and Q2)

Answers to question Q1 were gathered into 17 perception classes (Table 5), according to the main idea expressed by respondents. In Ans, the impression of 'dereliction, oldness and ugliness' predominated (41.9%). This result could be explained by the high disappointment created by the derelict state of the detention pond (Table 1). This perception class was followed by the class 'inertia and emptiness' (27.9%). People seemed unable to forget that the site remained unused for several years. The same reproach was found in Seraing, where it was the predominant perception class (31.6%). This perception class refers to statements from respondents who did not understand why the site remains empty, why "one" does not do something with this large space, with narratives including statements such as: "Do something on this site, anything but something, do not let it stand empty." In Trooz, people were less disapproving than in Ans and Seraing, likely because the site has been progressively occupied by 'local businesses' during the last few years (mentioned by 19.4% of respondents). The site was also associated with 'jobs' by 5.1% of respondents. Most of the respondents in Trooz (22.4%), however, gave a lukewarm reaction to the site, underlining that it is an 'industrial park'. Indeed, this class includes statements such as: "Well it is an industrial park! Of course it is ugly but they must work!"; "It is not attractive, but it is industrial buildings, it cannot be beautiful!"; and, "We need industries, so what?". These reactions illustrate a well-established stereotype according to which a working place does not need or cannot meet other functions such as landscape quality (Ling *et al.*,

Table 4. Image sets for the two German landscape styles and the replacement site (Q5)

Image set- Duisburg	Image set- Castrop-Rauxel	Image set-Replacement site
		

Table 5. Perception of the three underused sites (Q1)

Perception classes	Ans ($n=43$)	Trooz ($n=98$)	Seraing ($n=98$)
1. Nothing special (%)		8.2	17.3
2. OK, good (expeditious answer) (%)		1.0	15.3
3. Nostalgia for the past (%)	4.7	3.1	7.1
4. Presence of businesses, shops (positive) (%)		19.4	2.0
5. Jobs (%)		5.1	4.1
6. Future, opportunity, many possibilities (%)	7.0		1.0
7. Emptiness, inertia (%)	27.9	1.0	31.6
8. Industrial park (%)		22.4	3.1
9. Dereliction, oldness, ugliness (%)	41.9	14.3	1.0
10. Lack of greenery (%)		5.1	
11. Dirtiness (%)	2.3	7.1	3.1
12. Smoke, olfactory pollution (%)		8.2	
13. Greenery (%)			5.1
14. Quietness (%)	4.7	4.1	3.1
15. Insecurity (%)	7.0	1.0	
16. Capitalism (%)			1.0
17. No answer (%)	4.7		5.1

2007). However, 14.3% of respondents in Trooz concentrated on the impression of 'dereliction, oldness, ugliness' produced by the site and 5.1% underlined its 'lack of greenery'.

The analysis of question Q1 resulted in rather negative perceptions of the three regenerated sites. This confirms the aforementioned idea: brownfield regeneration schemes, even if they are welcomed because of economic activities and job opportunities, do not automatically continue to be appreciated over the long term.

Reactions towards landscape alterations proposed in the photomontages (Q2) were generally positive, especially in Trooz and Seraing (Figure 1). This result shows that there is a strong latent demand for regeneration schemes with a higher level of landscape quality than that proposed for the economically orientated sites in Wallonia. Perception and acceptability of proposed modifications to the local environment are related to the economic context and status of inhabitants. In the more deprived neighbourhoods of Trooz and Seraing, the low economic vitality seemed to lower expectations because people were very satisfied with an intermediary design quality (Figure 1). By contrast, respondents from Ans (more affluent than their counterparts from Seraing and Trooz) were also positive, but more cautious and demanding, even if a higher level of landscape quality was suggested on the photomontages. A typical reaction obtained in Ans was as follows: "It may be positive, but it depends on what would be done exactly on the site".

5.2 Results in the Three Neighbourhoods with Fully Regenerated Sites (Q3 and Q4)

Respondents' evaluation of the local regeneration schemes (Q3) are synthesised in Table 6. The mean ratings were 4.26 for Liege, 3.23 for Court-St-Etienne and 2.84 for Courcelles. The positive and negative aspects of the local regeneration scheme

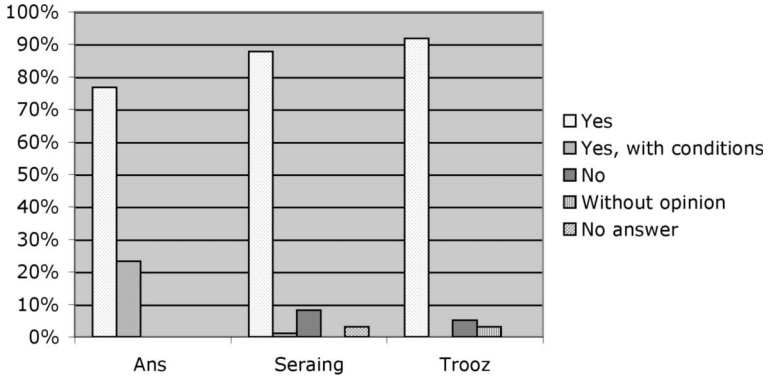

Figure 1. Perceptions of photomontages.

Table 6. Ratings of regeneration schemes for the three regenerated sites (Q3)

Local scheme	Mean rating	Standard deviation
Liege ($n = 85$)	4.26	0.69
Court-St-Etienne ($n = 74$)	3.23	0.98
Courcelles ($n = 62$)	2.84	0.95

(Q4) put forward by the local populations are presented in Table 7. The positive aspects spontaneously mentioned by respondents were quite similar in Liege and Court-St-Etienne. In Liege, the presence of activities (e.g. shops) was the most frequently mentioned aspect (27.1%), followed by the presence of greenery (18.8%), the atmosphere (15.3%), and the beautiful and well-designed character of the site (14.1%). In Court-St-Etienne, the most frequently mentioned aspect was the beautiful and well-designed character of the site (23.0%), the atmosphere (21.6%), the presence of activities (14.9%) and the cleanliness (13.5%). In Courcelles, the remediation of the site was the most appreciated change (21.0%), as this coal tip was previously generating dust throughout the neighbourhood (Table 2). This is followed by the possibility of outdoor activities (16.1%), sports amenities (14.5%) and the presence of greenery (12.9%). Although many answers were related to activities and land uses, many others also related to formal features of the landscape (greenery, beauty and design, cleanliness, atmosphere). This result confirms that landscape quality plays a significant role in the appreciation of implemented brownfield regeneration schemes.

Concerning negative aspects, the populations of Liege and Court-St-Etienne identified a wide panel of negative issues, without any one being predominant. By contrast the population of Courcelles (Perrier-Chenoit) focused strongly on bad management issues, with 54.8% of respondents underlining the lack of maintenance, 24.2% the vandalism and 6.5% the insecurity. These results, combined with the mean ratings of the different schemes (Q3), can be interpreted as follows. Local inhabitants in the first two cases did not perceive any major problem, which is

Table 7. Positive and negative aspects of the local regeneration schemes (Q4)

	Liege ($n = 85$)	Court-St-Etienne ($n = 74$)	Courcelles ($n = 62$)
Positive aspects:			
Activities (shops, pubs, etc.) (%)	27.1	14.9	
Outdoor activities (%)			16.1
Sports amenities (%)			14.5
A place for children (%)		1.4	3.2
Accessible housing (%)		6.8	
Rehabilitation/redevelopment (%)	4.7	5.4	
Clean-up of the site (%)			21.0
Greenery (trees, flowers, etc.) (%)	18.8		12.9
Stream rehabilitation (%)		5.4	
Beautiful/well designed (%)	14.1	23.0	9.7
Atmosphere (quietness) (%)	15.3	21.6	9.7
Security (%)	3.5		1.6
Cleanliness (maintenance) (%)	2.4	13.5	
Accessibility (%)	8.2	1.4	1.6
No answer (%)	5.9	6.8	9.7
Negative aspects:			
Activities and ambiance (%)	4.7	35.1	
Crowd (%)	11.8		
Maintenance (%)	16.5	5.4	54.8
Aesthetics (%)	4.7	6.8	1.6
Lack of accessibility (%)	5.9	4.1	
Noise (%)	5.9	1.4	
Traffic (%)	12.9	16.2	
Concurrence with city centre (%)	4.7		
Lack of nature (%)	2.4	1.4	
Insecurity (%)	4.7	8.1	6.5
Vandalism (%)	1.2	2.7	24.2
No answer (%)	24.7	18.9	12.9

reflected in their positive rating of the scheme. In the third case, by contrast, bad management issues dominated the local perception of the regeneration scheme and largely explained the lower rating of the scheme. The situation in Courcelles also illustrates that brownfield regeneration schemes that were welcomed at the time of the regeneration process are not automatically appreciated over the long-term. More precisely, the Courcelles situation illustrates the importance of maintenance to conserve the attractiveness of a site over the long term (Tjallingii, 2005).

5.3. Preferences Regarding Landscape Styles (Q5 and Q6)

Preferences for different landscape styles were investigated in the six neighbourhoods ($n = 452$). In this paper, we focus on the results of the Duisburg landscape style. These results revealed an unpredicted level of preference for Duisburg amongst certain categories of respondents and particularly interesting neighbourhood effects regarding preference for this landscape style.

Concerning question Q5, the Duisburg landscape park obtained significant scores in four of the six neighbourhoods (Table 8). This landscape style was preferred by

20.7%, 20.5%, 20.3% and 20.9% of people in Liege, Court-St-Etienne, Courcelles and Ans, respectively. The Duisburg landscape style obtained the second-highest score in all four neighbourhoods. Such a significant level of preference suggests that conservationist regeneration strategies implemented in the Ruhr could be appreciated in other contexts.

The statistical analysis of the personal attributes of respondents to question Q5 ($n = 452$) revealed several significant influences on preference for Duisburg landscape style (Tables 9 to 12). Gender was not correlated with the choice of Duisburg as a preferred landscape style (Table 9). On the contrary, a strong relationship existed with the age of respondents (Table 10). Further statistical tests showed that the effect was significant for those 18–28 years of age, who particularly appreciated Duisburg style (χ^2 (1) = 12.78, $p < 0.01$) and for people 60 years and more, who significantly disliked it (χ^2 (1) = 11.05, $p < 0.01$). For the other age classes, the correlation was not significant. A significant relationship was also present between the level of education and the preference for Duisburg landscape style (Table 11). Additional statistical tests showed that the effect was significant and positive for respondents who

Table 8. Relationship between preference for Duisburg landscape style and surveyed neighbourhood* (Q5)

		Preferred landscape style		
Surveyed neighbourhood		Duisburg	Others	All
Liege	No.	17	65	82
	%	20.7	79.3	
Court-St-Etienne	No.	15	58	73
	%	20.5	79.5	
Courcelles	No.	12	47	59
	%	20.3	79.7	
Ans	No.	9	34	43
	%	20.9	79.1	
Trooz	No.	2	96	98
	%	2.0	98.0	
Seraing	No.	7	90	97
	%	7.2	92.8	

* Chi^2 (5) = 25.12: significant at 1% level.

Table 9. Relationship between preference for Duisburg landscape style and gender*

		Landscape style		
Gender		Duisburg	Others	All
Male	No.	31	188	219
	%	14.2	85.8	
Female	No.	30	200	230
	%	13.0	87.0	

* Chi^2 (1) = 0.12: not significant at 1% level.

Table 10. Relationship between preference for Duisburg landscape style and age*

Age (years)		Landscape style		
		Duisburg	Others	All
−18	No.	3	25	28
	%	10.7	89.3	
18–28	No.	23	68	91
	%	25.3	74.7	
28–60	No.	31	188	219
	%	14.2	85.8	
60 and +	No.	4.4	95.6	113
	%	1.1	23.9	

* Chi^2 (3) = 18.73: significant at 1% level.

Table 11. Relationship between preference for Duisburg landscape style and level of education*

Level of education		Landscape style		
		Duisburg	Others	All
Primary school	No.	1	22	23
	%	4.3	95.7	
Lower secondary school	No.	7	81	88
	%	8.0	92.0	
Technical secondary school	No.	10	54	64
	%	15.6	84.4	
Upper secondary school	No.	13	114	127
	%	10.2	89.8	
Non-academic higher studies	No.	18	75	93
	%	19.4	80.6	
Academic studies	No.	13	38	51
	%	25.5	74.5	

* Chi^2 (5) = 13.97: significant at 5% level.

completed higher studies (χ^2 (1) = 6.41, $p < 0.05$). Finally, a significant relationship was found between some profession groups and preference for Duisburg (Table 12). Additional statistical tests showed that the effect was significant and positive for workers in the creative sector (χ^2 (1) = 6.10, $p < 0.05$) and in the health/social sector (χ^2 (1) = 4.31, $p < 0.05$). By contrast, a significant but negative relationship was found for retired persons (χ^2 (1) = 12.41, $p < 0.01$). The relationship was not statistically significant for the other occupational groups.

By comparison with the results obtained in the first four neighbourhoods (Table 8), a much lower level of preference was observed in Seraing and Trooz, where Duisburg received only 7.2% and 2.0% of expressed preferences, respectively. A chi-squared test confirmed the statistical significance of the differences between the six neighbourhoods on the expressed preference for Duisburg (Table 8). Furthermore, during the survey, researchers observed that many respondents in Seraing and Trooz

had strong negative reactions against the Duisburg visuals, which led them to spontaneously mention the industrial pollution present in their neighbourhood (Table 1). The low level of preference for Duisburg in these neighbourhoods may, therefore, be related to a 'neighbourhood effect' induced by the continued presence of polluting industries in Seraing and Trooz. This result suggests that community perceptions of post-industrial landscapes cannot be accurately assessed when the local environment remains affected by industrial pollution. Of note, the identified neighbourhood effect induced by polluting industries is likely to disappear with the elimination of pollution. This tends to be confirmed by the fact that the post-industrial aesthetics was appreciated in the other neighbourhoods (Liège, Court-St-Etienne, Courcelles and Ans), where the pollution had already stopped for some time. Chi-squared tests on the socio-demographic disparities between the different neighbourhoods (notably the age) confirmed the validity of the neighbourhood effect (Table 13). Indeed, there were no significant differences between the neighbourhoods concerning the proportion of personal attributes likely to influence the perception of the conservationist approach developed in the Duisburg landscape park.

The two main reasons given by respondents to justify the choice of Duisburg as their preferred landscape style (open question Q6) were the presence of green/nature (38.7%) and heritage conservation (25.8%) (Table 14).

It is well known that brownfield sites are typically perceived as environmentally contaminated (e.g. Lafortezza *et al*., 2008). From this perspective, it is striking that the nature register scores were quite high for a site with such a persistent industrial character. An explanation could be the satisfaction to see nature recovering

Table 12. Relationship between preference for Duisburg landscape style and profession*

		Landscape style		
Profession		Duisburg	Others	All
Student	No.	10	34	44
	%	22.7	77.3	
Retired	No.	5	106	111
	%	4.5	95.5	
Unemployed	No.	14	100	114
	%	12.3	87.7	
Manual worker	No.	7	42	49
	%	14.3	85.7	
Social/health	No.	7	17	24
	%	29.2	70.8	
Administration/education	No.	13	44	57
	%	22.8	77.2	
Creative sector**	No.	3	3	6
	%	50.0	50.0	
Manager/director	No.	2	10	12
	%	16.7	83.3	

* Chi^2 (7) = 18.48: significant at 1% level.
** Includes advertising, design, communication, architecture and the arts.

Table 13. Relationships between personal characteristics influencing preference for Duisburg and the surveyed neighbourhoods

	Surveyed neighbourhood			Significance tests	
Variable	Others	Trooz	Seraing	χ^2 (d.f.)	Sign. level (%)
18–28	63	11	17		
60 and +	71	24	24	2.82 (2)	n.s.
Academic studies	37	7	8		
Others	223	90	88	4.61 (2)	n.s.
Retired	66	22	27		
Social/health	14	8	2		
Creative worker	4	0	2	5.87 (4)	n.s.

Table 14. Reasons for preference of Duisburg landscape style and comparison with reasons given for all landscape styles (Q6)

	Landscape style		
Reason for preference	Duisburg ($n = 62$)	All ($n = 452$)	Ratio Duisburg/All
Green, nature (%)	38.7	40.6	0.95
Water (%)		8.3	
Activities (%)	16.1	12.2	1.33
Heritage/nostalgia (%)	25.8	5.4	4.75
Ambiance (%)	3.2	5.7	0.57
Image and design (%)	12.9	18.3	0.71
Large space (%)		2.2	
Security (%)		0.2	
Housing (%)		2.8	
No answer (%)	3.2	4.3	0.74

human works. The natural colonisation of the former industrial sites likely provided respondents with an idea of 'wilderness', as suggested by Franz *et al.* (2008), who analysed visitors' attitudes towards industrial forests in the Ruhr region.

The frequent use of the heritage narrative register to justify the Duisburg choice (Table 14) also confirms that industrial remains have a heritage value for a significant proportion of the population. From a broader perspective, this result could be illustrative of an international trend in which industrial aesthetics reinforces its influence on community perceptions, with a particular resonance amongst the younger generations. In 1998, Podmore highlighted how the mass media contributed to the re-coding of inner city industrial landscapes in several North American cities, by repeatedly representing lofts as the 'authentic' domain of the avant-garde. European industrial landscapes may experience a similar process of 're-coding'. This is clearly the case in the Ruhr, where Holden (1995) judiciously noted that the successful Ruhr strategy for regeneration lies in semantically renaming industrial brownfield sites as 'parks'. Following the current results, this process of 're-coding' is also likely to have a significant effect on local communities in Wallonia.

6. Discussion

6.1. Methodological Limitations

The present research is subject to two main limitations. First, the size of the sample was not very high in some neighbourhoods due to the low activity in their outdoor spaces. Second, the landscape styles presented in the six neighbourhoods for questions Q5 and Q6 were not perfectly identical. As explained above, a replacement site was proposed in place of the local scheme to limit familiarity. As the landscape style discussed in this paper (Duisburg) was presented in all six neighbourhoods, this choice did not harm the comparability between the samples or influence the main findings concerning preference for this landscape style.

6.2. Practical Implications

Despite the aforementioned limitations, the present research has significant implications for planners and regeneration agencies. One implication relates to the questions Q1 to Q3. The answers to these questions suggest that community attitudes towards brownfield regeneration are not automatically positive. Former brownfield sites that remain 'for sale' during a long period can be negatively perceived as 'empty and inert' by local communities, even though they have been subject to remediation and slight greening measures. A solution to prevent this negative impression of 'emptiness and inertia' could be to initiate temporary uses or more extensive greening. As this result was obtained in the context of urban neighbourhoods, it is worth mentioning that its transferability to places where developments occur on greenfields remains to be investigated.

A second implication is that landscape quality seems to play an active role in the appreciation of regenerated brownfield sites. As illustrated by the low attractiveness of the schemes developed in Ans, Seraing and Trooz (results from Q1 and Q2, as well as their low level of occupancy), the cultivation of a local sense of landscape quality seems to be an important precondition to attracting people and business. The results from questions Q3 and Q4 that concern the sites of Liege, Court-St-Etienne and Courcelles further suggest that landscape quality has a positive effect on the long-term perception of brownfield regeneration schemes. From this perspective, landscape quality deserves particular attention in the context of brownfield regeneration.

The strong demand for change, observed in certain neighbourhoods (Q1 and Q2), suggests that low economic vitality can lead communities to reduce their requirements for a proposed regeneration scheme. This leads to the risk of a cycle of dereliction, as neighbourhoods can easily embark on a path towards continuous reduction of both their landscape quality and economic attractiveness. For such contexts, looking beyond the immediate community demands has not only a cultural or aesthetic interest but also a socio-economic interest. The contrast between the initial resignation of certain respondents with regards to the low visual quality of industrial parks (Q1) and their later strong enthusiasm at the sight of the photomontages (Q2) further illustrates that the need for landscape quality is not always conscious nor spontaneously expressed.

The context dependency of landscape preferences, as illustrated by the results of Q5, suggests that communities should be investigated at the local level. This will elicit local preferences, highlight specificities of a particular context and develop local distinctiveness rather than preconceived schemes and concepts of landscape quality.

Regarding industrial heritage, the extensive use of the nature register to justify a preference for the Duisburg landscape style (Q5 and Q6) suggests that community perceptions of industrial landscapes can be positively influenced by nature development strategies. This is confirmed by Franz *et al.* (2008), who found that the strategy of natural colonisation of industrial brownfields attracted investors to these sites. Therefore, this approach could be considered as a possible solution for numerous brownfield sites where negative perceptions hinder redevelopment. This result, combined with the feeling of 'emptiness' observed in Ans and Seraing, also confirms the thesis of Lafortezza *et al.* (2008) that patterns of aggregated vegetation are visually preferred to disaggregated vegetation.

The differentiation between conservationist and interventionist approaches of landscape planning is an important issue in the field of brownfield regeneration. Holden expressed doubts about the transferability of conservationist approaches, such as that developed in Duisburg, considering that "such opportunities can only be taken if the post-industrial landscape is appreciated" (1995, p. 42). The results from questions Q5 and Q6, and especially the significant use of the heritage register to justify the preference for Duisburg, suggest that industrial features have a heritage value for a significant portion of the population. The profile identified for respondents who appreciated Duisburg landscape style (young, skilled worker in the health/social or creative sector) suggests that post-industrial landscapes could represent an increasingly promising avenue for reshaping a regional image and improving its residential and economic attractiveness.

Concerning the industrial heritage, the neighbourhood effect observed on the preference for the Duisburg landscape style raises the following important concrete questions. Should industrial heritage be demolished in Trooz and Seraing, where local communities do not appreciate post-industrial landscapes? On the contrary, should it be conserved, as suggested by reactions in the other four neighbourhoods? Although community investigations produce valuable information, they lead back to fundamental planning questions, such as, for whom and for what are brownfield sites being regenerated? Miles (2005) considered that iconic regeneration programmes conserving parts of industrial heritage can play a key role in reflecting a sense of local identity, even though this conservationist strategy might initially be perceived as a gentrification agenda aimed at 'outsider' populations. He also underlined that partial conservation of the physical environment allows the reinforcement of social cohesion between generations and social groups in a local community. Our recommendation here is to confront local community perceptions to other perceptions, be they from experts or from other communities. Given that built heritage destruction is irreversible, long-term impacts of interventionist approaches should be carefully examined before making a decision. This is especially the case when, as in Trooz or Seraing, perceptions are likely to evolve positively once the pollution stops. From a methodological point of view, the results synthesised in this paper show the relevance of the tested LPS investigation method to inform local brownfield regeneration processes. The multi-LPS approach is helpful to elicit community expectations

regarding landscape quality and to highlight differences in landscape preferences. The complementary case study approach captured possible explanations for the area-based perceptual differences. Various factors (e.g. concrete elements of the local context or international trends relayed by the media) may influence community perceptions, illustrating that these are also time contingent. If a community investigation is to be used to inform a local planning process, results should be cautiously interpreted and if possible, compared with previous results and/or with results from other sites. In the present analysis, for instance, the issue of industrial heritage illustrates that isolated data would have been far less meaningful or even misleading.

In conclusion, the results reported in this paper confirm that landscape quality is important in brownfield regeneration. Regeneration schemes can gain in attractiveness and contribute to the regeneration of a wider area if landscape quality is considered and integrated. This implies that a wide range of issues should be taken into consideration, including the need for green amenities and visually attractive landscapes, cultural heritage, maintenance, etc. This idea correlates with the contribution of Ling *et al*. (2007), who argued for more complex and multifunctional landscapes to ensure the ecological, historical and aesthetic functionality of the regenerated sites and thus seize the opportunity to enhance quality of life and preserve local distinctiveness.

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