PLANNING FOR A RESILIENT OPEN SPACE. A COMPARATIVE STUDY ON THE DRIVING FORCES AND SPATIAL EFFECTS OF URBANIZATION IN FLANDERS

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Keywords

open space, urbanization, spatial transformations, regional differences, driving forces

Abstract

Open space is scarce and under pressure in the highly urbanized region of Flanders, the northern part of Belgium. Due to urbanization and fragmentation, the former countryside has disintegrated into a complex spatial structure of open space fragments with different densities and functions, such as housing, work and recreation. The built-up density of the open space – defined as all space outside of residential areas, such as village and city centers – is increasing, while the predominance of agriculture as the traditional manager of open space is decreasing.

The question arises to what extent open space is resilient to urbanization and at what point the morphological transformations and new functions exceed the carrying capacity of open space. This is especially relevant since there is little coherent and effective spatial policy for some of these functions. Therefore, this research aims to gain insight into the current state and structure of open space in Flanders through a spatially coherent analysis based on a system approach.

The article focuses on four uses of open space, which are largely responsible for its increasing building density and changing morphology. These are (a) the residential use, with a growing household density, (b) the diverse economic use, altering the formerly agricultural rural economy, (c) the private use for gardens and hobby farming as an extension of the home environment, and (d) the use for public recreational purposes. The first two are 'hard' functions, taking place in buildings, whereas the other two are 'soft' activities, oriented towards the unbuilt space. While hard functions seem to be a threat to open space, soft functions are potential managers of open space, keeping the open space open. These new functions are mapped and analyzed through a comparative study in nine case municipalities with different spatial characteristics. In the paper, their region-specific or spatially heterogeneous patterns are examined. Since understanding the drivers that push open

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space into a new regime is key to resilience management, these are also analyzed through literature review.

The study shows that within Flanders, some open space areas are more resistent to urbanization than others. In more peripheral parts, production agriculture is strong enough and urbanization is only possible when space is available. In suburban parts, the open space serves urban needs and is highly fragmented by roads and buildings. These areas have passed a certain threshold and moved on to a different regime. The drivers for this process are very diverse, both in scale and type. Generally, we can conclude that the importance of these new users is substantial for the resilience of open space.

The insights presented in this article can contribute to a policy that is better adapted to the regional differences and current dynamics in open space. Since open space is a product of activities and lifestyles, reflecting a society that is subject to change, these transformations cannot be reversed, but can be steered towards a desired regime.

1. Introduction

Under the influence of urbanization, the open space in Western Europe is undergoing a number of fundamental changes. In this study, ‘open space’ is defined as all areas outside of cities or town centres. This was archetypically an open, monofunctional area used for production agriculture, forests and nature. Due to an external urbanization pressure, in combination with internal changes, the agricultural front seems to be losing power in the political struggle for land (Kühn, 2003; Busck et al., 2008). This allows urban centres to expand into open space and urban fragments to be scattered across the open space, systematically decreasing open space and fundamentally changing the structure of the remaining open space. This creates a complex, fragmented structure with besides the traditional open space users, several non-archetypical functions (such as housing, work and recreation).

Antrop (2004: 10) defines urbanization as a ‘complex process of change of rural lifestyles into urban ones’. Also Madsen et al. (2010: 48) indicate that ‘urbanization is not only a matter of land use change, but also a matter of functional and lifestyle changes, which may or may not manifest themselves as physical changes in built-up areas and land use.’ These definitions indicate that research on urbanization should not merely focus on spatial patterns, but also on functional changes - the driving forces behind morphological transformations -, which are fundamental to the analysis and the understanding of the urbanization process.

The condition of the Flemish countryside has been discussed a lot in recent years, in particular concerning the disappearing contrast between city and countryside. Many authors agree that ‘city’ and ‘countryside’ are archetypes that no longer exist in Flanders (De Meulder et al., 1999; Xaveer De Geyter Architecten, 2002; Van Eetvelde en Antrop, 2005; Thomas et al., 2008). Elements of these two archetypes can be found scattered and fragmented across the Flemish landscape.

The article addresses four functional transformations in Flanders' open space: (a) the increasing residential use, (b) the economic diversification, (c) the increasing private use, and (d) the increasing recreational (shared) use. These functional transformations introduce new, non-archetypical functions in open space, reflecting its urbanization. Most of these transformations are widely recognized and have (recently) been studied individually and independently (Leinfelder, 2007; Bomans et al., 2009; Verbeek et al., 2011; Dewaelheyns et al, 2008; Verhoeve et al , 2012). However, a spatially integrated approach, that considers not just one individual phenomenon, but focuses on open space as a whole, is missing. Given the scarcity of open space in Flanders, its limited carrying capacity and the high pressure on open space for further urbanization, insights into the current state of open space as a whole are nevertheless relevant.

In order to assess at what point this carrying capacity is exceeded, it is important to have an insight into the different aspects of the combined impact of these transformations on open space. This is especially relevant in the context of a policy oriented toward preserving and protecting the remaining open space. This article argues that the non-archetypical uses of open space have a fundamental impact on the morphology, the use and the meaning of open space. Their strongly individual, demand-oriented and autonomous character strengthens their spatial impact. In most cases, these new functions mark the transition of the archetype of open space to a new kind of (urbanized) open space.

The article first places the four selected transformations in their socio-cultural context, followed by a mapping of the new land uses via a terrain study in 27 case areas across nine municipalities with different characteristics, which allows an estimation of how much open space they take up. Through the terrain study results and map analysis, complemented by literature review, the impact of these new land uses on open space is assessed. More specifically, the effects on the morphology (physical), the dynamics (functional) and the symbolical meaning (the cultural values) of open space are considered. These form the core of the transition open space is undergoing due to urbanization. Finally, some reflections are made on the state and future of open space in an urbanized context.

2. Analysis

2.1 Study area Flanders

Flanders, the northern administrative region of federal Belgium and a small part of polycentric North-West Europe, is one of the larger urban regions in Western Europe with the most visible impact of urban sprawl[2] (Albrechts and Lievois, 2004; EEA,

[2] The other urbanized regions are London (United Kingdom), Paris (France), Milan (Italy), Rhine-Mainz and Rhine-Ruhr (Germany), and Randstad (the Netherlands).

2006). With a population density of 447 inhabitants per km² in 2007, it is one of the most densely built and inhabited, and economically active regions in Europe.

Within Flanders, the traditional boundaries between city center and suburbs, city and countryside, and residential and rural areas have faded. Only 10% of Flanders is defined as rural according to the OECD criterion (150 inhabitants per km² at basis district level (municipalities)). Kesteloot (2003) has determined that approximately 70% of the Flemish population resides in an 'urban complex' - an area characterized by suburbanization and by inhabitants commuting to and from urban agglomerations. In contrast, only 10% of the Flemish population lives in truly urban centers. Although the majority resides in a suburban environment, Cabus (2001) estimates that 76% of Flanders still remains open.

2.2 Literature review

Based on a literature review of current dynamics in Flanders' open space and reoccurring themes in research, in combination with previous research experiences, four functional transformations are selected, defined and placed in their sociocultural context. This analysis of driving forces contributes to a better insight into the current dynamics in Flanders' open space.

2.3 Case study, terrain mapping and impact analysis

For the majority of the selected phenomena, reliable and directly usable data on a Flemish scale are lacking. Dewaelheyns et al. (2008), Bomans et al. (2010) and Verhoeve et al. (2012) also emphasize this lack of data. This makes it impossible to study these phenomena on a generalized Flemish scale or to map evolutions over time. Therefore, it is chosen to detect these phenomena through an empirical terrain study in 27 study areas, across nine municipalities.

2.3.1 Open space

As mentioned before, open space is defined on a macro scale as all areas outside of cities or town centers. According to the definition by the National Institute for Statistics[3], 25.5% of Flanders consists of residential centers and 74.5% is open space, while according to TeleAtlas' definition of the built-up centres[4], 84.5% of Flanders can be considered open space.

2.3.2 Case study area

Nine municipalities, spatially distributed over Flanders, were examined. These were selected based on an earlier research project on mixed land use in Flanders,

[3] The statistical sectors are the base unit for the compilation and distribution of statistics. Their delineation is based on social, economic, urbanistic or morphological structural characteristics.
[4] TeleAtlas is a private digital mapping and navigation company. Their definition of the built-up centres is based on aerial photography.

distinguishing different spatial typologies (Leinfelder and Pisman, 2008). Eight of the selected municipalities form pairs with similar open space and urbanization characteristics. A ninth, little urbanized municipality was added as a reference[5].

Figure 1 shows their location on a building density map of Flanders.

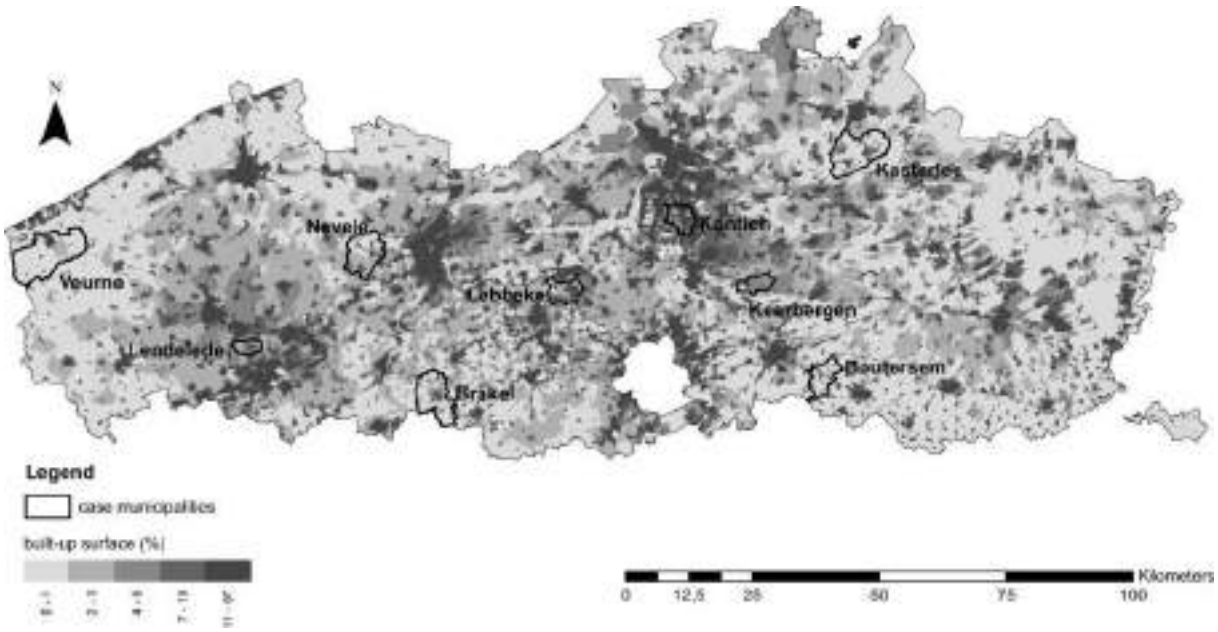


Figure 1. Location case municipalities on a building density map of Flanders (data: cadastral plan (CADMAP), 2009)

Per municipality three strongly different study areas were selected, to make the diversity of phenomena as big as possible:

- an area with a (possible) privatization pressure,
- an area with a (possible) recreation pressure, and
- a reference area, where production agriculture is still dominant.

Their selection was based - as far as possible - on the information in the respective municipal spatial structure plan.

The precise demarcation of the study areas was made by infrastructure lines, mostly roads and railways, to enable a clear parcel wise registration of the phenomena. The assumed size of a study area is approximately 200 ha, so that on average 600 ha is studied in each municipality. In smaller, highly urbanized municipalities the selected micro study areas are smaller (approx. 150 ha).

[5] The nine selected municipalities are (1) Veurne (low-dynamic open space under specific coastal recreational pressure); (2) Boutersem and (3) Nevele (low-dynamic open space under commuting pressure); (4) Brakel and (5) Kasterlee (dynamic open space under recreational pressure); (6) Keerbergen and (7) Lebbeke (dynamic open space in a suburban field); and (8) Kontich and (9) Lendelede (high-dynamic open space in an urban network).

2.3.3 Mapping methodology: terrain registrations

In these study areas terrain registrations were executed in the period 2008-2011. These consisted in the onsite registration of the selected phenomena, as far as possible at parcel level. For residential use (housing), non-agrarian economic activities and private use, the individual phenomena could be registered directly at parcel level. Recreational use on the other hand is mostly a form of shared use of space and volatile in nature, making it impossible to register the recreational use itself. Therefore, this phenomenon was operationalized by mapping recreational infrastructure elements as indications of recreational use. This resulted in the following categories and subdivisions of non-archetypical open space users which were mapped in the terrain study (see also Table 1):

- non-agrarian buildings: all buildings that have no link with productive agriculture and are thus 'new' users of open space, including their plot (buildings that are part of recreational attraction poles (such as restaurants and cafeterias and changing rooms of sports facilities) are not included here):
    - houses (a);
    - non-agrarian businesses (including associated housing facilities) (b): small and large scale commercial and manufacturing companies;
    - other (x): e.g. schools, public community centers, care homes, …
- non-archetypically used unbuilt space
    - privately used land (unbuilt) (c):
        - hobby pastures: all pastures that are used for hobby farming (mostly horses);
        - other privately used land: all other phenomena of private land use, like private woods, fishponds and scattered vegetable gardens;
    - indications of recreational use (d):
        - signposts: all forms of recreational signposting, generally linked to recreational networks;
        - recreational tracks: line-shaped structures that are clearly set up for or adapted to the needs of recreational users, like mountain bike and horse riding trails;
        - recreational attraction poles: all kinds of establishments that have a crowd pulling, recreational character, like restaurants, sports fields and riding schools;
        - public small-scale infrastructural elements: e.g. benches, information panels, bins.
    - other (x): e.g. utilities, …

If there was no clear indication of a certain activity, these activities were not registered, simply because these activities were 'invisible'. Therefore, the terrain registrations are an underestimation of reality. The invisibility of some activities (e.g. empty hobby pastures) may be related to the limiations of a one-time registration. In other cases (e.g. small businesses without signes), the activities taking place are

latent. In the context of a study on the spatial extent and impact however, these latent activities are less relevant, because they don't have a (significant) impact (yet). Nevertheless, they can grow out to be manifest activities, with a visible spatial impact.

Table 1. Overview of the elements that were registered in the terrain mapping

FUNCTION	REGISTERED ELEMENTS
(a) residential use	houses (+ parcel)
(b) non-agrarian businesses	non-agrarian businesses (+ parcel)
(c) private use	hobby pastures other privately used land
(d) recreational use	signposts recreational tracks recreational attraction poles public small-scale infrastructure elements
(x) other	other non-agrarian buildings other non-archetypical use (unbuilt)

Figure 2. Example of a digitalized terrain mapping in Brakel

Further processing of the terrain mappings took place in a GIS environment, making further analysis and calculations possible, as well as a convenient cartographic representation. For the digitalization of the terrain registration in GIS, digital aerial views[6] and cadastral plans[7] were used. This facilitated a detailed digitalization and made it possible to add some cases that were not visible on the terrain.

[6] OC_Gis Vlaanderen, 2003 and Google Maps, 2009
[7] Kadvec, 2005 and CADMAP, 2009

2.3.4 Extent and impact analysis

The different new uses were analyzed both quantitatively and qualitatively. Based on the terrain study mappings in GIS, a quantitative assessment of the spatial extent of the four new land uses was made. The qualitative evaluation of the spatial impact[8] was based on the fieldwork, map analysis and literature study.

3. Results

3.1 Four functional transformations in Flanders' open space

The increase in built-up density is generally seen as the core of the urbanization process and the main indicator for urbanization. However, literature review has indicated that there are also a number of transformations which are related to a different use of the existing structure, both built and unbuilt. These do not cause an increase in built-up density, but are nevertheless an expression of an urban lifestyle.

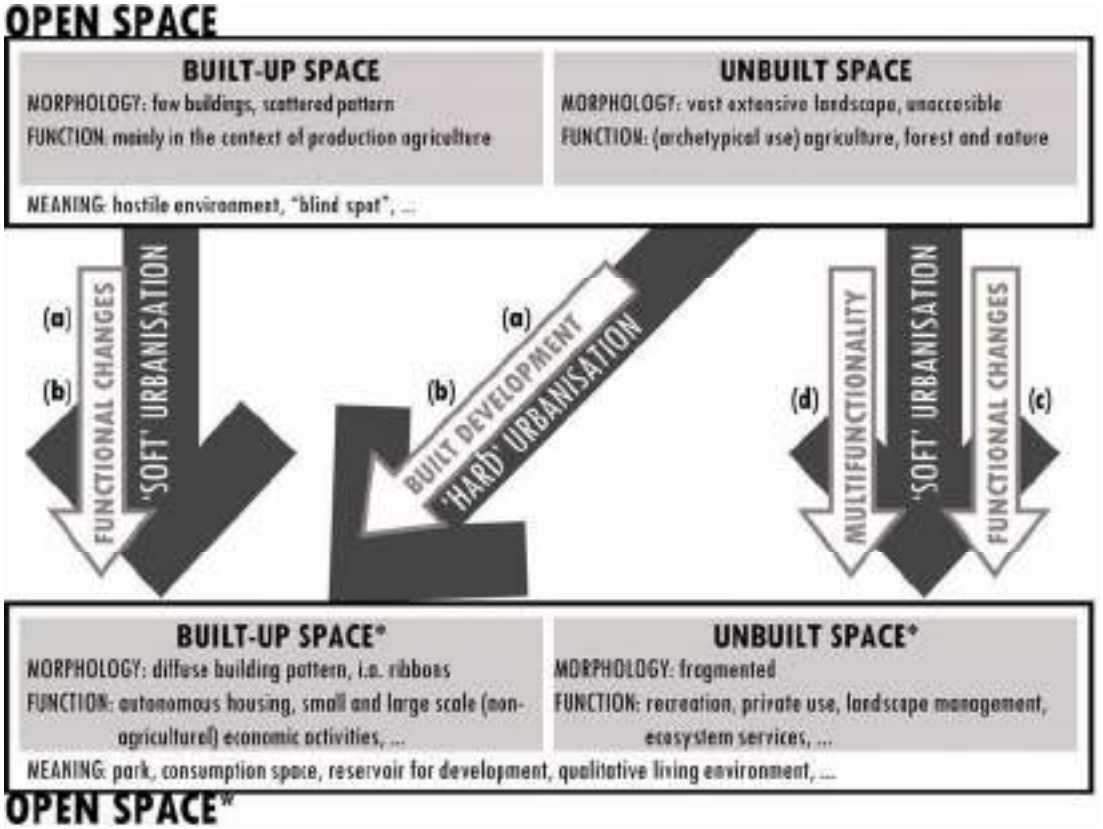


Figure 3. Schematic representation of the spatial transition open space is undergoing due to urbanization, with the indication of (a) residential use, (b) non-agrarian businesses, (c) private use and (d) recreational use

[8] Undoubtedly, these phenomena also have a certain ecological, economic, ... impact. However, these aspects are beyond the scope of this study.

Therefore, two types of spatial transformations can be distinguished within the urbanization process (Figure 3): hard urbanization, increasing the built-up density, and soft urbanization, functionally changing the existing built-up and unbuilt space from within. These are characteristic to the spatial transition that open space is undergoing due to urbanization.

3.1.1 Increasing residential use

One of the most important functional shifts in open space is the increasing use for housing. Flanders has a fragmented settlement pattern, with a lot of small housing concentrations spread out in its open space. Due to demographic growth, but also the shrinking size of families, the demand for housing is still high. Also the individual living space has grown dramatically as a result of increasing prosperity. Due to the creation of free time and the trend toward individualization, people spend more time in their home environment and more money on its design.

Figure 4. Examples of living in open space

On the other hand, there is a general preference for rural residential areas in Flanders (Verhetsel et al., 2003; Vanneste et al., 2007). This is linked to the rural idyll, the positive image of the countryside that urbanites have (Cloke and Milbourne, 1992). Also, higher travel speeds and lower travel costs have made living in open space technically and organizationally easier. Therefore, living on the countryside has evolved from a necessity to a choice.

Under the influence of a housing policy that is (historically) focused on dispersion and individual, detached housing, and a tolerant spatial policy, one tenth of the new households ends up in open space. Nevertheless, the household density in (residential) centers still increases relatively faster than in open space[9].

3.1.2 Economic diversification

As a part of the urbanization process, the agricultural production area has transformed into a diffuse field of different types of economic activities. Because of the decrease of the economic importance of production agriculture throughout the

[9] 6.8% increase of the household density in open space versus 9.1% in residential centers (period 1997-2007, based on the definition of residential centers by the Directorate General Statistics and Economic Information).

last century, space was created for other types of activities (Van den Bout and Ziegler, 2003; van der Wouden en van Dam, 2006). On the other hand, companies are becoming more and more footloose due to tertiarization and the knowledge economy, in combination with an increasing mobility, telecommunication and virtualization, also known as the emergence of the network society (Boudry et al., 2003). Furthermore, an integrated spatial policy for (small) economic activities is lacking, allowing these activities to settle in open space.

Figure 5. Examples of economic diversification in open space

This diversification of economic activities in rural areas is an irreversible dynamic with strong spatial and economic consequences (Verhoeve et al., 2012). Research has shown that most of these non-agrarian companies are active in the tertiary sector (mainly professions and other services) and are relatively young, indicating that this is a very recent dynamic. However, there is little known about the spatial reality of this economic diversification, both scientifically and politically.

3.1.3 Increasing private use

As a consequence of residential development, the surrounding (unbuilt) space is more and more incorporated in the private sphere, in the form of garden extensions, hobby pastures, weekend houses, private fishponds, private forests, etc. These types of land use are more private than the archetypical functions, such as agriculture and nature, in the sense that they no longer serve society, but an individual. They are also visually, physically and mentally linked with the private sphere because of their restricted accessibility and often strong enclosure. Because of this evolution, open space no longer has the character of a common place, but is becoming a patchwork of private enclaves.

Dewaelheyns et al. (2008) state that 8.2% of the Flemish territory consists of private gardens, and most of these gardens occupy former agricultural land. Bomans et al. (2009) conclude that 5.1% of Flanders, or 40% of all pastures, is occupied by horse pastures. These numbers illustrate the importance of this widespread phenomenon and the pressure it exerts on production agriculture.

These new land uses are part of the broad societal evolution towards individualization, which can be spatially translated into the concepts of privatization

and capsularization (De Cauter, 2005). Human activity moves from public to private space, which is isolated and directed inward. This use of open space is driven by lifestyle preferences instead of production needs, annexing open space as an extension of the living environment (Madsen et al., 2010).

Figure 6. Examples of private use in open space

3.1.4 Increasing recreational use

Opposed to the increasing private appropriation of open space, there are a number of processes that make the open space more accessible, introduce new meeting places and supply a multiple land use, mainly in the field of recreation (Leinfelder, 2007). In the past open space was situated only in cities and public space policy was mainly oriented towards central urban locations. Due to a scaling-up of urbanization processes, changes in leisure spending and fundamental transformations in the social-economic relations, public space is not exclusively an urban phenomenon anymore (Hemel and Van Uum, 1999) and the central public space loses its prominent role as meeting place and place of exchange (Sennet, 1997). A new (thinner) form of public life is emerging, giving public space a new meaning and making it appear at new places (Nio, 2001). Open space gradually fulfils a role as 'new' public space, an 'urban park'. It is more and more a shared space, consumed and experienced as a leisure space for urbanites (Van der Ploeg, 2001).

Figure 7. Examples of recreational (shared) use of open space

3.2 The extent of new uses of open space

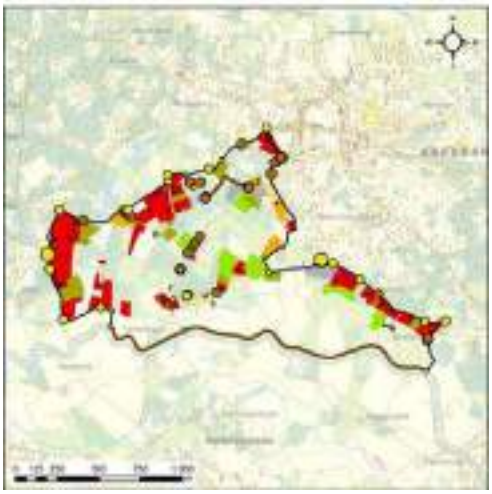
Table 2 gives an overview of the portions of the study areas used for the different non-archetypical land uses that were mapped in the terrain study. More than a fifth of

the whole study area is occupied by non-archetypical open space functions[10], of which the vast majority consists of the four selected functions. Of the total area of non-archetypical open space uses, about half consists of unbuilt parcels. Residential and private use are the most important non-archetypical open space uses in terms of surface, with each a surface of about 10% of the total study area. Non-agrarian businesses and recreational use each take up about 1% of the study area.

Table 2. Overview of the portion of the study area that is occupied by the different non-archetypical functions in open space for (a) the least urbanized study area (Veurne, Lovaart), (b) all 27 study areas, and (c) the most urbanized study area (Kontich, Broekbos)

SURFACE (%)	(A) LEAST URBANIZED	(B) ALL STUDY AREAS	(C) MOST URBANIZED
TOTAL	1,2%	22,4%	57,7%
built-up parcels	**0,7**	**11,3**	**24,5**
(a) residential use	0,5	10,3	21,5
(b) non-agrarian businesses	0,2	0,9	3,0
(x) other	0,0	0,1	0,0
unbuilt parcels	**0,5**	**11,1**	**33,2**
(c) private use	0,5	10,2	30,1
- hobby pastures	0,5	6,3	13,2
- other privately used parcels	0,0	3,8	16,9
(d) recreational use	0,0	0,7	3,1
(x) other	0,0	0,2	0,0

(a)



(b)

[10] For comparison, 10% of Flanders is taken up by forests (VBV, 2009), 2,5% by nature and forest reserves (INBO, 2007) and 46% by agriculture (AGIV, 2008). However, an overlap between these classes of archetypical land use and the non-archetypical land use classes of the case study is possible (e.g. a private forest).

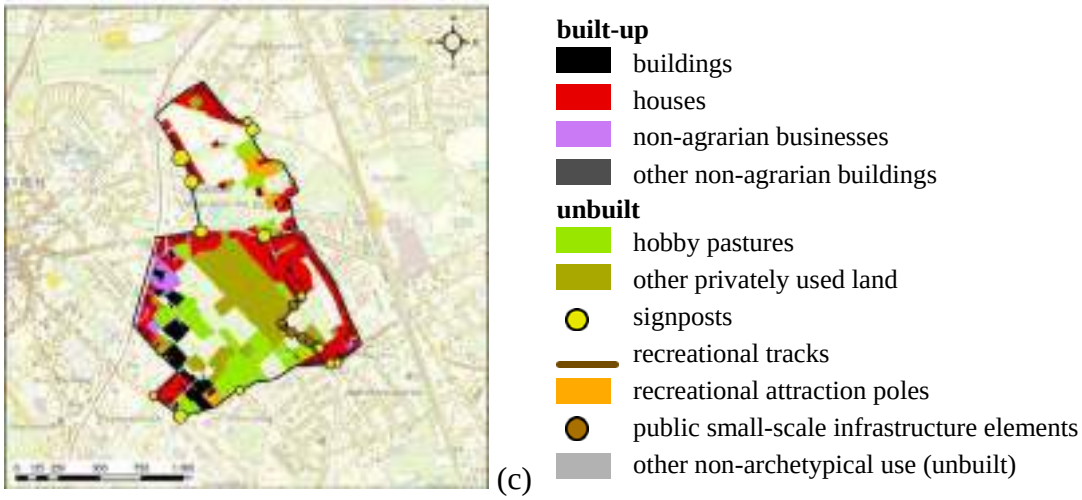


Figure 8. Terrain study results in three micro study areas: (a) the least urbanized study area (Veurne, Lovaart), (b) an average urbanized study area (Keerbergen, Broekelei), and (c) the most urbanized study area (Kontich, Broekbos)

The figures of the least and the most urbanized study area indicate that there are strong variations within Flanders regarding urbanization[11]. It is striking that almost all phenomena are found in each study area, even the least urbanized ones. This confirms that the new uses occur very widespread in the Flemish open space.

3.3 Spatial effects of new uses of open space

The discussed new land uses have an impact on the morphology, the function and the meaning of open space. In what follows, the combined impact of the four functional transformations is described.

3.3.1 Morphology

The physical-morphological impact of the new uses of open space covers many aspects. First of all, residential use and the non-agrarian businesses are the main driving factors for the increasing built-up density in open space, a classic indicator for urbanization. The growing claim of the various new functions of open space creates an expansion pressure, at the expense of archetypical open space uses. Moreover, the presence of buildings is a pull factor for new built development. This may lead to the conversion of open space into (residential) developments with a low density, and thus the loss of open space.

The urbanization process also has a morphological impact on the unbuilt space. This concerns not only gardens around houses or the space directly surrounding non-

[11] The spatial differentiation is - among other things - related to the spatial distribution of a number of factors of attraction. However, this is not addressed in this article. For this aspect we refer to the final report of the research (Tempels et al., 2012).

agrarian businesses, but also completely unbuilt parcels, such as garden extensions, vegetable gardens and hobby pastures. The morphological impact of this unbuilt urbanized space is limited, but not non-existent. Although no buildings are added, all other morphological aspects (parcel size, enclosure, vegetation, …) undergo major changes.

Figure 9. Built-up and unbuilt non-archetypical uses of open space: (a) non-agrarian business (metal trade) in Lendelede (Spoelewielen), (b) private use (isolated vegetable garden) in Kasterlee (Tielenbroek)

The diversity and the individual character of the new uses lead to changes in the open space design. Due to the lack of a (legal) framework, the urbanized open space follows its own logic, which is fundamentally different than that of agricultural land or nature areas. This logic is based on a unilateral (consumption) relationship, where the new users benefit from the qualities of a rural environment, but create little added value for that environment themselves. For example, many houses are private enclaves that are poorly integrated into the landscape, privately used parcels often have hard borders (both physically and visually) and non-agrarian companies sometimes pay little attention to the design of their plot. As a result, regional landscape characteristics are lost. It is however impossible to define a general rule. The visual impact is different for each individual case, ranging from virtually no to a very strong impact, both positive and negative.

Figure 10. Strongly individual and private character of the non-archetypical uses of open space: (a) private use (garden extension) in Boutersem (Kerkom), (b) residential use (houses and gardens) in Boutersem (Kerkom) and (c) private use (horse pasture) in Keerbergen (Heikant)

For soft urbanization, the morphological impact is rather limited, because no greenfields are developed. Recreation for example mainly uses existing infrastructure, with the addition of a number of small infrastructural elements, such as paths, benches and trash cans. Also for functional changes, such as the conversion of farms into housing or non-agrarian businesses, the intervention is limited to modifications to the building in the surrounding space, although the impact of these interventions can be important.

The increasing number of functions and uses requires an increasingly better physical accessibility of open space. The combination of a dense infrastructure network, a high building density and a small average parcel size with strongly defined and demarcated boundaries lead to a highly fragmented open space. From an ecological, economic and spatial perspective, this is often seen as a negative evolution.

Figure 11. Fragmentation due to ribbon development: (a) Lebbeke (Poelstraat), (b) Boutersem (Velperbos)

3.3.2 Function

This research focuses on four new, non-archetypical uses of open space. Obviously, the introduction of these functions themselves, and the dynamics they cause, are the most fundamental impact on the functioning of open space. These functions are in fact connected within a larger structure, each adding a new layer to open space in which goods and people move. For recreational use for example, this impact is much more important than the physical-morphological impact.

Figure 12. New layers of use in open space: (a) recreational shared use in Veurne (Lovaart), (b) non-agrarian business (insurance office) in Lendelede (Spoelewielen)

Also a number of secondary effects can be noticed, that originate from the relation between the transformations. Non-agrarian businesses, private use and

recreational use are inherently connected to the residential function, making living in open space an important catalyst for the whole urbanization process. Further, living, working and recreating in open space induce a diffuse movement pattern, which may lead to further spatial distribution of (urban) functions.

3.3.3 Meaning

As a result of the functional changes in open space, also its significance and meaning change. While the archetypical open space serves the common interest, these new functions each project their own individual desires on open space, nourishing the perception that open space is a reservoir of 'empty', developable space. Open space is seen as a qualitative living environment, as available space for (economic) development and production, as an attractive landscape for consumption, … Its significance is each time different, from an inaccessible, private space that can be individually appropriated, to a common place with a strong public character, from a series of private enclaves to a public attraction pole, and from a production space to a place for consumption. Because of these strong diversity of functions and meanings, open space is no longer complementary to the city, but rather a diluted version of the city.

Figure 13. Image of the (a) least urbanized study area (Veurne, Lovaart), and (b) the most urbanized study area (Kontich, Broekbos)

3.4 Typology of urbanized open space

The case study also shows that within the defined types of spatial transformations (hard and soft urbanization), the non-archetypical uses often occur together (Table 3). The economic diversification is strongly related to residential use, given that non-agrarian businesses often operate from the home environment. Although private and recreational (public) use appear to be contradictory, also a spatial relation can be noted. Where privatization uses whole parcels, closing them off, public use uses the (road) infrastructure between them. In this respect they are spatially complementary.

Table 3. Extent of the different non-archetypical functions[12] in open space for the different case municipalities.

	Veurne	Nevele	Brakel	Kaster-lee	Lende-lede	Bouter-sem	Keer-bergen	Lebbe-ke	Kon-tich
(a) residential used (%)	1,2% --	6,7% --	11,9% -	6,1% --	7,7% -	12,2% +	24,6% ++	14,6% ++	12,7% +
(b) non-agrarian businesses (number/km²)	0,5 --	1,3 --	2,2 -	1,2 --	8,0 ++	4,9 +	3,3 +	7,4 ++	2,7 -
(c) private use (%)	1,6% --	9,2% -	7,3% --	16,3% ++	7,3% --	8,3% -	14,1% +	10,3% +	21,1% ++
(d) recreational use (indicator)	11,5 --	18,3 --	40,4 ++	29,7 -	22,3 --	37,6 +	41,5 ++	33,9 +	25,6 -

The extent of the different non-archetypical uses of open space is determinant for the new regime open space is shifting into. Throughout the different case municipalities, it appears that there are four types of open space in respect to the urbanization phenomena. These originate from the varying relationship between hard and soft urbanization.

The two extremes are the highly urbanized regions (hard and soft urbanization; Keerbergen, Lebbeke, Kontich and Boutersem) and archetypical open space (little urbanization; Veurne and Nevele). In addition to these two obvious types, two different types in the middle spectrum can be distinguished: areas with only hard urbanization (Lendelede) and areas with only soft urbanization (Brakel and Kasterlee). In the areas with only hard urbanization, a high building density is combined with the use of the remaining open space for production agriculture. The open space with only soft urbanization on the other hand, is mainly used by visitors of urban space further away.

4. Conclusions

This paper has demonstrated the diversity and the great extent of urbanization in Flanders. The four selected non-archetypical uses of open space (residential use, non-agrarian businesses, private use and recreational use) take place in both the built and the unbuilt parts of open space and are all current and important phenomena in Flanders' open space. These phenomena take up more than a fifth of the case study area and even in the least urbanized areas, virtually all of these phenomena are present. These developments are on the edge or outside of the policy framework, causing them to be strongly autonomous. The fact that these phenomena are structured by supply (availability of open space, for example due to the decline of

[12] Since the recreational use could not fully be expressed by a surface, an indicator was used. This indicator represents the number of elements (signposts, recreational tracks, recreational attraction poles and public small-scale infrastructural elements), weighed in accordance to their importance (respectively the factors 1, 3, 3, 2) and divided by the surface of the study area (in km²).

agriculture) and demand (driving forces) contributes to their wide distribution and great extent.

The impact of the four new uses fundamentally affects all aspects of open space: its morphology, its functioning and its meaning. Although some new functions are less important in terms of land use, they can cause important dynamics. Therefore, these also have an impact on open space.

It is clear that attention is needed for these widespread but underrated new uses of open space, especially from a policy perspective. The transition described in this article proves that in large parts of Flanders archetypical open space no longer exists. In these areas, quality can only be generated if policy is no longer aimed at the protection and preservation of archetypical open space, but acknowledges this new context and responds to these new needs, new perceptions, …

Monitoring is in this respect an important first step. The lack of knowledge about these changes is an obstacle in the development of a vision on these changes. Monitoring however is not evident, since many of these changes are latent and are hard or impossible to map on a large scale. In addition, their impact on for example the functioning of open space is very difficult to capture (quantitatively).

Subsequently the question arises whether these changes are desirable. This is a difficult discussion and opinions will differ. The carrying capacity of open space cannot be defined universally, but depends on the capacities and characteristics of open space in relation to the specific functions it needs to fulfil. In order to estimate this carrying capacity, it must be determined what is expected of open space and according to which priorities.

Hereby a comparative assesment should be made of the individual demand (housing, gardens, ...) and the public interest (water management, nature preservation, ...). Most new developments in open space have a very strong individual and private character. Given the high pressure on open space, ways of combining these two seemingly opposite interests should be found. Due to the lack of embedding of for example the economic diversification, the open space often doesn’t benefit from the advantages and a certain potential remains untapped. This contributes to the conservative attitude toward these new developments.

Anyhow, these transformations reflect a societal change that is irreversible and seems unstoppable. Therefore, the question might not be whether these transformations are good or bad, but rather how they can be controlled and be integrated in open space in a suitable, judicious way. This assessment should deal positively and creatively with the urbanized context. Urbanization is often seen as a negative evolution, especially from the open space perspective. However, it should be taken into account that this evolution is the expression of a rapidly changing society. The type of open space that often spontaneously develops in Flanders - multifunctional, dynamic and versatile - resembles in some respects very much

visionary urban greenbelt models from the last century (in which this belt was sometimes even seen as a field). Consequently, the observed evolution can also be seen as a natural and necessary adaptation to a new context, since the archetypical open space cannot survive in an urbanized society.

Strategies are needed that start from the qualities and the potential of open space. In an urbanized context, where production agriculture stands little chance, private and recreational use can for example be used to protect open space for built development. Also the economic diversification brings about investment dynamics, of which open space does not (yet) benefit. From this perspective, the changes in open space are not seen as a threat, but rather as an opportunity. In this context the issues in open space are not so much related to the strong change per se, but rather the fact that it is happening unnoticed and strongly autonomous, causing opportunities to be missed.

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