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Greenway planning and landscape structure; some theoretical backgrounds

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Introduction

In this paper we will put forward some theoretical backgrounds on greenway planning as planning and design intervention in landscape architecture. In order to analyse the theoretical context of greenway planning, we first start with a short overview of terminology. In the next step we will investigate a number of case studies on how the principles of greenway planning have been applied and how it relates to other aspects of plan making in landscape architecture. The approach of greenway planning is very much based on linear systems and networks where 'structure' plays a key role. We will put special emphasis on the concept of 'structure' both in the existing landscape and as part of plan making. The goal of the paper is to show how greenway planning relates to land, landscape and landscape architecture. The research approach is based on the principles of case study research (Zeisel, 2006). A number of case studies will be analysed and related to texts and reflections.

Terminology & definitions

What are 'greenways'?

Systems or networks of interconnected lands (patches and corridors) that are planned, designed and managed for multiple purposes, including: ecological protection, recreation, and cultural/historic landscape value(s) (Fabos and Ahern 1995).

What is 'greenway planning'?

Ahern (2002) defines it as (...) a subset of landscape planning (...). Given the definition of 'greenway' as above, Ahern primarily refers to 'systems and networks' and does not make a distinction between systems and networks in the existing landscapes and those created by human interventions. Greenway planning is usually imbedded within a comprehensive planning approach which addresses the other concerns/sectors of planning, including: physical, economic, and social. (Fabos & Ahern 1995). The set of definitions is well-defined and consistent. Greenway planning seems to be a morphological concept, with strong ecological connotations.

How does 'greenway planning' relate to 'landscape architecture'?

Motloch (2001) defines landscape planning as part of landscape architecture. In the definition of landscape architecture by ECLAS (2003), planning, design and management are distinguished ('ECLAS' stands for: European Council of Landscape Architecture Schools). One of the elements in the ECLAS definition we want to focus on, is the different levels of intervention; local, regional and global. Greenway planning is an approach that is typically related to the regional level with an emphasis on the structural aspects. So, the question is how these structural aspects can be related both to the levels of materialisation of form and to the strategy for landscape development in the long run. A second question is how these levels of intervention are related to the steps in the design process.

Structure in landscape architecture

The concept of 'structure' is a very general one and is used in many disciplines. Kepes (1965) defines 'structure' as: (...), in its basic sense, is the creative unity of the parts and joints of entities. It is a pattern of dynamic cohesion in which noun and verb, form and to form, are coexistent and interchangeable; of interacting forces perceived as a single spatio-temporal entity. The description of Kepes is interesting for design disciplines since he seeks for aspects referring both to art and science. Even though landscapes change and develop over time, there are also material aspects that do not change, which is characterised by the concept of structure of the landscape (Bell, 1999). The concept of structure has been an approach in landscape architecture that has already a long tradition in different locations and different periods in history (Kostof, 1999; Jellicoe & Jellicoe, 1971; Motloch, 2001). As part of the design process, we view 'structure' also as an intermediate level of intervention between materialising form and strategy for the landscape development in the long run. For landscape architecture, we have defined 'structure' more precisely by distinguishing three key aspects that are always part of structure; system/flows, form/pattern, organisation/hierarchy. In landscape architecture 'structure' always includes the water system and the opening up of an area, the road system. Moreover we distinguish 'structure' in plan making both in the existing landscape before intervention and as a level of intervention, structuring of flows, access, use. As level of intervention 'structuring' intermediates between the materialisation of form and development of the landscape in the long run; on an abstract level, structure relates and represents space and time. It implies that plan making in landscape architecture comprises planning, design and management; there is no planning without design and vice versa. Finally structure refers both to material and immaterial phenomena.

How are greenway, structure and network related in landscape architecture?

Most greenways can be considered as part of landscape structure, either of the existing landscape before intervention or as intervention. Greenways are different from greenbelts; greenways always refer to landscape structures; either natural or man-made. The Green Belt of London is one of the few exceptions; it is rather a zone where any building and construction is forbidden, but is not really related to the landscape. The morphological aspect of greenways is part of structure as a form or pattern (Crowe, 1988). A recent example of a project where the structural principles have been the basis for plan making is the 'Millenáris Project' in Budapest. In this project the valley form has been opened up to let fresh air from the higher mountains reach the centre of the city (Bardóczi et al., 2011). Structure and network are closely related but not the same. In the concept of networks, the dynamics of movement and change comes more to the foreground, like in the examples of road networks or networks of cycle tracks and public transport. The links come together in hubs. Greenways are always physical while structures and networks can also be virtual, for instance topological networks (Haggett, 1967)

Case studies; landscape structure and the concept of 'greenway'

In cases on greenway planning from the two earlier conferences (Fábos et al., 2010; Fábos et al., 2013), two aspects come forward; linearity and ecological issues. Linearity is well known in landscape planning, first of all as a form of planning settlements (Boileau, 1959; Collins, 1959) and secondly the landscape plans for roadside environments and other linear infrastructure (Kostof, 1999). Bacon (1974) puts emphasis on linear structures in urban landscapes as movement systems. Judit (2011) did study the concept of greenways in architectural design for her study on linear systems in Hungary. Turner (1995) distinguished seven types of greenway planning: parkway, blueway, paveway, glazeway, skyway, ecoway and cycleway. So, greenways are always part of the landscape as a natural system, as a socio-economic system and as a cultural system and can have different types of materialisation, not only plants and plantation.

Cases

In the four case studies we have chosen, are in one or another way related to rivers and river systems. Rivers are good examples of landscape structures. In all river systems, the hydrological cycle (climate), the watersheds or catchments (geological material and landscape form or topography), groundwater (location, flows and relation to ground level), determine the main factors for landscape structure and thus also development.

The river Kromme Rijn in Holland as a basis for settlement and land use

In the Roman times the Kromme Rijn formed a northern branch of the river Rhine, to flow into the North Sea at Katwijk. It formed the waterway between Utrecht, the Rhine and eventually what we now call Germany. Already during the Roman Empire at Wijk bij Duurstede, its mouth silted up and made it unfit for shipping anymore. The river kept its function for draining the water from the area at large. Over time we see a series of interventions by man in the area. In the 17-18th century two mansions were built on sites of former villa's (fig. 1). These are examples of interventions on a modest scale, but in later times there have been also interventions that were totally out of scale like the construction of the series of fortresses as defence system in the 19th and the new motorways in the 20th, the A12 eastbound to Germany and the A28 northbound. At the same time we see that the river as landscape structure remained intact and still plays a role in the functioning and use of the landscape at large; the axial systems of the mansions are located and positioned perpendicular to the river course and are used today as leisure space for the citizens from the city of Utrecht.



Figure1. Mansions ‘Oud and Nieuw Amelisweerd’ along the Kromme Rijn

Paris; from the walled city to the 'network city'

The river Seine and how the river as a system is related to the urban landscape. From its founding in the Roman times, the city of Paris has created a series of interventions that related the river Seine to the urban landscape. Its first settlement took place around the Île-de la Cité, with two major roads crossing the river perpendicularly (Chadych & Leborgne, 1999). Since that time, the city has grown and in the development of the urban landscape of Paris over time, we see a series of interventions that specifically are oriented to the river. One of the first was the gardens of the Tuileries in the axis of the Louvre, parallel to the river. A recent one is the new park Citroën on the site of the former car plant in the city. Note that there are examples of locating the axial

systems both perpendicularly and parallel to the river (Bacon, 1974). These axial systems give the city not only an orientation on the river but also an identity that we hardly find in other cities on rivers. In a study on the urban development of Paris, Baudelot et al. (2003) study the steps from the Paris as the 'walled city', to the 'network city' (fig. 2).

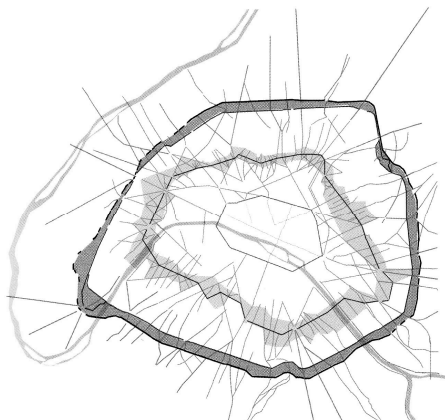


Figure 2. The city of Paris; from the walled city to the network city

The Maros river in Romania

The Maros (Mureş) river is almost 800 km long; it originates in the eastern Carpathian mountains in Romania and merges with the Tisza river in Szeged in Hungary (Brilly, 2010). In the Roman times, a Roman road gave access to the area, while they used the river as a waterway also for transport. In the Middle Ages the river was used as a waterway for the transport of salt (Mihăilescu & Praporgescu, 2011). In the 19th century an extensive network of railways was constructed connecting Budapest to the Carpathian mountains in the south. This railway network enabled new mining, small industry, gave access to spa's and generally opened up the area to the region (Turnock, 2006). Fekete (2007) did a first systematic study of Transylvanian gardens of castles and mansions along the Maros river. He describes 37 examples and sketches a short historical development. Some of the castles date from the Middle Ages but also till the 19th century, new mansions have been constructed and reconstruction of existing ones took place. The study forms also a point of departure for a regional development study in contemporary context (fig. 3). At the regional level the existing topography and the watershed are the basis for landscape structure. Settlements, road systems, railways and main types of land use further complement the structure. In the Maros river valley we see them bundled along the valley form. What is also remarkable is that the main road sometimes 'switches' from left to right bank and the other way round thus

creating a certain 'asymmetry' in the valley landscape. The European Water Framework Directive (Directive, 2000; Chave, 2002) offers a European framework for water and water systems that fits well in the landscape architectural approach of watersheds (Marsh, 1983). Applications of the European Water Framework Directive can be found in the study of Billen et al., (2007) for the Seine river in France and the Waterplan for the city of Rotterdam (Jacobs et al., 2007). Kaika (2003) puts the Water Framework Directive in a wider perspective of politics, economy and planning. Here we have developed a design approach of alternating future use by changing the road systems between left and right bank (Toorn and Fekete, 2016). Thus creating differences and conditions for different types of use in the future, including water storage, leisure, energy production by making use of hydropower and solar systems.

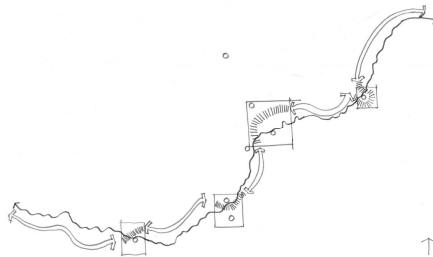


Figure 3. Design strategy for alternating use; the principle of asymmetry

Rotterdam; 'waterproof' by 2030

Rotterdam is the biggest port in Holland and is located on the banks of the rivers or branches of Meuse, Rhine and Rotte (Mann, 1973). The 'Waterplan 2 Rotterdam' (Jacobs et al., 2007) outlines how the municipality of Rotterdam and the water boards want to deal with the city's water in the period till 2030, the same as the spatial development plan for the city. The main goal of the plan is, to make the city 'waterproof' by means of an integrated approach to water storage, water quality, sea defence. The main problems related to water, that the city is facing, is the rise of the sea level (safety), the increased rainfall with more peak discharges (municipal sewage system) and the care for water quality. The plan is based on the water systems approach, which departs from the distinction of watersheds. The area is divided into three parts; the river city, the right bank (north) and the left bank (south) (fig. 4). Secondly the European Water Framework Directive (Directive, 2000; Chave, 2002) has been used as a guideline to conform to European standards. Finally, the creation of conditions for the growing economy, the liveability and conditions for well-being of the urban landscape have from the very beginning on been integral part of the plan strategy. The Zuiderpark on the left bank is one of the first major projects that have been realised in the context of the Waterplan. For such long time spans, a

realisation strategy has been developed to organise the plan in steps in time and place. The plan also comprises generic solutions: water plaza's, green roofs, reconstruction the river Rotte in the city.

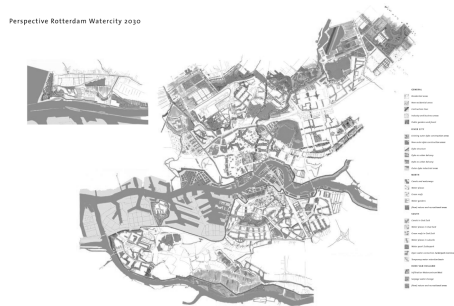


Figure 4. The Waterplan for the city of Rotterdam

Results

A structural approach comprises three levels of intervention; the materialisation of form, the structuring of (land)use and the strategy of the landscape development in the long run. In all cases we have seen how the landscape structure is defined by a river but differently in all cases. As a natural system the river defines the watershed and the topography. In the case of the Kromme Rijn and Paris, the relation is a cultural one but in the case of the city of Rotterdam the relation is integrated into a strategy for the landscape development in the long run; Rotterdam as a water city that will be climate proof in 2030. In the case of the river Maros, a similar strategy could be developed, based on the same principles creating a different setting, but the same principles are valid. Here the layering of different cultural influences since the Bronze Age forms the point of departure for a contemporary strategy for landscape development in the long run. For such a strategy, three key aspects play a role; energy transition, water storage and management, the creation of healthy environments for people.

Conclusions and discussion

In the study on the Budapest City park the issue of structure is extended with an analysis of historical maps (Szilágyi & Veréb, 2014). The general design principle that is referred to is on the one hand continuity and on the other hand flexibility over time. It means that structure forms the basis for continuity over time, while at the same time providing possibilities for changes within that structure. Another example of making use of the principle of structure in the design process can be found on the work of the German landscape architect Peter Latz, such as Duisburg Nord (Design, 2008). Both in the projects of Latz, his writings and his teaching, the structural approach is evident and gets

special emphasis. In this study we have extended the morphological concept of greenway planning to a more structural approach. It means more focus on relations between elements, structures and processes at different levels of intervention. This structural approach leads to three specific theoretical distinctions, as we have seen in the case studies and in some references. The concept comprises three key issues: distinction between existing and intervention, between functioning & use, between structure & network.

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