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KOMMÜNIKÉ

COMMUNIQUE

A Tájépítészeti és Településépítészeti Kar a 2019. évet centenáriumi emlékévvé nyilvánítja, hogy méltó módon emlékezhessünk meg a Kar két jeles személyisége, Mócsényi Mihály professzor úr és Balogh András művésztanárunk születésének 100. évfordulójáról.

Balogh András (1919-1992) festőművész, kerttervező, művészeti szakíró, címzetes egyetemi tanár a kertművészet, a tájépítészet, a képzőművészet és művészettörténet kapcsolatát, közös pontjait, egymásra hatását vizsgálva 30 évig oktatta a táj- és kertépítészhallgatókat, tanított művészettörténetet, kertesztétikát, szabadkézi rajzot és ábrázoló geometriát. Rendszeresen tartott rajzsakkori kurzusokat a szakra jelentkező hallgatójelölteknek és az érdeklődő tájépítészhallgatóknak.

Karunk az ICOMOS Történeti Kertek Szakbizottságával, az Ormos Imre Alapítvánnyal, a Magyar Tájépítészek Szövetségével és az MTA Tájépítészeti Albizottságával karöltve 2019 tavaszán (március 18-19.) műhelykonferenciát, hallgatói workshopot és kiállítást szervez Balogh András emlékére a FUGA Építészeti Központban, illetve az egyetem Budai Campusán. A kiállítás Balogh András szellemiségét, oktatói, írói és festőművészi alkotói tevékenységét mutatja be.

Mócsényi Mihály (1919-2017) tájépítész, több tudományterületen is képzett iskolateremtő és -fejlesztő egyetemi tanár, rektor, professor emeritus,

az önálló Tájépítészeti Kar életre hívója és első dékánja, nyolc évtizeden keresztül a magyar tájépítész szakma és oktatás meghatározó egyénisége, hazai és nemzetközi nagykövete.

Karunk a Magyar Építész Kamara Tájépítészeti Tagozatával, az Ormos Imre Alapítvánnyal, a Magyar Tájépítészek Szövetségével és az MTA Tájépítészeti Albizottságával, valamint a Kar Hallgatói Önkormányzatával és a Rerich Béla Tájépítészeti Szakkollégiummal közösen készíti elő a Mócsényi Mihály Centenárium programjait.

Professzor úr 100. születésnapját a Budai Campus Felső-Arborétumban található szoborkertben mellszobor avatásával ünnepeljük 2019 november 9-én, megörökítve a karalapító professzorunk emberi nagyságát, örökérvényű tanításait, mindvégig szoros kapcsolatát az egyetemmel, a kollégákkal, a diáksággal.

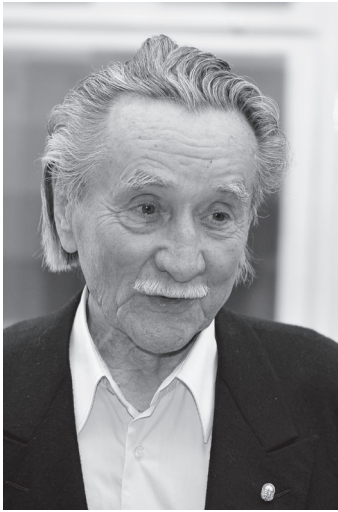
Decemberben kétnapos, nemzetközi konferenciát és életmű-kiállítást szervezünk Mócsényi Mihály tiszteletére az MTA székházában, illetve a FUGA Építészeti Központban. A konferencia központi témája Mócsényi Mihály tájépítészeti alkotói és tudományos örökségének két fő vonulata: a kertépítészeti, szabadtertervezői munkássága és a tájléptékű tájépítészeti, diszciplínafejlesztő munkássága. Alkotói és tudományos örökségét a 20. századi késő modern és kortárs tájépítészetre gyakorolt hatások tükrében, neves külföldi és hazai előadók

felkérésével kívánjuk bemutatni. A kiállítás Mócsényi Mihály termékeny életútját, a professzor sokoldalúságát, hazai és nemzetközi szakterület-fejlesztő hatását és elismertségét mutatja be.

A Centenárium Év programjaira ezúton hívunk minden szakmabelit és barátot, támogatót, tisztelőt, és várjuk a méltó megemlékezés és a minél teljesebb körű életút bemutatás érdekében a személyes archívumokban és emlékekben megbújó Mócsényi-relikviákról a híreket.

A Tájépítészeti és Településtervezési Kar nevében,
Budapest, 2018. december 3.

Fekete Albert, dékán



1. kép/pict.:

Mőcsényi Mihály /
Mihály Mőcsényi

2. kép/pict.:

Balogh András /
András Balogh

The Faculty of Landscape Architecture and Urbanism declares 2019 as a centennial memorial year in order for us to notably commemorate two of the faculty's prominent figures' 100th birth anniversaries, that of Professor Mihály Mőcsényi and our art teacher András Balogh.

Mihály Mőcsényi (1919-2017): landscape architect, school founder and developer, university professor qualified in different scientific fields, rector, professor emeritus, founder of the independent Landscape Architecture Faculty and its first dean, the decisive personality of Hungarian landscape architecture profession and education throughout eight decades, moreover the profession's national and international ambassador.

Our faculty prepares the programs of Mihály Mőcsényi Centenary in cooperation with the Landscape Architecture Department of the Architectural Chamber of Hungary, the Imre Ormos Foundation, the Hungarian Landscape Architecture Association and the Landscape Architecture Subcommittee of the Hungarian Academy of Sciences as well as with the faculty's Students Government and the Béla Rerrich Vocational Collage of Landscape Architecture.

We will celebrate the 100th birthday of professor Mőcsényi on the 9th of November, 2019, by inaugurating his bust situated in the sculpture garden at the upper arboretum of the Buda campus

in order to immortalize his human greatness, everlasting teachings, his never lasting tight connection to the university, and to its colleagues and students.

We are going to organize a two-day international conference and oeuvre exhibition in honour of Mihály Mőcsényi in December in the hall of the Hungarian Academy of Sciences and the FUGA Architectural Centre. The main topics of the conference will be the two major strands of Mőcsényi's landscape architectural crativity and scientific heritage: his work of garden architecture and open space design as well as his landscape scaled landscape architectural, discipline developmental work. His creative and scientific heritage is intended to be portraid in view of the effects on the late modern 20's century's, and the post-modern landscape architecture with the help of renowned foreign and national presenters. The exhibition will show the prolific oeuvre of Mihály Mőcsényi, his versatile personality, and the profession's national and international development and recognition he achieved.

András Balogh (1919-1992) painter, garden designer, art critic, honorary university teacher instructed landscape and garden architect students for 30 years. He taught art history, garden aesthetics, freehand drawing and descriptive geometry, and he also held regular courses on drawing specifcily for the faculty candidates and curious landscape architecture students.

Our faculty organizes a workshop together with an exhibition in the spring of 2019 (18-19 of March) in collaboration with the ICOMOS Commission of Historical Gardens, the Imre Ormos Foundation, the Hungarian Landscape Architecture Association in memory of András Balogh at the FUGA Architectural Centre and at the Buda campus of the university. The exhibition is intended to present the spirit and the educational, writer and painter activity of András Balogh.

Hereby we invite every professional and friend, supporter, respecer to the programs of the Centenary Year, and, for the sake of the widest insight to and worthy commemoration of the oeuvre, we are looking forward to the news of concealing Mőcsényi relics in personal archives and memories.

On behalf of the Faculty of Landscape Architecture and Urbanism,
Budapest, 3rd of December, 2018.

Albert Fekete, dean

THE HISTORIC GARDEN HERITAGE OF CENTRAL AND EASTERN EUROPE AND NEW CHALLENGES FOR LANDSCAPE ARCHITECTURE

A KÖZÉP-EURÓPAI TÖRTÉNETI KERTEK ÖRÖKSÉGE ÉS ÚJ KIHÍVÁSOK A TÁJÉPÍTÉSZEK SZÁMÁRA

SZERZŐ/BY:
MARTIN VAN DEN TOORN

ABSTRACT

In this paper I will put forward some aspects of the position Central and Eastern Europe in the European history of landscape architecture, with a special focus on Hungary. The key question is how this position influences the contemporary planning and design of landscapes where heritage plays a role.

The first part of the paper will pay attention to the historical development of the garden as a landscape element in the history of landscape architecture in general and how it affected thinking and practice. It will be further elaborated on the position of Central and Eastern Europe in the context of European landscape architecture and the special position of Hungary.

The second part deals with the design approaches related to heritage and contemporary planning and design of landscapes. These design approaches will be placed in the frame of the new challenges for landscape architecture for the

future; water conservation, energy transition and the creation of comfort and healthy environments for people. It will be worked out in a case study in Romania; the landscape of the Maros river valley.

In the conclusions the concept of 'readability' is put forward in the context of heritage in landscape architecture as an alternative for conservation.

Keywords

historicism, readability, design approach, design experiment, design knowledge

INTRODUCTION

In the conference on Landscape heritage held at the Faculty of Landscape Architecture and Urbanism, Budapest this year (April 23-24, 2018), my contribution has been that of a foreigner that has only impressions of a country from discussions and seeing without speaking the language. It means there is no personal historical experience of land and culture; hence it

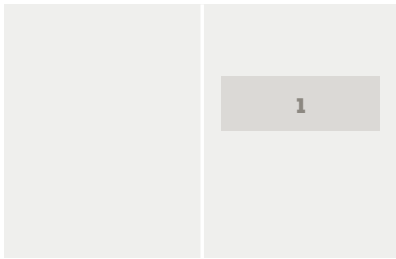
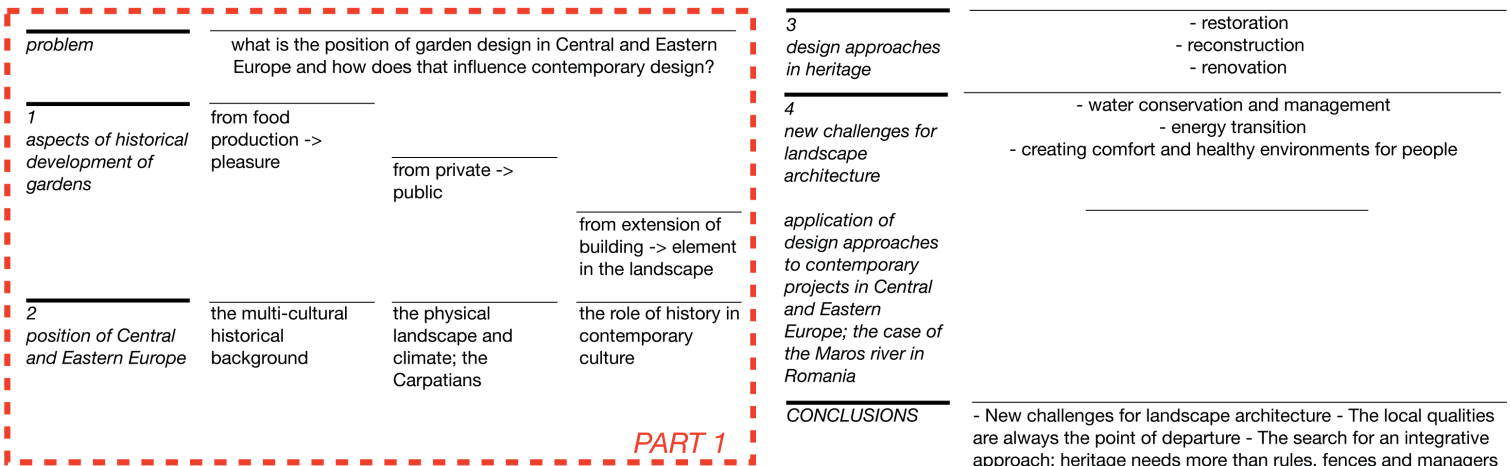


Fig. 1: Schematic overview of content of the first part of the article. Heritage, conservation and historicism in the context of new challenges for landscape architecture elaborated in a case study on the Maros river valley in Romania. The second part is going to deal with the historic garden heritage from the design and the contemporary landscape planning issues point of view. (to be published in 4D 50.)



introduces the viewpoint of a Western European as a foreigner. Only since I have started teaching and doing research in Budapest I have been introduced into land, landscape and landscape architecture of Hungary and its surrounding countries.

Heritage and landscape have a special relationship; it is impossible to conserve landscapes since the landscape always changes even without human intervention. So, conservation as in architecture in the form of restored buildings as monuments does not exist in landscape architecture. Landscapes are also cultural phenomena of which some are managed and maintained as 'cultural monuments' in which the dynamics of landscapes is necessarily taken into account.

The overall goal of this article is to focus on design approaches for landscapes as cultural monuments, in which restoration and development can be found side by side.

Two research questions define the general outline of the article:

- How can the generic historical development of landscape architecture from garden to landscape, be applied to specific conditions of the landscapes of Central and Eastern Europe in general and to Hungary in particular?
- How can generic design approaches in the context of heritage be applied to the contemporary situation in the wider context of Central and Eastern Europe?

The research method is based on the principles of case study research,¹ in which cases are studied and analysed in their context and lead to insights that add to already existing body of design knowledge. Material is based on texts from history, design projects and field work. (fig. 1):

Since the terms and definitions used in heritage are not always clearly

¹ Zeisel, J. *Inquiry by design – Environment / Behavior / Neuroscience in architecture, interiors, landscape and planning*. New York, Norton & Co., 2006, rev. ed.



defined, I have described some for the content of this article.

Landscape architecture

Landscape Architecture is both a professional activity and an academic discipline. It encompasses the fields of landscape planning, landscape management and landscape design in both urban and rural areas and at the local and regional level. It is concerned with the conservation and enhancement of the landscape and its associated values for the benefit of current and future generations (ECLAS, 2004).

In landscape architecture, 'landscape' is object of planning and design, so quite different from other disciplines that deal with 'landscape'.

Terms related to heritage; types of intervention into historical settings and environments:

Preservation
 'to preserve' means *maintaining something in its original or existing state.*
 The Oxford Dictionary: *'The state of being preserved, especially to a specified degree.'* This last point is important

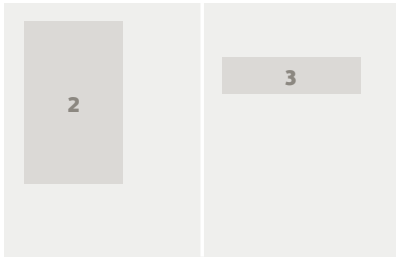


Fig. 2: March (1412-1416) from the Book of Hours, Les très riches heures du Duc de Berry (Dücker & Roelofs, 2005). The miniature shows in precise detail some of the activities in the month of March such as pruning trees or grape vines, or ploughing the fields. It gives us also an idea

about the state of agriculture and horticulture of that period. The linear patterns of planting of trees in the orchards or the vines in the vineyard in the different enclosed parts do indicate that horticultural techniques were already well developed. The castle

in the background is one of several owned by Jean Duc du Berry; it is the castle of Lusignan in Poitou, famous for the legend about the fairy Melusine, ancestress of the Lusignans **Fig. 3:** The Villa Lante in Bagnaia, north of Rome; the view towards the settlement. The two

buildings, on the left and on the right, are in different ways related to the outdoor space; first of all through the axis, secondly because of the visual connection to the façade thirdly because of the main entrance which is also part of the axis. The view along the central axis between the two

building gives also an idea of the small scale and intimacy of the ensemble. Water in different forms follows the axis and contributes to the character and identity



for historical landscapes since they are built up of 'layers' of different interventions in different periods.

Conservation

To conserve means 'protecting something of environmental or cultural importance from harm or destruction.' Here we see the cultural aspect being introduced. In all landscapes 'culture' plays a major role, not only in historical landscapes.

Transformation

To transform means 'making a marked change in the form, nature or appearance' (The Oxford Dictionary). Transformation is a generic term that is not only used in the context of heritage. In landscape architecture all design is a form of transformation since all interventions take place in an existing situation; being one of the key differences with architecture.

1. THE DEVELOPMENT OF THE GARDEN AS TYPE IN LANDSCAPE ARCHITECTURE

In landscape architecture we usually distinguish between three basic types; garden, park, landscape. They are also in line with the historical development

of the discipline. Note that they are not referring to elements or objects in the landscape; the terms represent types with common characteristics. I will first make some remarks on the historical development of 'gardens' as type; three developments took place in the course of time that are relevant in this context.

From function to pleasure

Originally gardens had only one function; the production of food. That's why some authors² state that the art of making gardens originates from horticulture and makes use of horticultural principles. The miniatures of the Limbourg brothers from the 15th century show examples of agricultural and horticultural practice at the end of the Middle Ages (fig. 2).

Sørensen (1963) considers the development of the garden as a gradual process from functional (food production) to pleasure. The link between the two – according to him – is water; in the first gardens away from rivers, water was needed for irrigation, in the pleasure gardens water is transformed into fountains, cascades, ponds. Note that in garden design water also refers symbolically to life.³ Sørensen speaks of the Spanish gardens as a 'stylised water system'. As examples of

² Sørensen, C.T. *The origin of garden art – Havekunstens oprindelse*. København, The Danish Architectural Press, 1963; Solomon, B.S. *Green architecture and the agrarian garden*. New York, Rizzoli, 1989

³ Baridon, M. *L'eau dans les jardins d'Europe*. Wavre, Mardaga, 2008



Roman Campagna Villa Lante 1

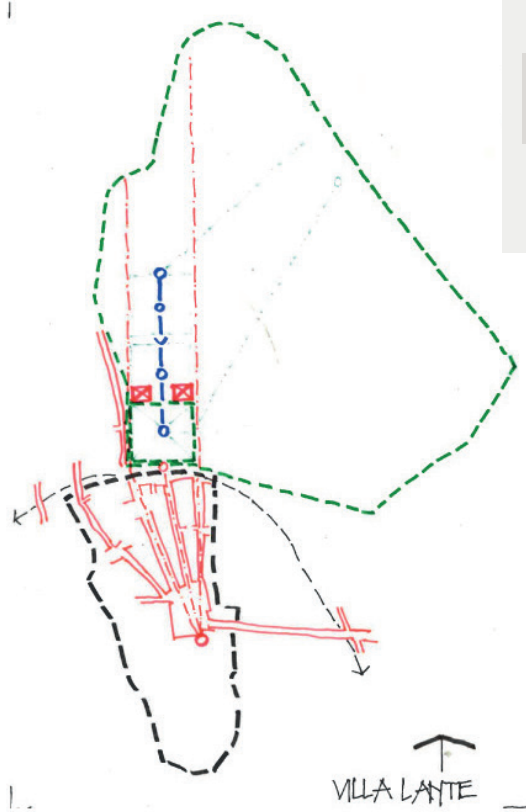


Fig. 4: Villa Lante compared to Vaux-le-Vicomte; different relation between building, garden, landscape

this transformation he compares the Orange Court patio of the mosque in Cordoba with the Generalife in Granada.

Solomon (1969) does not so much refer to the historical origin but makes clear how rural practice (agriculture, horticulture) has influenced architecture and landscape architecture in the past and still does so in contemporary practice.

An early form of leisure use was hunting. It became one of the most common uses for parks and forests and was a popular form of leisure for the upper class. Later on even special parks and especially forests were designed for hunting.

From private to public

Originally, because of the primary function of gardens for production of food, they were private. This continued in later developments when the function of the garden gradually changed to gardens for pleasure. Only from the 18th century on, private gardens and parks started to be gradually opened

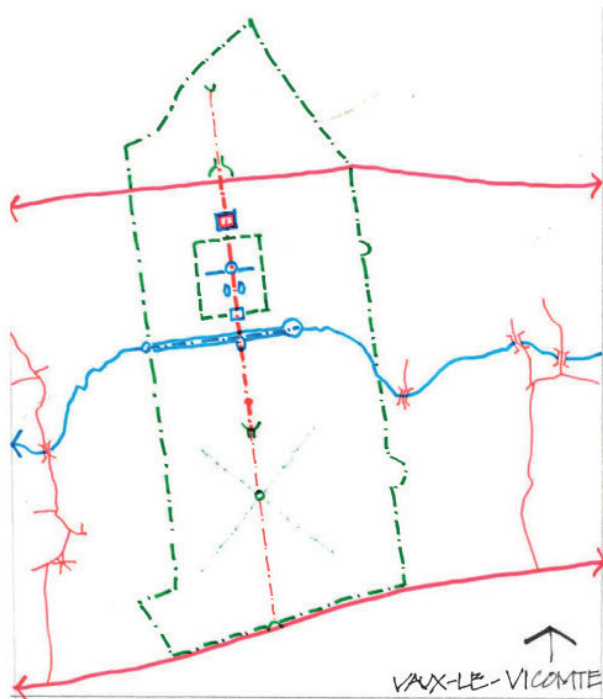
up for the public and later also new parks were designed as public parks.

Chadwick (1966) makes a remarkable point in this respect in stating that the botanical gardens always have been public and thus probably have been the forerunners of public gardens.⁴ The first botanical gardens date from the end of Middle Ages with the rise of the universities in Europe that in many cases included a garden for medical herbs which later on transformed into a botanical garden. These botanical gardens were public but were not used by the public as part of mass culture that emerged after the Industrial revolution in Western Europe.

From extension of the building to the element in the landscape

So far we have paid attention to the function, use and formal status of the garden as an element in itself, but gardens find also their origin as space related to buildings. Over time this relation has evolved in different ways.

⁴ Chadwick, G.F. *The park and the town – Public landscape in the 19th and 20th century.* London, The Architectural press, 1966



Renaissance; the garden as extension of the building

In the Roman villa's of the Renaissance, the garden became an extension of the building; the outdoor part of the building. Even if there were other elements such as forests, parks, these were treated as separate units such as in the Villa Lante⁵ where the settlement and the forest were related to the villa & garden but not as part of the architecture of the building (fig. 3).

Baroque; the garden as element in the ensemble of building, garden, park

A second phase in the development took place in the design of the baroque gardens in France where an axial system organised elements, buildings, spaces but also created first steps in the (visual) relation to the landscape. In Vaux the axis remains largely inside the space of the park, the relation to the landscape is established by the water (fig. 4). In Versailles the axis extends beyond garden and park into both the rural and the urban landscape.⁶

In the French baroque, the garden was extended into a park by an axial system that formed a transition between building and the surrounding landscape, by making use of the laws of perspective.⁷ It also meant that in Versailles, for the first time in history, the building was no longer the most important object of design but the design of the ensemble of garden and park formed the core of the overall design (fig. 5). In this structure all other elements were part of the whole and designed as such. It means that also the role of the landscape architect changed considerably; from designer of gardens and parks as elements to ensembles in which different elements were organised in a new spatial whole.

The 'garden landscape' at the continent; garden as one of the elements in the landscape

A third phase in the development of the relation between building and garden has been developed in the landscape

5 In the Villa Lante, building and garden are directly related to each other and are organised in an axial water system that connects both (Ree et al., 1992). The renaissance principle of the square is applied to organise the layout and spaces. The ensemble is completely enclosed but does have a visual relation with the settlement, located south of the ensemble. In Vaux-le-Vicomte there are two axes; one through the castle and another one perpendicular to that as grand canal. Both remain inside the garden and park space but offer openings to the landscape at the edges of the park
6 The palace in Versailles is large but is, from a design point of view, not so interesting. The core of the design problem is no longer the building and the garden but the design of an ensemble that – visually – reaches out into the landscape, be it urban or rural. The main relation of the building to the outdoors was enabling to view and enjoy the gardens, the park and the axis of the grand canal. Mariage (1990) emphasises also the regional dimension of Le Nôtre's work, principles that are applicable to contemporary planning and design. In most studies on Le Nôtre only the stylistic and historical aspects get attention
7 Farhat, G. Les grandes perspectives dans l'oeuvre de Le Nôtre. In: Bouchenot-Déchin & Farhat, 2013. p 170-187



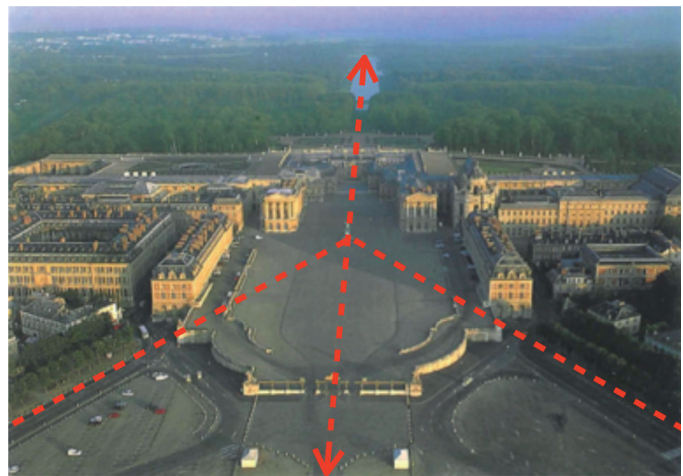
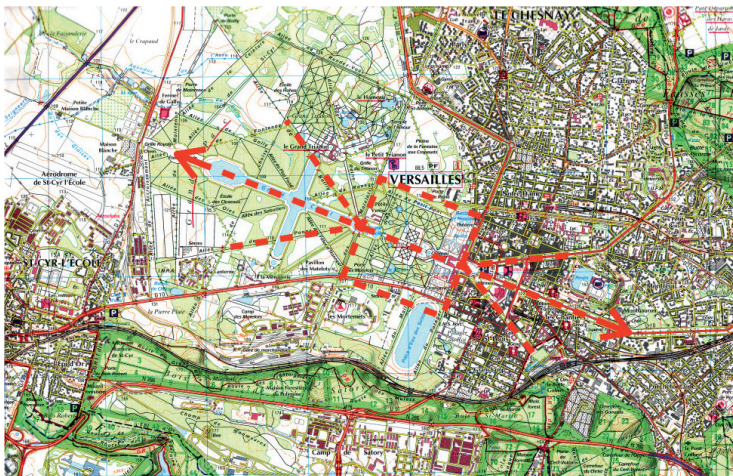
Fig. 5: Versailles, castle, garden, park, landscape

Fig. 6: 'Garden landscape' of Wörlitz. On the left; Wörlitz and its landscape context. The 'garden kingdom' of Wörlitz

was created by Prince Leopold III Friedrich Franz of Anhalt-Dessau (1740-1817) and his friend and adviser Friedrich Wilhelm von Erdmannsdorff (1736-1800) starting

in the 18th century over a period of forty years. In the 19th and 20th century the original grounds have been divided into four parts due to the construction of the railway line and

motorway 9. On the right: Plan drawing of Wörlitzer Park (Andersson et al., 2005). (SOURCE: GOOGLEMAPS)



style on the continent in Germany. As example Wörlitz has been chosen,⁸ it is located in Saxony-Anhalt in Germany and part of the river landscape of the Elbe of about 14.500 ha (fig. 6). It is since 2000 on the UNESCO world heritage list.

Contrary to the 'landscape garden' in England, in Wörlitz for the first time a 'garden landscape' was developed with the main characteristic of design of new elements in everyday landscapes. In Wörlitz, the designers went beyond the mere copying of garden scenery and buildings from other sites, but instead generated a synthesis of a wide range of artistic relationships in an existing landscape. Among new and characteristic components of this garden landscape was the integration of a didactic element, referring to the ideas of the enlightenment and to Jean-Jacques Rousseau (1712-1778), Johann Joachim Winckelmann (1717-1768), and Goethe (1749-1832). The notion of public access to the buildings and grounds was a reflection of the pedagogic concept of the humanisation of society.

Turner (2011) comments on Wörlitz: 'Wörlitz has many interesting scenes, which can be enjoyed like items in a postcard collection, but it suffers from

the site's flatness and does not have the unified composition of Stourhead.'⁹

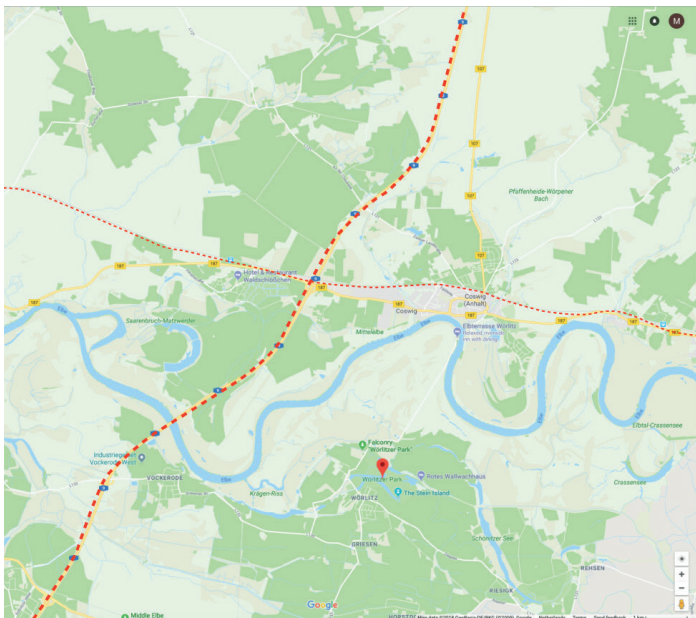
Later on, in the Landscape style, the design of the building became even less important in the context of the design of the ensemble. In the landscape style the experience of the park and the surrounding landscape was the core of the design approach. This is not only visible in the relative smaller size of the buildings in relation to the gardens, parks, forests but also the scope and importance of the design approach in which the design of the building was no more than just one of the elements.

In the overview of styles by Turner (2011), this development is shown in the plans where the size and location of the building gets smaller and less important. Turner analyses garden design between 2000 BCE - 2000 CE; garden types and garden styles that show in the beginning the building as the most important element but later on becoming just one of the elements in the ensemble. The principle of development is clear in the diagrams despite the difference in size and scale.

Note that the term 'garden' is sometimes loosely interpreted; Turner (2011) uses the term in the title of his book while

8 Wörlitz was the first garden landscape at the continent. It is a vast park dominated by water not only in its original river landscape but also in the design. The prince took the lake as starting point; he dug fresh creeks and inlets, and united these with small streams thus creating islands, each as a complete visual unit, with one or more buildings as characteristic elements. The plan comprises classical and romantic elements that are organized in five gardens; (1) the Schloss Garten with its Englischer Sitz, modelled on Stourhead but intended as a private garden; (2) the Neumark Garten with a canal, islands, a circular building modelled on Stowe; (3) the Schloss Garten with a Gothic House, a Temple of Venus and a Temple of Flora; (4) the garden on the north-east shore of the lake; (5) the New Gardens with mementos of Italy and an artificial volcano. These 'gardens' are autonomous elements that fit into and function as part of a designed landscape structure made up of existing landscape structures and new interventions. We see here an important step in the evolution of the concept of garden as type. At Wörlitz a new landscape was designed and planned at a regional scale by smaller gardens, parks and built elements; thus creating an integration of art, economy and education into new ensembles was created based not on a visual illusion but as a living entity (Jellicoe & Jellicoe, 2006). This is the way how in the evolution of the concept of garden has become one of the focal elements of the regional planning and landscape design.

9 Turner, T. European gardens – History, philosophy and design. London, Routledge, 2011



the content is not only about gardens but also parks, landscapes and settlements. The same goes for the 'Oxford Companion to the Garden',¹⁰ a major encyclopaedic overview for landscape architectural projects and issues but still uses 'garden' in the title (fig. 7).

2. THE POSITION OF CENTRAL AND EASTERN EUROPE IN EUROPEAN LANDSCAPE ARCHITECTURE; DIFFERENCES AND SIMILARITIES

The dominance of Western, Southern and Northern Europe in studies on the history of landscape architecture
 Since the start of my working in Budapest I have been confronted with the fact that in the treatises on history of European gardens you can hardly find any information about the history of gardens and of landscape architecture in Central and Eastern Europe as compared to the other parts of Europe. As an outsider who does not speak Hungarian or any of the languages from the countries surrounding Hungary, I assume there is certainly more information in these languages. Just to give an indication of my statement, I have selected six studies on the history and development of European landscape architecture.¹¹

In all six, Central and Eastern Europe is poorly represented or sometimes even not mentioned at all (fig. 8).

The special position of Hungary in the context of Central and Eastern Europe

Different aspects define the position of Hungary in Central and Eastern Europe in the European history of landscape architecture

Landscape as natural system (fig. 9; 10)

Hungary is landlocked and the land is dominated by the Carpathians, a series of mountain ranges around a basin.¹² In the south west it borders the Balkans and in the west the Alps. Apart from the rivers that originate in the Carpathians, there are also larger rivers coming from outside the Carpathians such as the Danube and a branch, the Tisza River. The climate is a European continental climate with warm, dry summers and cold winters.

Landscape as a socio-economic system

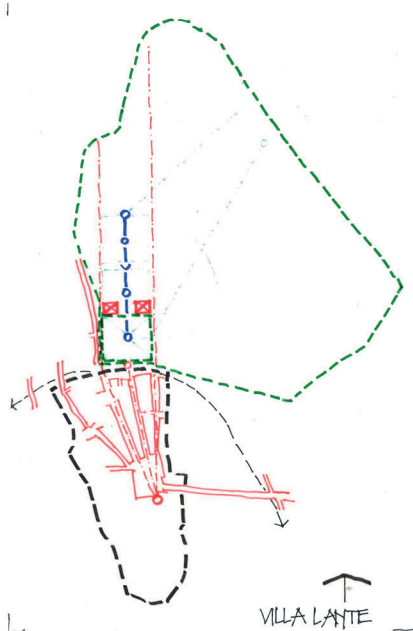
Hungary is not only geographically located in the centre of the Carpathian basin, Budapest is also an economic hub at the regional scale. Its economy was partly industrial and mining and partly

¹⁰ Taylor, P. (ed.) *The Oxford companion to the garden*. Oxford, OUP, 2008

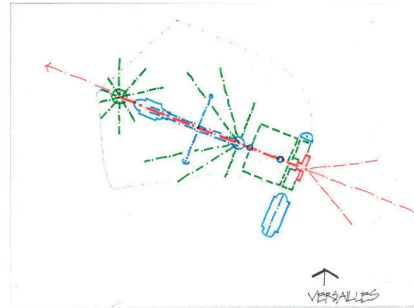
¹¹ Andersson, S.L. & M. Floryan & A. Lund. *Great European gardens – An atlas of historic plans*. Copenhagen, The Danish Architectural Press, 2005; Benevolo, L. *The European city – The making of Europe*. Oxford, Blackwell, 1993.; Gothein, M.L. *Geschichte der Gartenkunst – Erster Band – Von Ägypten bis zur Renaissance in Italien, Spanien und Portugal; Zweiter Band – Von der Renaissance in Frankreich bis zur Gegenwart – mit 326 Tafeln und illustrationen*. Jena, E. Diederich, 1914; Gutkind, E.A. *Urban development in East-Central Europe: Poland, Czechoslovakia, and Hungary – International history of city development Volume VII*. New York / London, The Free Press / Collier - MacMillan Ltd, 1972; *Urban development in Eastern Europe: Bulgaria, Romania and the U.S.S.R. – International history of city development. Volume VIII*. New York / London, The Free Press / Collier - MacMillan Ltd, 1972; Jellicoe & Jellicoe (1975-2006); *The Landscape of Man: Shaping the Environment from Prehistory to the Present Day*; Lavedan, P. *Histoire de l'urbanisme [I] – Antiquité - Moyen Age*. Paris, Henri Laurens Éd., 1926; *Histoire de l'urbanisme [II] – Renaissance et temps modernes*. Paris, Henri Laurens Éd., 1941; Lavedan, P. *Histoire de l'urbanisme [III] – Époque contemporaine*. Paris, Henri Laurens Éd., 1952.

¹² Pécsi, M. *Man and Environment*. Ed. by Márton Pécsi, Ferenc Probáld. Budapest: Akadémiai. 1974.; Embleton, C. (ed.) *Geomorphology of Europe*. Basel, Weinheim, Verlag Chemie, 1983

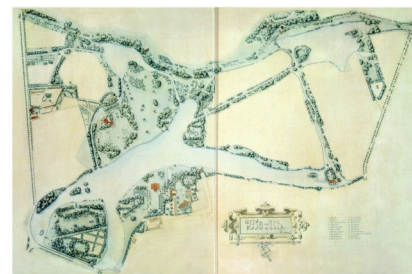
building <-> garden <-> landscape
 Renaissance
 Example: Villa Lante



building <-> garden / park <-> landscape (rural & urban)
 Baroque
 Example: Versailles



building <-> garden / park <-> landscape
 Landscape style
 Example: Wörlitz



Andersson et al., 2005

Beautiful collection of historical plans from all over Europe, does have a plan of Lednice in Czechia but that is all on Central & Eastern Europe.

Benevolo (1993)

this compact but well written history of the European city, pays only incidentally attention to central and eastern Europe; certainly not in a structural way or from a regional or cultural perspective.

Gothein (1914-1979)

Gothein, still being the classic resource on the history of European garden and park design, hardly gives information on Eastern Europe; on Hungary less than a page.

Gutkind (1972 [1]; [2])

offers a well-documented overview of settlement history and structure in most countries of Central and Eastern Europe except for the Balkan.

Jellicoe & Jellicoe (1975-2006)

in their study they do cover examples and cases from Vienna, St. Petersburg but for the rest Central and Eastern Europe is not included.

Lavedan (1926; 1941; 1952)

Germany is extensive dealt with but apart from some words on the early history of Cracow, and on St. Petersburg, nothing is said about Central and Eastern Europe.

agriculture and horticulture. It has a relatively large population as compared to neighbouring countries. Its central position is also marked by the multiple connections with surrounding countries, as can be seen in the railway connections; Budapest is still a hub in the network. Hall (1993), in an article on urban developments in Europe pays special attention to Eastern Europe. Even though the study is now more than 20 years old, the specific position of Central and Eastern Europe described in this article, remains valid.¹³

Landscape as a cultural system

Typical for Hungary is its rich multicultural history with influences from all over Europe and outside Europe; during the Austrian-Hungarian monarchy the area made up one of the main powers in Europe (fig. 11).

Starting with the Roman Empire, different regimes have dominated the country; the Ottoman Empire and recently the Russian influence after WWII. This multicultural background is one of the characteristics of landscape as a cultural system nowadays; a

¹³ Hall, P. Forces shaping urban Europe. *Urban Studies* 30 (1993) - 6. p 883-898

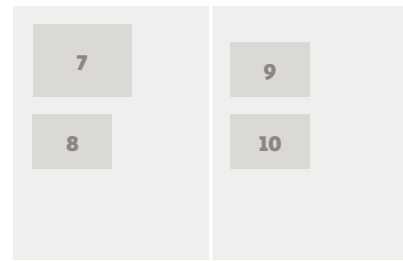


Fig. 7: Three phases in the development of the relation between building and garden. The garden, from extension to the building to designed landscapes where the buildings, gardens, parks are designed as elements in the landscape in Villa Lante, Versailles and Wörlitz; garden design as part of regional planning and design.

Fig. 9: The basis of the land; the Carpathian Basin. The geographical location of the country in the centre of the Carpathian basin also influences its economy and culture (Encyclopaedia Britannica)

Fig. 10: The Carpathians and the Danube watershed. A second major component of the land; the Danube watershed which is only partly overlapping with the Carpathians



rich diversity in cultural backgrounds coupled to a strong national identity.

All three did and still do influence the contemporary Hungarian landscape, so also the issue of heritage and cultural landscape.

The role of history in contemporary planning and design

While there are distinct differences between Central & Eastern Europe and the rest of Europe, there are also similarities. One of them is the role of history in heritage planning and design.

Fortunately landscapes cannot be conserved like paintings, buildings and even ensembles. Still many people think you can conserve landscapes but it is impossible. There is a fundamental difference in the context of heritage between conservation of elements – and even structures – and landscapes which are dynamic systems of people and natural systems, influenced by different forces. Landscape conservation in the strict sense is non-existent and is basically misleading for use in relation to landscapes.

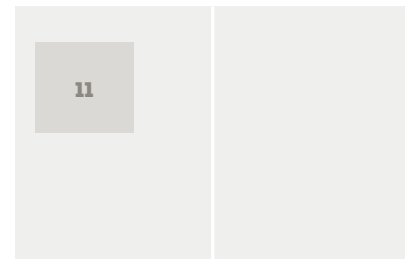
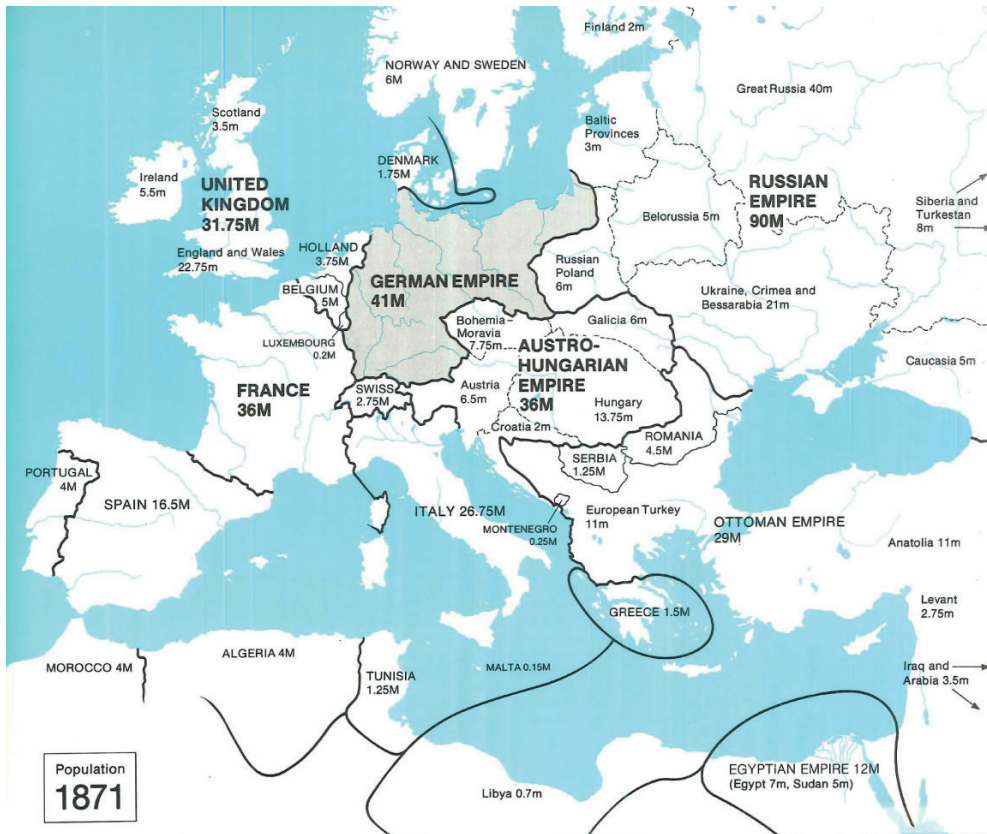


Fig. 11: History & culture; the special position of Hungary in Central and Eastern Europe in the European history (1871). Note the surface of the Austro-Hungarian Empire and Hungary

in the context of Europe, as for the size of the population (McEvedy, 1986)

The role of history is becoming more and more important in the experience of landscapes but also in planning and design of landscapes as we can for instance see in the growing list of the UNESCO heritage list of cultural monuments. This is not only a phenomenon related to the growing importance of leisure but also in the larger cultural context, the role of history in society in general is becoming more important. Schama (2004) did a remarkable study on the relation between history, culture and landscape in Europe which illustrates how history is ingrained in the European landscapes.¹⁴ Where conservation of elements enables the interpretation and re-interpretation of history and former cultures, in landscapes we use the concept of 'readability'. It means even without completely conserving landscapes – which is impossible – we still can 'read' the evolution and genesis of landscapes and environments because of the layered structure of landscapes. This layered structure is sometimes also

referred to with the term 'palimpsest' which originates in geography and stands for an old technique of parchment on which new writing replaced the old one by scratching the old writing away.¹⁵ The same principle we see in landscapes where parts are 'erased' to make space for new forms of land use such as in the case of new urban development, new parcelling or new roads that are superimposed on existing patterns. In Hungarian landscape architecture the importance of heritage is increasing as can for instance be illustrated in the recent plans for Várkert Bazár in Budapest.¹⁶ In scientific research as basis for re-design of historical landscapes, the study of Csepely-Knorr (2016) is a major step towards making the results of research on Hungarian design knowledge accessible for English-speaking designers and researchers.¹⁷ ©

- ¹⁴ Schama, S. *Landscape and memory*. London, HarperCollins Publishers, 1995, 2004
- ¹⁵ Kjerrgren, L. *Layers of land – The palimpsest concept in relation to landscape architecture*. Uppsala, Division of Landscape architecture, 2011 24 p
- ¹⁶ Bardóczy, S. (ed.): *Landscape odyssey – Landscape architecture in Hungary, the most significant projects and artworks 2010-2015*. Budapest, Hungarian Association of Landscape Architects, 2015
- ¹⁷ Csepely-Knorr, L. *Barren Places to Public Spaces: A History of Public Parks in Budapest, 1867 - 1914*, Budapest City Archives, Budapest. 2016

ÖSSZEFOGLALÓ

A KÖZÉP-EURÓPAI TÖRTÉNETI KERTEK ÖRÖKSÉGE ÉS ÚJ KIHÍVÁSOK A TÁJÉPÍTÉSZET SZÁMÁRA

Ebben a tanulmányban a közép- és kelet-európai, s azon belül is különös tekintettel Magyarország tájépítészetének helyzetét és szerepét ismertetjük a szakterület európai történelmében. A legfontosabb kérdés az elemzés során az örökség szerepe a kortárs tájépítészeti tervezésben.

A dolgozat első részében a kert, mint tájépítészeti alkotás történeti fejlődését mutatjuk be általánosságban, illetve a gondolkodás és a gyakorlat fejlődésére gyakorolt hatásában. A második rész az örökség és a kortárs tájépítészeti tervezés kapcsolatával foglalkozik. A tervezői, alkotói szemléletet napjaink legfontosabb tájépítészeti kihívásainak tükrében mutatjuk be; az aktuális szempontok a fenntartható vízgazdálkodás és energiaszolgáltatás, valamint a kellemes és egészséges környezet megteremtése az emberek számára. Ezt egy romániai, a Maros folyó völgyében készült tájépítészeti munka esettanulmányként való bemutatása szemlélteti. A következtetésekben az "olvashatóság" fogalmát a tájépítészeti örökség kontextusában értelmezzük, mint az örökségvédelem és -megújítás egyik lehetséges útját.

A budapesti Tájépítészeti és Településtervezési Karon idén április-

ban tartott, a tájépítészeti örökségről szóló konferencián elhangzott előadás egy, a helyszínen járó külföldi szakértői benyomásain és meglátásain alapult. A nyelvet sajnos nem beszélem, s kétségkívül nincs mélyebb, személyes ismeretem a helyi tájról, kultúráról és történelemről. A régióval, a tájépítészeti adottságokkal és értékekkel csak néhány éve ismerkedem, amióta Budapesten tanítok és kutatok.

A táji örökség sajtószerű jelenség. A tájat ugyanis nem lehet megőrizni, konzerválni, mert a táj az emberi beavatkozás nélkül is folytonosan változik. Az építészeti örökségvédelem hagyományos módszerei, a rekonstrukció és a restauráció a tájépítészetben nem értelmezhető. A táj nem műemlék, s nem konzerválható. A tájat a társadalom, a kultúra hozza létre és alakítja. Egyes tájakat "kulturális emlék vagy örökség" formájában kezelnek és tartanak fenn, a tájak dinamikáját szükségképpen figyelembe véve.

Két kutatási kérdés határozza meg a cikk tartalmát és célját.

- Hogyan lehet a tájépítészeti, ill. kertművészet általános történelmi fejlődését a kert léptékéről táji szintre alkalmazni, kiterjeszteni?
- Hogyan alkalmazhatóak az általános tájépítészeti tervezési elvek az örökség, a táji örökség esetében, s különösen a vizsgált térségben, ill. régióban?

A tájépítészetben általában három fő típust különböztetünk meg: kert, park, táj. Ez a tipológia egyben a történeti fejlődést is tükrözi.

Az első típus a kert, aminek fejlődése három szempont szerint tagolható: a funkcionális szempont szerint a természetből kialakult kondicionáló kertek; a tulajdonviszonyok szerint a magánkertektől a köztertekig tartó fejlődés; a lépték és térépítészeti koncepció szerint a tájat meghatározó szerepet betöltő kertek kialakulásáig.

A történelemismeret szerepe egyre nagyobb fontosságú nem csak a táj tanulmányozásában és megértésében, hanem a tervezés és fejlesztés folyamatában is. Jól tükrözi ezt a tendenciát az UNESCO egyre bővülő kulturális örökségeinek listája. S messze nem csak a szabadidő és pihenés, vagy utazás kulturális jelentőségének erősödéséről van szó. A történelmi folyamatok, társadalmi változások folyamatosan formálják, alakítják a tájakat, ami egyes tájrészletek, tájlemek erodálódását és új tájhasználatok megjelenését eredményezik, hiszen a táj nem konzerválható, nem rekonstruálható. A táj maga a változás, a fejlődés, a hangsúly a tájlemek és tájalkotók, valamint a történeti fejlődés ismeretén és a tervezésben való érvényesítésén van. ©

BUENOS AIRES METROPOLITAN AREA GREEN SPACE SYSTEM DEVELOPMENT, CHALLENGES AND OPPORTUNITIES

KIHÍVÁSOK ÉS LEHETŐSÉGEK A BUENOS AIRES METROPOLISZ- TÉRSÉG ZÖLDHÁLÓZATÁNAK FEJLESZTÉSÉBEN

SZERZŐ/BY: DAMIÁN A. PÉREZ, GISELA I. HIDDE, VALERIA M. MICOU,
MARTIN SIMONYAN, VANINA PERRETA DEL MISSIER

ABSTRACT

Buenos Aires metropolitan area, as other global megacities, deal with complex planning and governance problems regarding the allocation and conservation of green space.

During the second half of the XX century regional plans have considered the allocation of land for green space with dissimilar success. The preservation of green space is mainly threatened by weak governance, discontinuous planning policies, and unplanned informal development.

Flood-prone areas and public land have kept their structure mostly because of its relative unsuitability for development; however, over the years, these

remnants of open space have been shrinking constantly. Even though the urban area expansion is constant there are still some areas that could be considered as part of a future city's green space system. The lower delta of the Parana river in the north-west and the coast of Rio de la Plata in the south-east of the city are promising areas but face big threats because of unplanned development or new urbanization and infrastructure projects.

INTRODUCTION

Green space has multiple benefits and provide various services both to society and nature and plays a vital role in urban planning. Swanwick et al. (2003)¹ defined

¹ Swanwick, C., Dunnett, N., & Woolley, H. (2003). *Nature, Role and Value of Green Space in Towns and Cities: An Overview*. *Built Environment* (1978-), 29(2), 94-106. Retrieved from <http://www.jstor.org/stable/23288809>

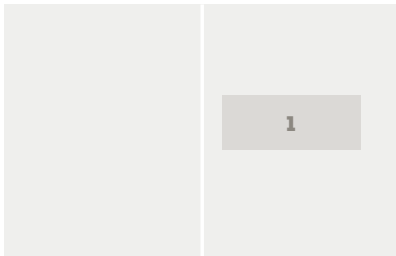


Fig. 1: Part of the planned park system for the northwest coast of Buenos Aires. Benito J. Carrasco



Green Space as land predominantly soft, unsealed and permeable that together with gray space (areas predominantly sealed, impermeable, hard) compose the external environment of an urban area.

Green Infrastructure is an emergent coherent planning concept that is increasingly used in planning. While the concept of Green Infrastructure has not a single widely recognized definition the term includes both green spaces and the fact that they are interlinked (EEA, 2011).² In this sense it could be applied to a land matrix predominantly urban (grey space) or a land matrix predominantly green (green space). Whether in an existing urban area or new planned or rural areas, green infrastructure focuses on green space and their ecosystem values and functions

and on the benefits provided to human populations (Benedict & McMahon).³

In the last decade, the city of Buenos Aires and its metropolitan area have been struggling to become more sustainable and major public investment has been made in waste management, public transportation, and the renovation of urban public space. Among other city structure features, most of the indicators of cities sustainability consider the availability or access to green space. Throughout the recent history green space have always been regarded as desirable. Despite the efforts on improving the public open space (green and grey), in the metropolitan area there are, in general, problems of availability (low quantity and poor distribution) and low quality of green space. Most

² Green Infrastructure and Territorial Cohesion. The concept of green infrastructure and its integration into policies using monitoring systems. EEA Technical Report N° 18/2011. ISSN 1725-2237

³ Benedict & McMahon. Green Infrastructure: Smart Conservation for the 21st Century. SPRAWL WATCH CLEARING-HOUSE MONOGRAPH SERIES. The Conservation Fund. 2002 Pg. 5

efforts have been directed to increase the quality of existing green space however few considerations have been given to increase their area, number and connectedness. Through history, only a few regional plans have been proposed for Buenos Aires city region. Many authors have analysed these plans although none have done it considering green space as the main object of study. A review of the plans in terms of green space allocation along with an analysis of the recent changes in the land use of the remaining large green areas are needed. Taking into consideration the city expansion tendency an analysis of the remaining large green areas in the city periphery is also needed in order to consider them for future plans.

BUENOS AIRES METROPOLITAN AREA

Situated on the bank of one of the widest rivers in the world, the city of Buenos Aires and its metropolitan area seems more like an ocean coastal city than a river city. Once called the “Paris of South America” because of its urban structure similarities with the European city, it is nowadays a vast and very complex metropolis with various social, structural, and economic challenges, although still a vibrant cultural and social lighthouse in South America. Buenos Aires metropolitan area spans over an area of 3800 sq.km and it is composed by the autonomous city

of Buenos Aires and 24 surrounding districts (municipalities) plus 6 more districts that are connected and are part of the agglomeration although they are still not fully urbanized.⁴

Around 12 million people live in the area (a third of the country) and its economic activities accumulates half of the national GDP. The city is located on the rolling pampas ecological region, one of the richest and most productive agricultural areas of the country. The topography is mostly flat except for the steep slopes of the Parana and Rio de la Plata rivers.

The agglomeration spans over the basins of three main rivers, the Lujan, Reconquista and Matanza-Riachuelo. All three of them are tributaries of the La Plata River, part of the estuary of the Parana river. Because of its proximity to the Rio de la Plata, the lower lying urban area is highly vulnerable to sea-level rise and storm surges (and from flooding from intense rainfall – because of inadequacies in provision for storm and surface drainage); the recurrent flooding, expected to become more frequent, is related with not so successful attempts to stop development on areas near the rivers and on flooding plains (Barros, 2005).⁵ In this sense, flooding plains of the three main rivers have been considered green space in many of the historical regional plans.

In Buenos Aires, the municipality (local territorial division) is the primary authority of landscape and

⁴ “¿Qué es el Gran Buenos Aires?”. National Institute of Statistics and Censuses. 2003-08-01. Archived from the original (PDF) on 2008-09-11. Retrieved 2018-05-18.

⁵ Barros, V. *Global Climate Change and the Coastal Areas of the Río de la Plata. The International START Secretariat.* 2005

| | |
|---|--|
| Development on fertile soil areas | Reduction of near city agricultural (mainly horticultural) areas. |
| Development on flood plains | Alters the hydric system |
| Banalization of landscape and loss of biodiversity | Lower biodiversity due to substitution of species and modification of structure. |

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Table 1: Causes and ecosystem services disrupted by the extended creation of gated neighborhoods in Buenos Aires metropolitan area. (FERNÁNDEZ ET AL. 2009)

urban planning. Provincial laws and federal laws are above the municipal level, but the main land use decision is taken by local decision making. Nature protected areas can be of municipal, provincial, or national (federal) level. This decentralized planning scheme have brought over the years to uncoordinated efforts and disagreement on the green open areas worth to preserve.

URBAN DEVELOPMENT AND EXPANSION

The city experienced through history a strongly spontaneous development in terms of spatial distribution, and many of the plans conceived for the region were partially or never implemented. According to many authors, urban sprawl has many causes, among which population growth, weak governance, lack of a continuous public policy which transcends the different governments and property speculation stand out (Bhatta, 2010).⁶

The urban continuum has expanded in concentric rings following the regional accesses to the city, first the city expanded next to the roads then railways and later on highways. After this the interstitial spaces were consolidated following a pattern of *urban expansion* as a spreading “oil stain”

In the period between 1949 and 1960 most of the city expansion occurred

driven mainly by the internal migration of people to the metropolitan region attracted by the industrial expansion.

After 1980 and specially during the 90', the urban spread took on the form of an archipelago with the massive growth of gated communities in the suburbs, a type of development that has been favoring urban sprawl since then. These communities were created without integration to the existing urban fabric. Large tracts of land were used with the consequent creation of sensible urban contrast between neighbouring lower-class and high-class residential areas. The expansion of the urban agglomeration over productive land and undeclared green space was characterized by a lack of planning and speculative practices over the price of the land before developing (Morello et al, 2003)⁷ This process of production of the built environment by private planning and intervention, obeys mainly market principles (Pirez, 2002)⁸ and the developed residential land, although of low density and greener than other parts of the city, have massively altered the ecosystem services provided by open space (Fernandez et al., 2009)⁹ (Table 1)

Besides the developers, the other main players involved in city transformation in the last decades are: a) the informal market and the informal settlements, which frequently occupy public lands; b) the government with the establishment

⁶ Bhatta, B. *Analysis of Urban Growth and Sprawl from Remote Sensing Data. Chapter 2.* Springer Verlag. 2010

⁷ Morello, J., Mateucci, S. D., Rodríguez, A. *Sustainable Development and Urban Growth in the Argentine Pampas Region.* ANNALS, AAPSS, 590, November 2003

⁸ Pirez, Pedro. *Buenos Aires: fragmentation and privatization of the metropolitan city.* *Environment & Urbanization* Vol 14 No 1 April 2002

⁹ Fernández L.; Herrero, A. C.; Martín I. (2009) *Alteración de servicios ecológicos del urbanismo privado en la región metropolitana de Buenos Aires.* XI Jornadas de Investigación del Centro de Investigaciones Geográficas y del Departamento de Geografía, 12 y 13 de noviembre de 2009, La Plata. Available at: http://www.fuentesmemoria.fahce.unlp.edu.ar/trab_eventos/ev.818/ev.818.pdf

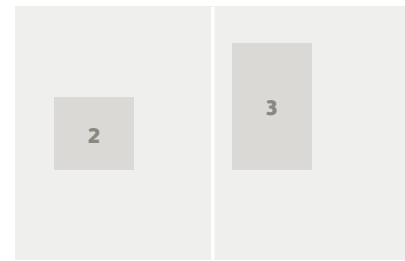
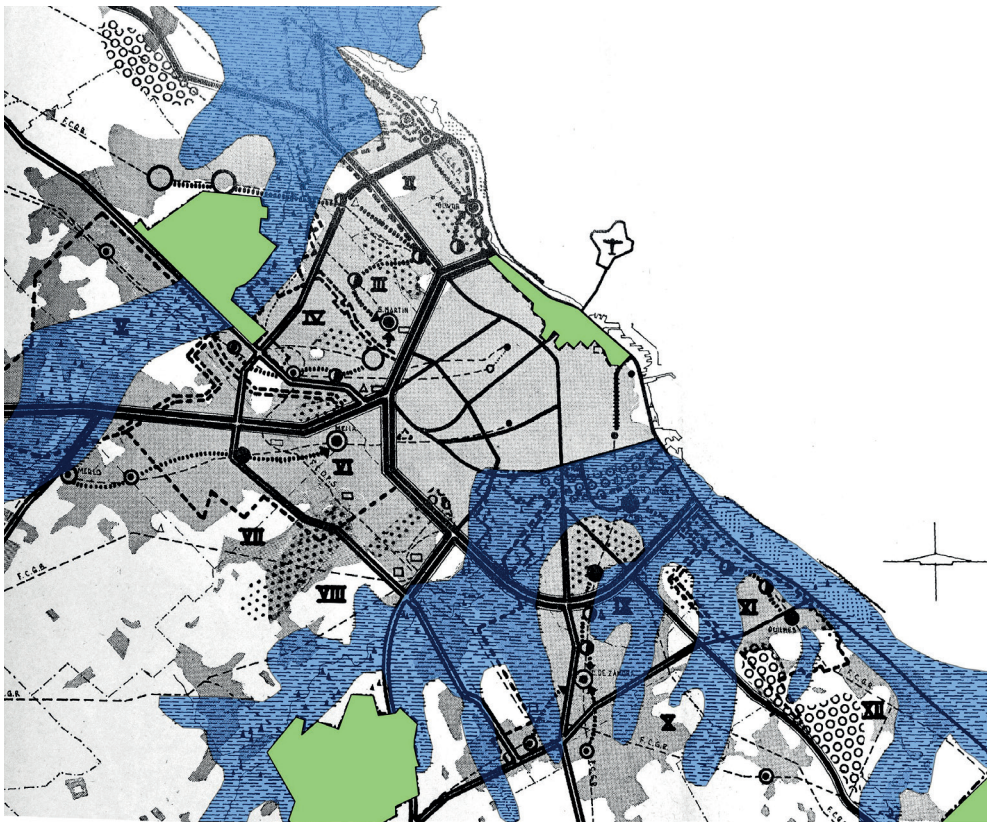


Fig. 2: Regional Plan 1962 - Light green: Planned green open spaces. Light blue: Flood plain open space (SOURCE: LINEAMIENTOS GENERALES PARA EL ÁREA METROPOLITANA, PLANO DIRECTOR PARA LA CIUDAD DE BUENOS AIRES)

Fig. 3: Regional plan 1967-1969 (SOURCE: ESQUEMA DIRECTOR AÑO 2000)

of social housing, on easily available public land (Perahia, 2010).¹⁰

The lack of space for democratic decisions made at metropolitan level and the inability to change the course of territorial appropriation processes are issues that affect the metropolitan governance and contribute to the open space planning and management complexity (Pirez, 2002).⁸

PLANNING FOR THE GREY AND GREEN

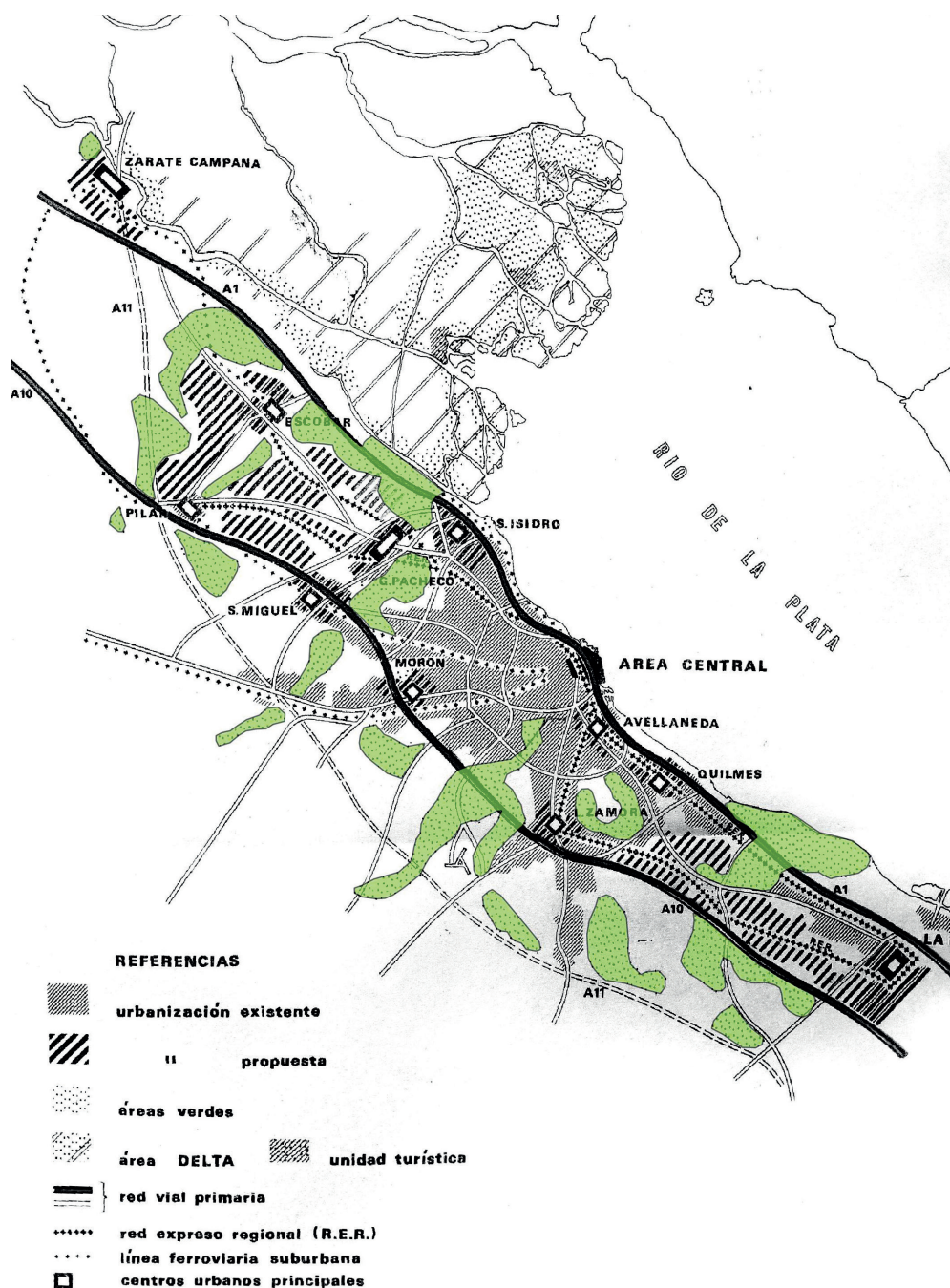
The city has faced periods of its evolution as a metropolis where the open space has been highly considered and other periods (mostly coincidental with political or economic turmoil)

where planning and open space has not been taken much into account.

Buenos Aires was a small city until few decades before the down of XX century. Around 1880 a substantial European immigration flow began and steadily increased until 1914. In 1914, foreigners accounted for about 30% of the country's population.

During the first years of the 20th century many of the theories of the French "doctrine hygiéniste" were followed and applied, this included, for instance, the creation of big parks in the fringes of a (then) small city, not yet fully urbanized. The concept of green space in the city changed, it was not a recreational area for the high classes anymore; on the contrary, it was conceived as a space in which the

¹⁰ Perahia, Raquel. *Los actores públicos y privados y las transformaciones en la región metropolitana de Buenos Aires in: "Cuestiones territoriales en la región metropolitana de Buenos Aires".* Compiladoras Sonia Vidal-Koppmann y Raquel Perahia. Ediciones Facultad de Arquitectura y Editorial Nobuko, Buenos Aires 2010, ISBN 978-987-584-305



different social classes could be integrated. These big parks were meant to create better environmental conditions in neighborhoods where hospitals, landfills and marginal population were established. The park started to be part of the urbanization. They were also considered a green frontier, a way to stop the city expansion over the pampas. After a few decades, this system limiting the city grow was transformed in the quality green space of the incipient metropolitan area (Gorelik, 1998).¹¹

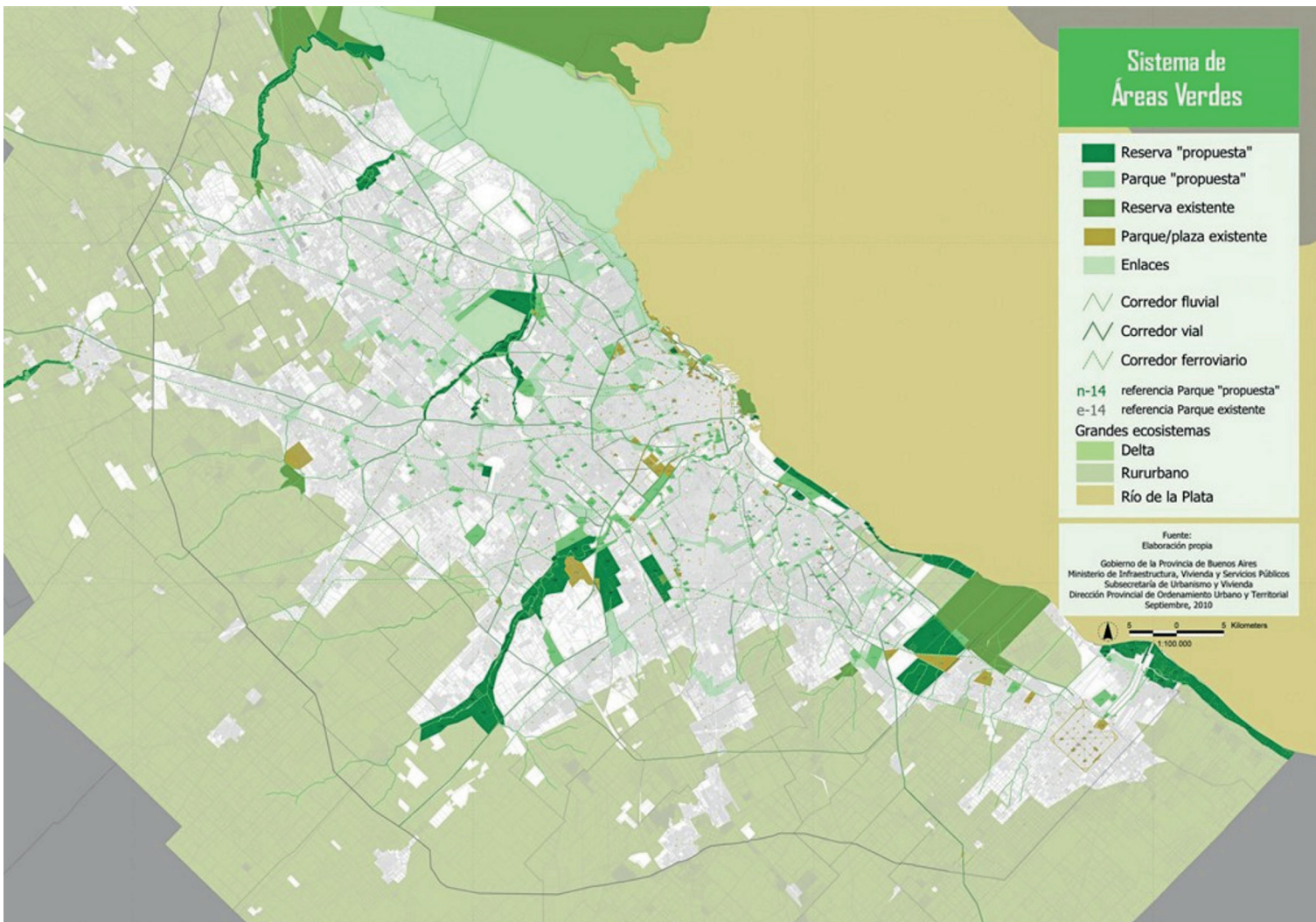
One of the first references to the city need of a planned green open space network was done by Benito J. Carrasco at the down of the XX century. Carrasco was an agronomic engineer who dedicated his academic life to the advance of knowledge and education, of green

space planning and design. He was the founder of the parks and garden department at the Agronomic School of Buenos Aires University, was also one of the most prolific designers of that era, fostering their extension throughout the city. He proposed, as early as 1910 a “park system” (Fig. 1) for the whole city and advocated for its creation till his death in 1958 (Berjman, 1997).¹²

The “Plan Director para la Ciudad de Buenos Aires”, published in 1947, was one of the first conceptual planning approaches for the area. In this urban planning project Le Corbusier proposed to concentrate the dwelling areas within the existing towns of the moment (the metropolitan area was not yet consolidated) keeping the in-between areas as green space that should be, in his

¹¹ Gorelik, Adrian. *La Grilla y el parque. Espacio público y cultura urbana en Buenos Aires, 1887-1936*. Universidad Nacional de Quilmes, 1^a Edición 1998

¹² Berjman, S. *Comp. Benito Javier Carrasco: sus textos. Facultad de Agronomía, Universidad de Buenos Aires. Cátedra de Planificación de Espacios Verdes*. 1997



view, forest, nurseries and farms. Many of the ideas and concrete proposals of this comprehensive plan were considered and followed in the subsequent decades, however the proposed regulations for green space conservation were never implemented.

Between 1947 and 1960 the agglomeration duplicates its area from 567 Km² to 1282 Km² between 1895 and 1914 the agglomeration went from 86 Km² to 241 Km² (Buzai, 1993).¹³ This produced the need to finally develop a long deferred official regional plan.

Regional plan 1962

Inspired on the 1945 Abercrombie' plan for London, in 1962 a plan for Buenos Aires city that included guidelines on how to structure the metropolitan region was approved (Fig. 2). This plan strongly advocated against urban development on lowland and flooding prone areas and the recalling of areas for green space on the coast of Río de la Plata. Unfortunately, the

plan was not mandatory for the metropolitan area districts. Part of this unsuitable land was finally built up, bringing major hazards to the population even nowadays, subsequently the considered open areas, part of an incipient green space network slowly diminished (Suarez, 1994).¹⁴

Regional plan 1967 - 1969

The "Esquema Director Año 2000" was the first study which was done for the region at national level. It took the spontaneous spatial evolution of the metropolitan area and developed a scenario for the year 2000. The plan set aside big green areas mainly in the Matanza and Reconquista rivers' floodplains. The proposal was set in order to duplicate the park area in the metropolitan region (Fig. 3).

Strategic Guidelines for the Metropolitan Region of Buenos Aires - 2007

In-between the 70' and 2000 many provincial level laws were passed to regulate land use allocation,¹⁵ urban

¹³ Buzai, Gustavo. *Buenos Aires 1869-1991: Análisis SIG de su evolución espacial*. 1993

¹⁴ Suarez, Odilia. *Planes y Códigos para Buenos Aires 1925-1985. Serie Ediciones previas. Ediciones FADU-UBA*. 1994. ISBN: 950-29-0172-X

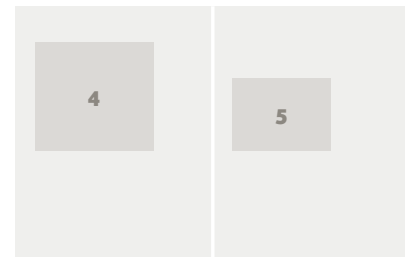
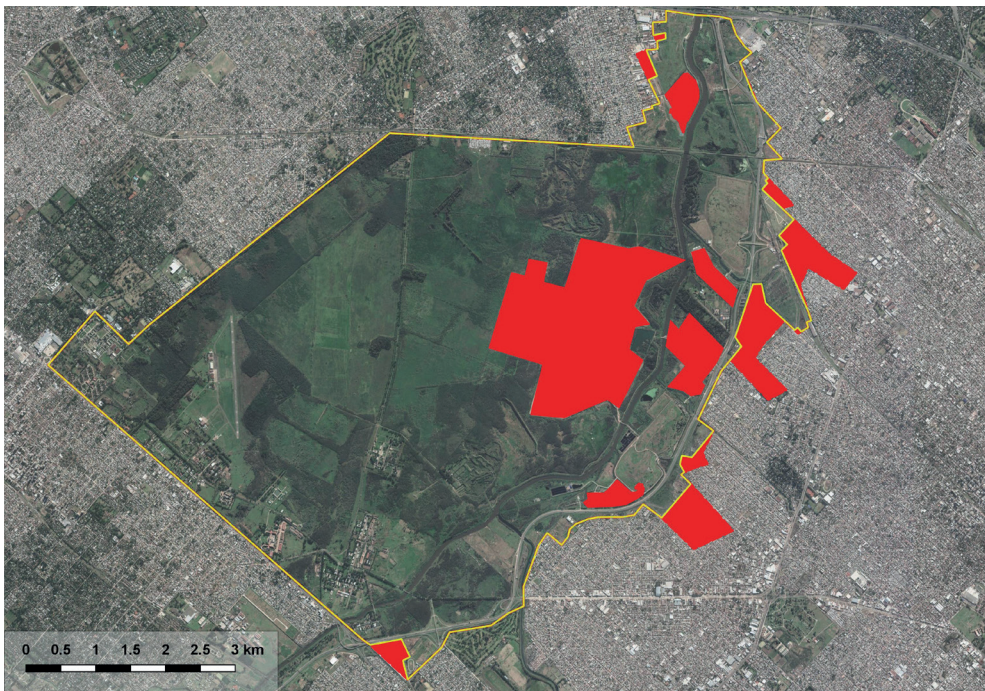


Fig. 4: Metropolitan Green Space System (SOURCE: GOBIERNO DE LA PCIA. DE BUENOS AIRES. DIRECCIÓN PROVINCIAL DE ORDENAMIENTO URBANO Y TERRITORIAL. 2010)

Fig. 5: Campo de Mayo, changes in the land use. The yellow line corresponds to the green space in 2018 imagery, red polygons highlight the changes between 1984 and 2018 (SOURCE: GOOGLE/LANDSAT/DIGITALGLOBE.)

forest preservation¹⁶ and protection of landscapes and green spaces.¹⁷

It wasn't until the 2000's that a true effort to create a system of green space was done. In 2007 the provincial government outlined a complete plan for the area: the Strategic Guidelines for the Metropolitan Region of Buenos Aires. On this document, in which representatives from the Federal, Provincial and Municipal levels were included, a series of programs were proposed among which there was one related to the development of a public green space system, including the protection and management of strategic ecosystems. In the proposal riparian areas, wetlands, vacant open space in-between the urban fabric, areas of landscape or leisure value and green corridors were considered for protection for reasons of natural resources conservation, hydrologic regulation, aquifer recharge, flood control, pollution reduction, habitat provision and biodiversity preservation. A Metropolitan Green space system was proposed (Fig. 4),

seeking to incorporate 6800 Has. of green space. The proposal would have changed the green space per inhabitant ratio from 3,2m²/inh to 8,3m²/ihn. To implement this system legislation changes were suggested along with a draft masterplan for green areas and ecological corridors, management plans for the three main watersheds of the region, legal regulations on the use of riparian areas, and finally, a body for metropolitan green area management (Garay et al., 2007).¹⁸ Unfortunately, neither of these proposals have yet been implemented.

THE "SHRINKING" GREEN SPACE

The percentage of urban green spaces (ratio between the area of urban green space and the area of built-up area) has been used as an indicator of green space availability. Huang et al. (2017)¹⁹ studied availability and accessibility to green space in megacities and found that for Buenos Aires the

¹⁵ Ley Provincial N° 8912/77 de Ordenamiento Territorial y Uso del Suelo.

¹⁶ Ley Provincial N° 12.276/99, de Arbolado Público.

¹⁷ Ley Provincial N° 12.704/01 "Paisaje Protegido de Interés Provincial" o "Espacio Verde de Interés Provincial" This could have been a very important legal instrument, related with the IUCN category 5, protected landscape. Sadly, the application of the law is very difficult because of the way it was implemented.

¹⁸ Garay et al. Lineamientos Estratégicos para la Región Metropolitana de Buenos Aires. Subsecretaría de Urbanismo y Vivienda. Dirección Provincial de Ordenamiento Urbano y Territorial. Pdf. pp. 267-264. 2007. http://www.mosp.gba.gov.ar/sitios/urbanoter/planurbana/Lineamientos_RMBA.pdf. Retrieved April 2018.

¹⁹ Huang, Conghong; Yang, Jun; Lu, Hui; Huang, Huabing; Yu, Le. Green Spaces as an Indicator of Urban Health: Evaluating Its Changes in 28 Mega-Cities. Remote Sensing. 2017, 9, 1266

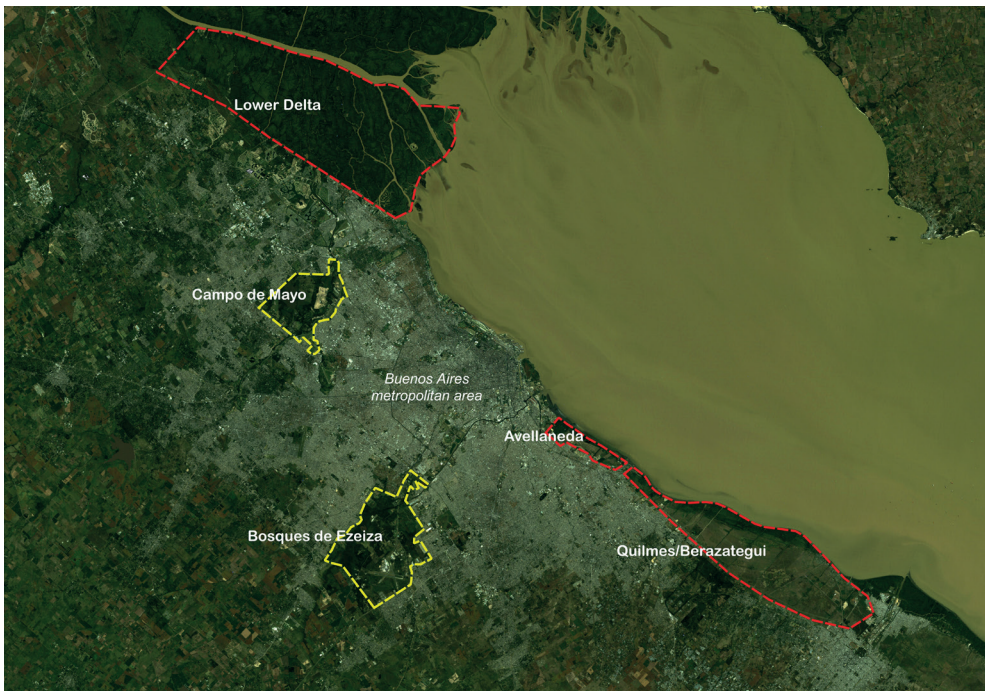


Fig. 6: Large green areas in the metropolitan region. Yellow outline: Consolidated shrinking spaces. Red outline: Areas of interest for preservation (SOURCE: LANDSAT 7)

Fig. 7: Typical wooden piers to access weekend houses on the Parana river delta

availability has been increasing very slowly (1.11%) between 2005 and 2015. This strongly contrast with the 26% expected grow of the urbanized area if the actual tendencies are sustained and the population increase 10% in the next 10 years (Lanfranchi et al, 2018).²⁰

Metropolitan non-developed areas provide unique opportunities to enhance the availability of green space and the provision of ecosystem services depending on the scale. During the evolution of the city, the once planned green space has slowly but steadily been shrinking, its structure has changed, and many ecological services were lost. To check if the tendency holds true, a visual analysis of an area situated in the Reconquista river flood plain has been done using photo interpretation techniques (Fig. 5). The military purposes of the area kept it aside from city development for many decades. The study used easily available Landsat and Google / DigitalGlobe's remote imagery from the

years 1984 and 2018 respectively. Polygons have been drawn with QGIS software on the green areas of the imagery for different years and the enclosed grey spaces have been differentiated when located in a green matrix. Year-to-year area differences have been highlighted for comparison reasons.

Although not quantified, the land use change is significant and a modification in the green space to grey space ratio has been verified. A detailed analysis reveal that the transformation can be divided into three main categories: urban infrastructure (recycling plant, penitentiary), dwelling (slums, state built housing and closed neighborhoods) and industrial. This shrinking phenomenon can be seen in the recent evolution of the land use of many of the areas historically deemed as green.

Many green areas of metropolitan Buenos Aires are facing change lately, the characterization and analysis of

²⁰ Lanfranchi, G., Duarte, J. I., y Granero Realini, G. (enero de 2018). *La expansión de los Grandes Aglomerados Urbanos argentinos. Documento de Políticas Públicas/Recomendación N°197. Buenos Aires: CIPPEC.*



them could help point to truly sustainable development and to the preservation of the structure and services provided by them. A first step to this is to reveal the recent changes and consider the challenges and opportunities for each of the areas.

UNDEVELOPED GREEN AREAS FACING CHANGE

There are still large green areas in the metropolitan region (Fig. 6) that could be part of a green space system, two of them are deemed as of greater value for their size and relative nearness to the denser parts of the city.

The Delta of the Paraná River is one of the largest coastal wetlands systems of Argentina spanning through 300km from Santa Fe province to Buenos Aires. The lower delta is located beside the north part of the metropolitan area of Buenos Aires. The sediments transported

by the river increases the length of the delta at a rate of 50 to 100m per year. It is an area that “remains under the dichotomy of the wild condition of its islands and the urbanized growing processes of its edges” (Zagare, 2014)²¹

The lower delta has traditionally been used as agricultural land to produce fruits, nowadays the main agricultural production is wood. For this reason, it has been highly intervened and large parts of the original vegetation have been replaced, nonetheless the landscape structure has not changed much.

It is divided into different parts belonging to three metropolitan municipalities, which makes difficult the management of the area as a whole. The lower delta can also be divided between an insular part and a continental part. The insular part nearest to the city has been inhabited for more than a hundred years being one of the metropolitan touristic hot spots since

²¹ Zagare, V. M. E. (2014). *Dichotomous Delta: between the natural and the metropolitan. The case of the Parana Delta, Argentina. Built Environment, 40(2), 213-229.*

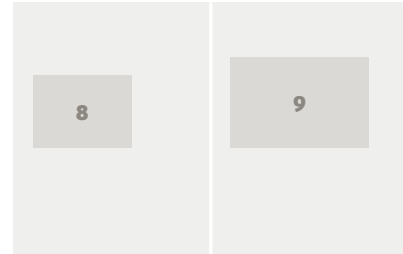


Fig. 8: Casa Museo Sarmiento a protected heritage building in the lower Parana Delta / Niels Mickers / Wikimedia Commons / CC-BY-2.0

Fig. 9: Gated neighbourhoods on mainland wetland area. Red outline: Parana river lower delta (SOURCE: GOOGLE EARTH/DIGITALGLOBE)

1900' (Fig. 7). Many protected and unprotected heritage buildings are in this area (Fig. 8). The permanent residents have a very strong sense of belonging, shown in the quickly organized demonstrations against threats to the area.

In the “continental” area of the delta, the wetlands lying on the coast of Lujan River has been one of the most heavily urbanized by private investors (Fabricante et al., 2012).²² The landscape structure has been deeply changed mainly by modifications in the topography. In almost all the urbanizations the wetland has been drained by creating islands and lakes landscapes with the aim of raising the level of the areas to develop. (Fig. 9)

Despite all this anthropogenic change, the landscape of the island side remains mostly unchanged, although in the last two decades there have been several attempts to start the developing of gated neighbourhoods with the same unsustainable criteria.

There have been several plans for the area at different administrative levels. At municipal level the Management Plan for the Tigre island Delta²³ and local zoning²⁴ successfully prevented massive development on the island side. At a national level there is also a regional plan for the strategic conservation and sustainable use of the Parana Delta, an agreement between three of the provinces where the delta is. This document has been guiding other actions and legislation since 2010 (Piecas, 2008).²⁵

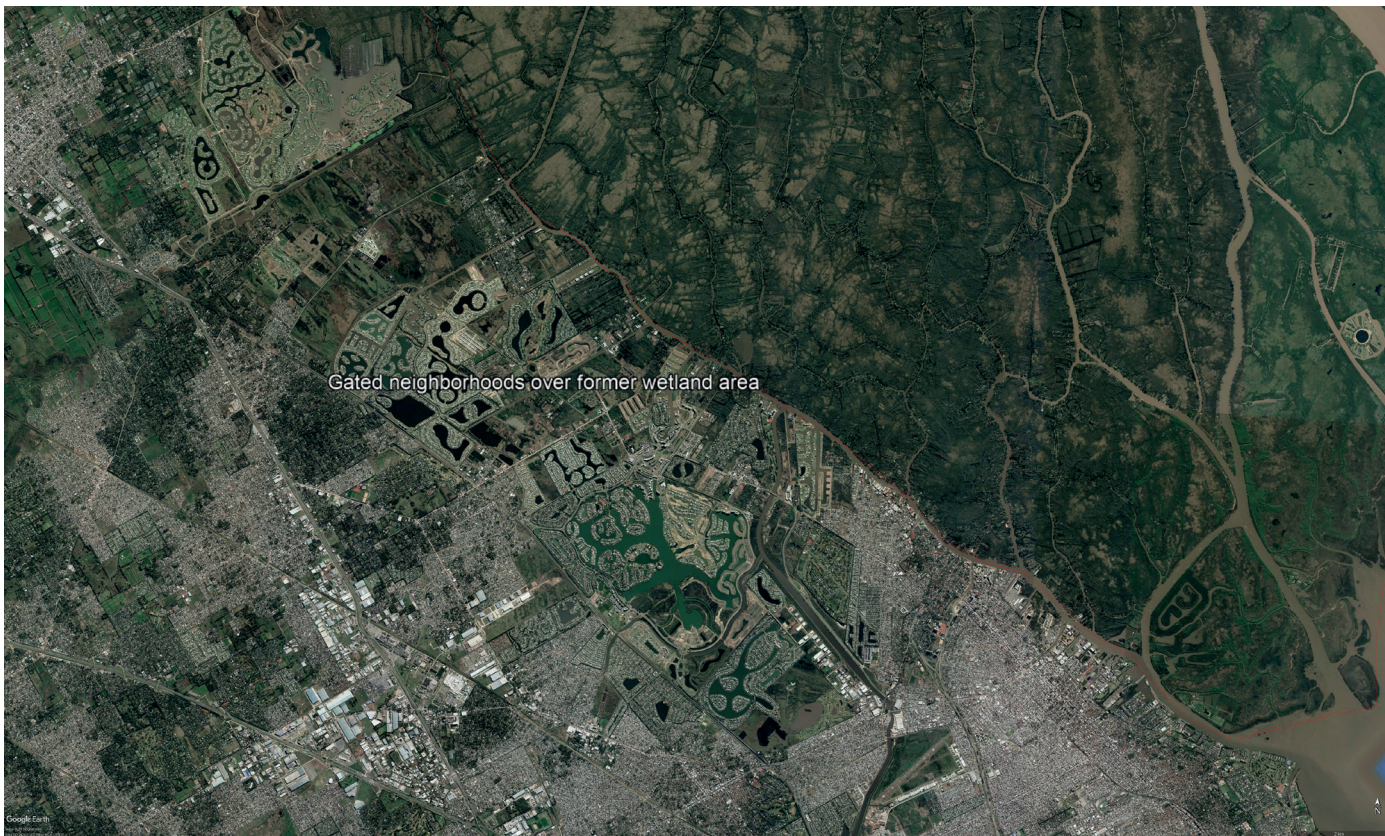
The second largest green open space embedded in the metropolitan area is the south-east coast of Rio de la Plata river between Buenos Aires autonomous city boundary and La Plata city (Fig. 6). This area has remained undeveloped until very recently, mostly because is flood prone. It is a stripe between 2 and 8 kilometres wide comprising the alluvial plain of the river. The area has been historically used for farming, there still remains some orchards producing the only local

²² Fabricante, I., Minotti, P. and Kandus, P. (2012). *Urbanizaciones cerradas en humedales. Análisis espacial en el Delta del Paraná y en las llanuras aluviales de sus principales tributarios en sector continental de la provincia de Buenos Aires, Argentina. Informe Técnico. Universidad Nacional de General San Martín (UNSAM) y Fundación Humedales / Wetlands International*

²³ Municipio de Tigre (2012). *Plan de Manejo: Islas del Delta - Tigre.*

²⁴ Municipio de Tigre (2013) Ordenanza 3344/13 - Ordenamiento Territorial Particularizado para la Localidad Delta del Tigre.

²⁵ PIECAS (2008) ([https://www.mininterior.gov.ar/planificacion/pdf/planes-reg/Plan-Integral-Estrategico-para-la-Conservacion-y-Aprovechamineto-Sostenible-en-el-Delta-del-Parana-\(Entre%20Rios,-Santa%20Fe,-Buenos%20Aires\).pdf](https://www.mininterior.gov.ar/planificacion/pdf/planes-reg/Plan-Integral-Estrategico-para-la-Conservacion-y-Aprovechamineto-Sostenible-en-el-Delta-del-Parana-(Entre%20Rios,-Santa%20Fe,-Buenos%20Aires).pdf))



wine. Part of the area was used as a landfill between 70' and 90' which brought about several environmental problems.

The municipality of Quilmes has historically been the only one allowing permanent occupation of the area. During the first decades of XX century a watering place was established on the river coast. A riverside park, a promenade and a wooden pier were built, attracting people and fisherman from all over the city. Over several decades the area declined, and many unplanned housing areas were established by filling the wetland up with debris. Nowadays the area is flood prone and face many threats and difficulties regarding water management.

Throughout many areas of this stripe is still possible to see and experience the natural river shore as it was before human intervention, a unique feature for an area so near the city centre. Unfortunately, water pollution, both from Rio de la Plata river

and their tributaries affect the environment and the quality of the experience.

Currently, two major projects are laid out for the area, a new dense, high rise buildings urbanization to be built on the coast of the river (Fig. 10) and a coastal levee along the coast to reduce the river flooding. These actions might fundamentally change the structure of the wetlands and the access to the river as well as laying down the conditions to change the space from green to grey.

CONCLUSIONS AND VISION

Planned metropolitan scale green space has been considered in plans since the beginning of the XX century following the planning paradigm of the period, although they have not been formally introduced into policy until recently. Regional plans have considered the need for green open space although with different commitment levels. A discontinuous planning policy, property

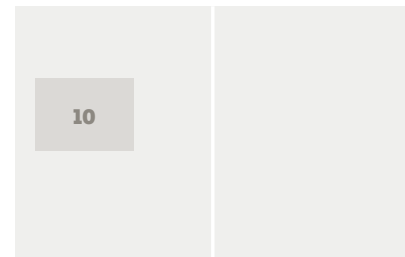


Fig. 10: Urbanization project on the Avellaneda municipality coast (grey)
(SOURCE: LANDSAT 7)

speculation, weak public governance coupled with increased demands for land have gradually deprived the city of needed open space opportunities.

The green areas set aside in different plans over the years have been slowly diminishing in size. Green spaces, as an interconnected system, have recently been considered on the regional plans. Part of the open space left aside in the metropolitan area have, for different reasons, been developed. To preserve these areas many difficult challenges related to governance should be addressed. In addition, because of relatively recent urban sprawl, huge tracts of land have been settled and the opportunities to develop a network of green spaces (a base for a true metropolitan green infrastructure) are shrinking.

Nevertheless, there are still areas that could be incorporated into a regional scale green space network. Several plans and enacted legislation affecting both these areas are threatening or

trying to preserve them. The plans drafted until recently usually present fragmented visions, lacking a holistic perspective to address the challenging environmental and social problems leading to maintaining open green space in the metropolitan area.

The concept of green infrastructure has not yet been addressed in its full potential as a strategic approach to land conservation and planning purposes but could offer a more integrative perspective for future regional plans helping to recognize the green space as the base for the provision of ecological services to finally develop a long delayed metropolitan green space system. ©

KIHÍVÁSOK ÉS LEHETŐSÉGEK A BUENOS AIRES METROPOLISZ- TÉRSÉG ZÖLDHÁLÓZATÁNAK FEJLESZTÉSÉBEN

Buenos Aires metropolisztérsege 12 millió embernek nyújt otthont. Az agglomeráció 3800 km² területet ölel fel, a nagyvárosi kerületek mellett 24 szomszédos és 6 kapcsolódó települést foglal magába. Buenos Aires más nagyvárosi metropolisztérsegekhez hasonlóan komplex tervezési, fenntartási és menedzsmentproblémákkal küzd a zöldhálózatok védelméért, fejlesztését illetően.

Buenos Aires intenzív növekedése 1880 után indult meg. Sokáig koncentrikus körök mentén terjeszkedett, és a legintenzívebb növekedést 1949 és 1960 között produkálta. Az 1980-as évektől a beépített területek szigetszerű növekedése figyelhető meg a nagyváros körül. A piac vezérelte, átgondolatlan fejlesztések folyamatosan öröklték fel az ökológiai értékeket. A XX. század második felében több regionális léptékű terv foglalkozott a zöldhálózat védelmével és fejlesztésével, sajnos inkább kevesebb mint több sikerrel.

Az első átfogó, a város egészére kiterjedő parkrendszer kialakítását 1910-ben Benito J. Carrasco javasolta. Az 1947-ben napvilágot látott "Plan Director para la Ciudad de Buenos Aires" tervet Le Corbusier ihlette, melynek elsődleges célja volt a fejlesztéseket a meglévő beépített területek mentén koncentrálni, és a közties területeket természetesen állapotban tartani (erdők, mezőgazdasági területek). Az 1962-es regionális léptékű terv Abercrombie elvei alapján készült, s igyekezett korlátozni az árvízzel veszélyeztetett, alacsonyan fekvő területek beépítését. A terv sajnos nem érte el célját. Az 1967 – 1969 között készült regionális tervben kidolgoztak egy 2000-ig mutató fejlődési forgatókönyvet, amelyben a zöldfelületek megduplázását tűzték ki célul az agglomerációban. 2007-ben készült egy javaslat "Stratégia irányelvek Buenos Aires metropolistérsege" címmel, amely egy teljes zöldhálózat kialakítását és a zöldfelületek arányának növelését tűzte ki célul (2 m²/lakosról 8,3 m²/lakosra). Sajnos ezek a célok sem valósultak meg.

A zöldfelületeket leginkább az elégtelen hatósági szabályozás, a rap-

szodikus tervezéspolitikák és az engedély nélküli fejlesztések fenyegetik. Az árvízveszélyes és a közösségi tulajdonban lévő szabad területek megmaradása elsősorban annak köszönhető, hogy ezek valójában kevésbé alkalmasak fejlesztésre. Sajnos még így folyamatosan csökkennek ezek a szabad területek.

A beépített területek folyamatos növekedése ellenére is fennmaradtak értékes zöldfelületek, amelyek fontos részei lehetnének a nagyváros zöldhálózatának. A Parana folyó deltavidéke Buenos Airstól észak-nyugatra, valamint a Rio de la Plata partja potenciális súlyponti területek lehetnek a jövőben, azonban a tervszerűtlen beépítés, az infrastruktúrafejlesztés komoly veszélyeztető tényezőt jelentenek. ●

REGENERATION OF CULTURAL LANDSCAPE

INHERITANCE AND DEVELOPMENT OF TRADITIONAL
ECO-WISDOM OF POLDER LANDSCAPE IN YANGTZE
RIVER REGION, CHINA

KULTÚRTÁJ-MEGÚJÍTÁS A JANGCE FOLYÓ MENTI POLDERTÁJ FEJLESZTÉSE AZ ÖKOTUDATOS TÁJGONDOZÁS HAGYOMÁNYAINAK MEGÚJÍTÁSÁVAL

SZERZŐ/BY:
DAI DAIXIN

ABSTRACT

As an important form of land utilization and agricultural production along Yangtze River in Anhui Province, the polder constitutes the typical cultural landscape in the course of interactions between local residents and the great nature. The geographical conditions composed by the polders, the dams and the water network, the people and other living things in such an environment form the social ecological system (SES) together, which has not only constituted the local landscape with great regional characteristics, but played significant social and economic roles in history. Nowadays, the transform of land use results in confliction between the traditional eco-wisdom of polder landscape and the construction of new town in this area.

To make reconnection, the paper summarizes the mechanism of the traditional polder landscape, which consists of three subsystems of stormwater management, land use and community. Based on that, regenerative strategies of planning and design are proposed in the case of Hangbu New Town in Shucheng County of Anhui Province. The conclusion can be drawn that the eco-wisdom of polder landscape still shows its strong vitality in proper planning strategies, and landscape regeneration should integrate economic, environmental and social efficiency together for the development of new towns.

Key words: landscape architecture; landscape regeneration; ecological wisdom; polder landscape; stormwater control; ecological security pattern

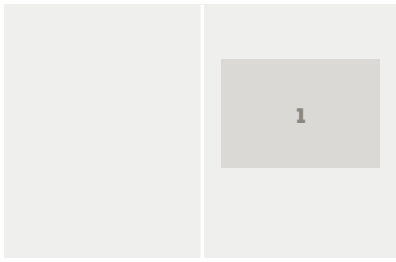
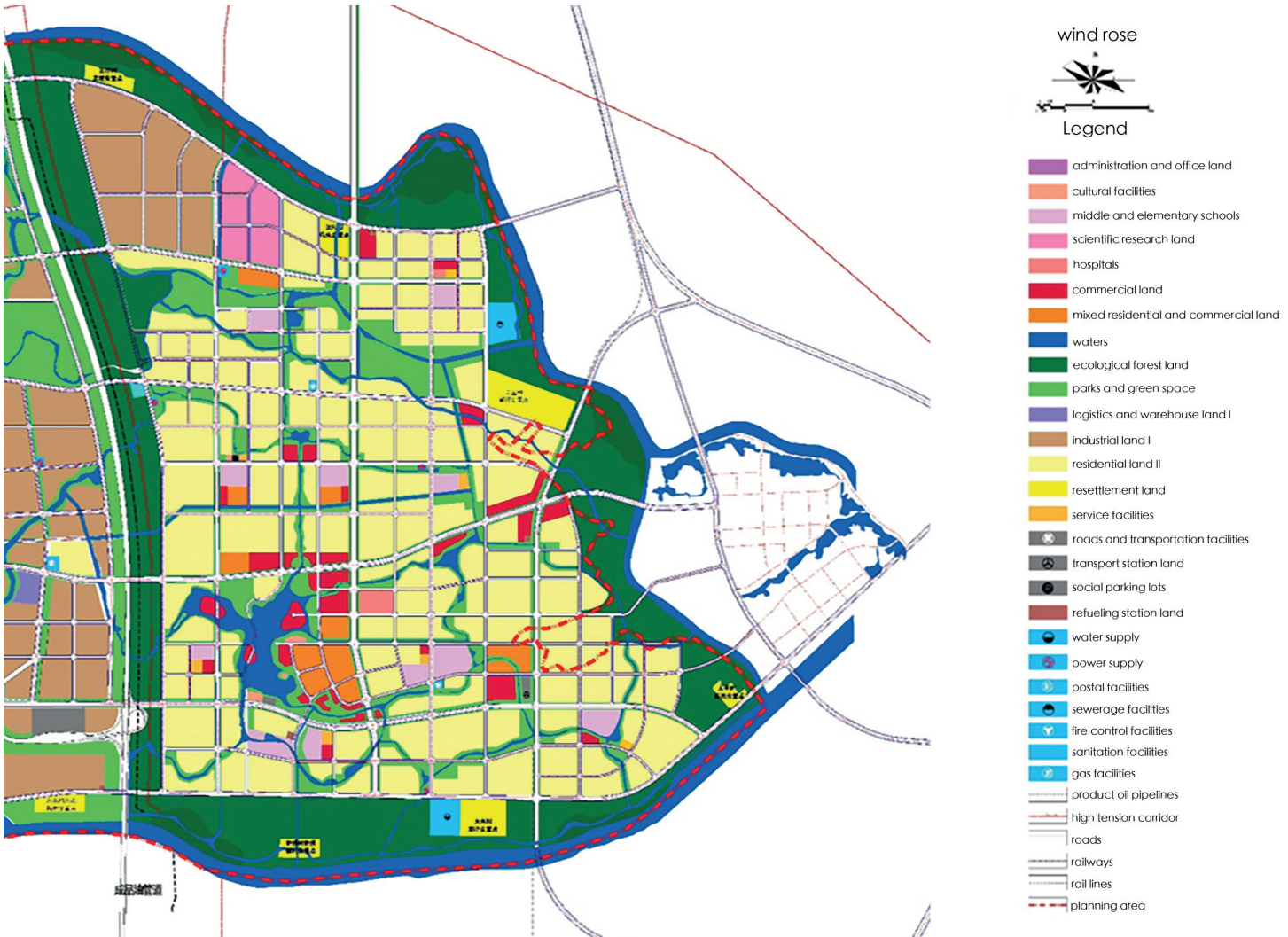


Fig. 1: Land use plan of Hangbu New Town



1. INTRODUCTION

Polder is an important agricultural landscape by transforming the capricious swamp into stable and fertile land, and imposed influences on regional production, hydrology infrastructure and town planning.¹ It is the wise response of ancient Chinese to the lowland environment in Yangtze River Watershed. It is a low-lying tract of farmland enclosed by dikes that form an artificial hydrological entity, meaning it has no connection with outside water other than through manually operated devices.² In the view of nowadays theory, it is a typical total human ecosystem, which integrates human systems and natural system together at the highest level.³ The system acts like an organism, all

the elements of the system work properly and symbiose harmonically.

As a representative vernacular landscape type especially in Dutch lowlands and Yangtze River Delta in China, polder has been studied from different perspectives through synchronic and diachronic research. Based on historical context research and diachronic comparison, Chinese scholars study the formation and historic evolvement of polder landscape, different parts of its structural components, functions on agricultural production, ecology and culture, and the impacts on regional land use patterns as well as the characteristics of settlement distribution.^{1,4-6}

Synchronic research focuses on the pattern of landscape space, the natural context and the mechanism of hydrology,

1 Guo W, Hou X L. *Dredge, Drain and Reclaim: Landscape Analysis of Polder Model in Dutch Lowlands* [J]. *Landscape Architecture*, 2015①:16-22.

2 ZHUANG Huafeng. *Cult ivation of Diked Paddy - Fields in Ancient South - East China and Their Effects on Ecological Environment* [J]. *Journal of Chinese Historical Geography*, 2005②:87-94.

3 NAVEH Z. *The total human ecosystem: integrating ecology and economics* [J]. *BioScience*, 2000(4): 357-361.

4 Hou X L, Guo W. *Polder Landscape Study Discussion on Form, Function and Impact* [J]. *Landscape Architecture*, 2015.

5 Guo W, Hou X L. *Dyke, Reclamation and Settlement: Landscape Architectural Analysis of Polder Landscape in Xiaoshao Region* [J]. *Chinese Landscape Architecture*, 2016(7):41-48.

6 Guo W, Hou X L. *Land from the Sea: Landscape Architectural Analysis of Lake Bed Polders in North Holland during Golden Age* [J]. *Chinese Landscape Architecture*, 2015, 31(7):97-101.

and the assessment as an important part. Considering the differences among contexts, Chinese scholars concentrate on regional ecosystem service⁷ such as Taihu Basin⁸ while foreign scholars' place more importance on polder management of Dutch lowlands such as risk resilience⁹⁻¹² and spatial quality provision.¹³ Recently from a more comprehensive perspective of landscape architecture, scholars pay more attention on the cultural and aesthetic value in the preservation of polder beside ecological functions.¹⁴ Typological methods are used in the analysis of structural characteristics and spatial design disciplines, which are critical to polder transformation,¹⁵ but the role that polder landscape plays in new town planning and its land use is still lack of attention.

With the continued process of urbanization in China, there will soon be more and more new towns constructed on the polders in Yangtze River Watershed. Essentially speaking, same as the ancestors making polders, the purpose of the construction activity is also to improve the environment on the land that is not suitable for living, and to pursue happiness. Traditional ecological wisdom is a summary of agricultural social experience, and the construction of a new town will bring a change in the way of land-use. Nowadays, the transformation of land-use from polder to new town results in neglecting of the traditional eco-wisdom, normally the polders are transformed in the way as if they have never existed during the land formation. Therefore, the construction of new town is facing many challenges:

- a) Aggravation of flood risk. As the polder is abandoned, a large amount of farmland will be replaced by construction land, which in turn, will cause the infiltration of the land surface reduce sharply. As a result, the risk of flood is aggravated.
- b) Decrease of biodiversity. The destruction of the natural environment caused by construction activities

is inevitable. When we remove the polders, the original ecosystem is also destroyed. It will result in the reduction of regional biodiversity.

c) Impact on settlement mode. Compared with the past, the rapid increase in the number of people living in residential areas will make the traditional low-density mode of human settlement no longer applicable.

All of the above show that the large-scale construction activities in polder areas fall into the dilemma of losing the guidance of traditional ecological wisdom. Can we inherit and develop the traditional polder eco-wisdom to make a sustainable new town? Before answering this question, the following issues should be taken into account:

- a) How to deal with the problems brought about by new town planning as well as formulate ecological and sustainable planning?
- b) Is the traditional ecological wisdom still applicable for guiding the construction of a new town?
- c) If it is still applicable, how to make it adapt to the new context of urban construction?

This paper tries to answer the above questions based on a case of planning. The site locates in Shucheng County of Anhui Province, which is in eastern China. Polder landscape is the typical feature of this area. The developer and local government invited the research team, to give advices and provide consultation service to the construction of here mentioned Hangbu New Town.

2. TRADITIONAL ECO-WISDOM OF POLDER LANDSCAPE IN YANGTZE RIVER REGION

The Yangtze River Watershed had been exploited long ago, it can be traced back to AD 140 according to documentary records. Polder landscape, as the typical feature of this area, also

7 Wang J Q, Tang C H, Yan W T. *Mechanism and Pattern of Polders in the Yangtze River Delta: Effective Physical Form for Ecosystem Services Provision*[[]. *Landscape Architecture*, 2018(1).

8 Dong C, Gao J. *Assessment for polder water ecosystem service functions in western part of Taihu basin*[[]. *Journal of University of Chinese Academy of Sciences*, 2014.

9 Manen S E V, Brinkhuis M. *Quantitative flood risk assessment for Polders*[[]. *Reliability Engineering & System Safety*, 2005, 90(2):229-237.

10 Guo W, Hou X L. *The Analysis on Flexible Strategies of Flood Control in Netherlands Delta*[[]. *Landscape Architecture*, 2016(1):34-38.

11 Cremers, Jan; Bekker, Sonja; Dekker, Ronald. / *The Dutch polder model: Resilience in times of crisis. Talking through the crisis: social dialogue and industrial relations trends in selected EU countries.* editor / Igor Guardiancich; Oscar Molina. Geneva: ILO, 2017. pp. 189-212.

12 Barendregt A, Wassen M J, Smid J T D. *Hydroecological modelling in a polder landscape: a tool for wetland management*[[M]// *Landscape Ecology of a Stressed Environment.* Springer Netherlands, 1993:79-99.

13 Nillesen A L, Kok M. *An integrated approach to flood risk management and spatial quality for a Netherlands' river polder area*[[]. *Mitigation & Adaptation Strategies for Global Change*, 2015, 20(9):949-966.

14 Liu T, Dan-Zi W U. *Study on the Vernacular Landscape in the Perspective of Landscape Architecture—Taking the River Network Plain in Taihu Basin as An Example*[[]. *Chinese Landscape Architecture*, 2014.

15 Nijhuis S F, Han B. *Polderscapes: The Landscape Architecture of the Dutch Lowlands*[[]. *Landscape Architecture*, 2016.

has a long history in this area. It can be found as the pattern on ancient tablets or as official records in local historical County Annals. As a historical living environment of local residents, it is also a typical cultural landscape that reflects the traditional eco-wisdom of Chinese. In this paper, the traditional eco-wisdom of polders is expounded in three aspects: flexible stormwater management, efficient land-use, and polder-based community.

2.1 FLEXIBLE STORMWATER MANAGEMENT

The uneven distribution of rainfall in various seasons and areas is the biggest problem for agriculture in Yangtze River Region. Usually, there is drought in the spring and flood in the summer. As a result, water resources should be rationally allocated to avoid disasters and increase harvest. Polder is just the proper system to manage water resource—it consists of dikes, ditches and water conservancy facilities. Dike is a key component to protect farmland. The peripheral dike is the first line of defense, increasing its height and thickness can help link up the whole polder area; for the inner area, dikes of different heights will be built according to the elevation of site, so as to divide the polder into many retaining sectors. In this way, the stormwater will only flow over one or a few sectors instead of the whole farmland being flooded. The ditches around or in the polders are also very important. Their function is to drain water, sometimes even to store or retain the water. Transportation is available in some wide ditches or channels. Facilities such as watergates and waterwheels are controllers of the whole system. This hierarchical structure (Dike + Ditch + Facility) will effectively improve the flood control capacity and further strengthen the resistance to natural disasters.

2.2 EFFICIENT LAND-USE

In addition to the use of lower land as farmland, the ancient Chinese also knew how to use every patch of land in polders. Planting on dikes is a key technology for the land-use of polder. It is of great value for bank reinforcing, production, ecology, and aesthetics. Tree roots deep in the bank have a strong soil-fixing effect to resist the erosion of rainwater. Sometimes, people plant trees along the banks to make the soil compacted, and then build and connect the dikes after years. Fruit trees or mulberries are a good choice since they have economic value at the same time. Some other common economic plants are *Arundo donax*, *Zizania latifolia*. These trees and shrubs along or on dikes connected as a green network, it combines with the farmlands, creating the traditional wood-farm ecological communities. Finally, the polder landscape is also a place of scenic beauty to Chinese, many well-known poets wrote lots of beautiful poems in the history.

2.3 POLDER-BASED COMMUNITY

People built their houses on the dikes, created unique settlement patterns. For instance, Wei Guo researched on the settlement forms in Xiaoshao polders, summarized three patterns.¹⁶ Residents in polder areas also developed their unique customs and culture through thousands of years. In the polder area of Furong, residents worship Chen Chou, a local polder coordinator in the Ming dynasty, who had outstanding political achievements on stormwater control. After his death, a memorial temple was built for residents to worship him, and folk tales regarding to his achievements had been handed down since then. Nowadays, residents around Chaohu of Anhui Province, remain the custom of building tombs on dikes to

16 GUO Wei, HOU Xiaolei. *Dyke, Reclamation and Settlement: Landscape Architectural Analysis of Polder Landscape in Xiaoshao Region*[J]. *Chinese Landscape Architecture*, 2016(7):41-48.

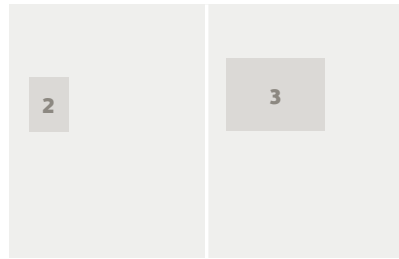


Fig. 2: Master plan of Hangbu New Town

Fig. 3: Hierarchical sponge city system in Hangbu New Town

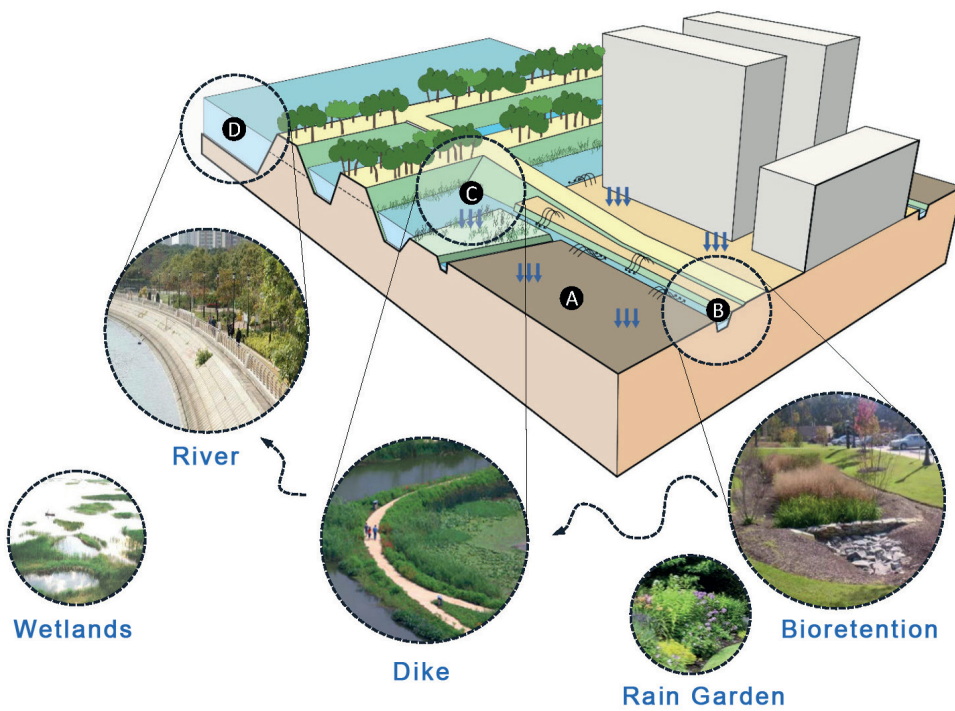
avoid flooding. In addition, it also reflects that polder system is closely associated to local residents from life to death. From the view of governance, residents of the district will allocate the amount of labor on the embankment maintenance based on the distance between the residence and the embankment or the number of privately owned farms. During the Song dynasty, there was a polder chief system, which took the responsibility for the supervision and implementation of maintenance.

In summary, it shows that the coupling development of the three subsystems, economy, society and environment, is the driving force for the virtuous circle of the entire polder landscape system. Polder dikes can effectively prevent storm-water from taking away the nutrients in the soil, as a result, it contributes to good agricultural production. At the same time, polder, as wetland, has the most distinct land-water edge effect and is rich in biodiversity. The banks provide growing space for various trees, those economic tree species not only provide residents with additional income, but also reinforce the dikes so that keeping them from storm-water erosion. Polder landscape protects the safety of local residents; in return,

local residents are the maintainers of polder landscape system. People spontaneously formed temporary groups to work together to repair dikes and defend against floods and droughts at the critical juncture. As for environment benefits, the efficient flow of materials and energy in the system ensures the functions of ecosystem.

3. POLDER LANDSCAPE REGENERATION IN NEW TOWN PLANNING

The case in this paper is Hangbu New Town in Shucheng County of Anhui Province. It is a polder area surrounded by Fenge River, Hangbu River and wetlands. Between the two rivers, most riverways of Fenge River are natural; while riverways of Hangbu River are more artificial with lots of ponds, the lower courses of both rivers run into Chaohu Lake, an important big lake in the eastern part of China. Due to social development, part of the function of polder system has disappeared, for example transportation function of the main channels. Further more, due to the impact of fast urbanization, most of the local residents moved to cities, especially the young people who themselves



work in cities, leaving their parents and children living in the hometown. As a consequence, the polder settlements are declining. The unpleasant discharge of domestic garbage and sewage, as well as the siltation of the ditches, caused the status of the current water bodies to be extremely poor.

Local government and developers aimed to change the current situation. The comprehensive planning for the new town illustrated the ambition of the developers. As seen in the land use plan (Fig. 1), there is a road grid in the new town that has no relation with the network of dikes, but green spaces are carefully planned based on it. My research team proposed a sketch of new plan for the new town, which considered coordinating the road network with the original polder landscape (Fig. 2). Unfortunately, it was not accepted since the higher government has already authorized the comprehensive planning. However, our ideas to keep the polder system changed the developers' mind, they invited us to make a new scheme to utilize the polder system based on the comprehensive planning of the new town. In our proposal, we developed a series of strategies to merge the polder system

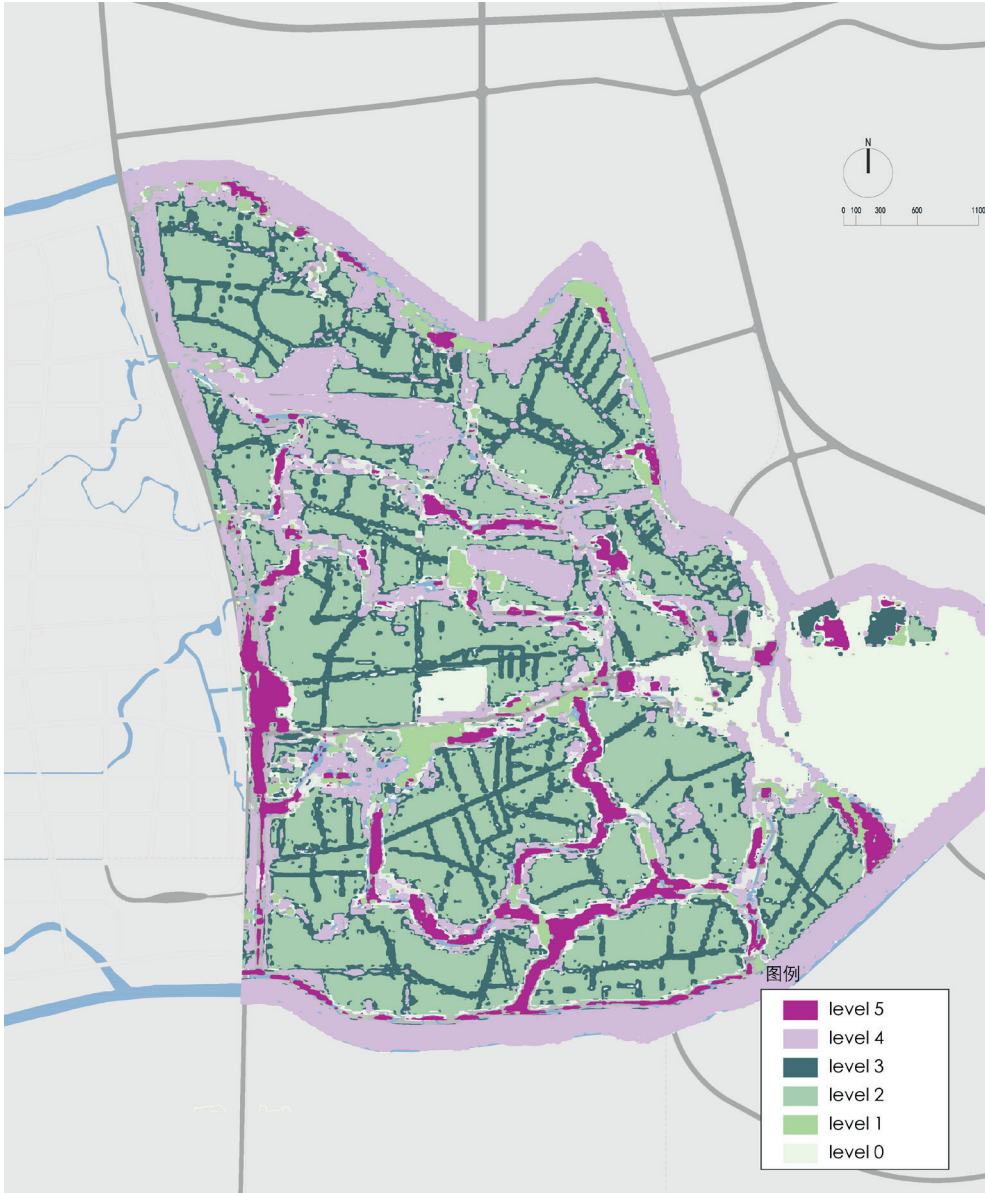
into the road grid, and to regenerate the polder landscape in new town. The paper introduces briefly as follows:

3.1 LOW IMPACT DEVELOPMENT

Since the polder landscape has always been used to prevent and control flood and waterlogging disasters in the history, it can also be used the same way nowadays in the new town. According to the low impact development (LID) concept in stormwater management, we set up LID solutions by reusing and restoring the polder system.

1) Using polder dikes as flood preventing system

Existing peripheral dikes are all kept and reinforced to prevent the flood from Fengele River and Hangbu River. We raised the flood control standards of the dikes from one in 30 years to one in 50 years, since the situation is much worse than before. For the inner dikes, firstly they should be adjusted and adapted to the planned road network. The elevation of the top of the inner dikes is 3.5 to 4.0 meters higher than most of the elevation of those roads. We checked all the crossings of the inner dikes and planned



roads, calculated the slopes of the road while adjusting them to meet the dikes at the crossing, so that almost all the inner dikes can be retained. Secondly, new dikes are added to connect with the old ones, thus 16 flood retaining sectors are set up. By reusing the existing polder dikes, a safer flood preventing system will be set up for the new town.

2) Dredging ditches as retaining & drainage system

Modern cities use underground pipelines as drainage system. It is suggested

to apply multi-methods in stormwater management according to LID, especially rain gardens and bioretention in green lands. In the proposal, we restored the channels and ditches not only to drain away the rainwater to rivers, but also to retain the runoff in the rain-storm. The main concern of keeping all the ditches is land use efficiency. Since the ditches locate in the green land, our proposal is easy to be accepted by the developers. Aesthetics is another aspect that we considered, it can be resolved by design skill, as we will explain later.

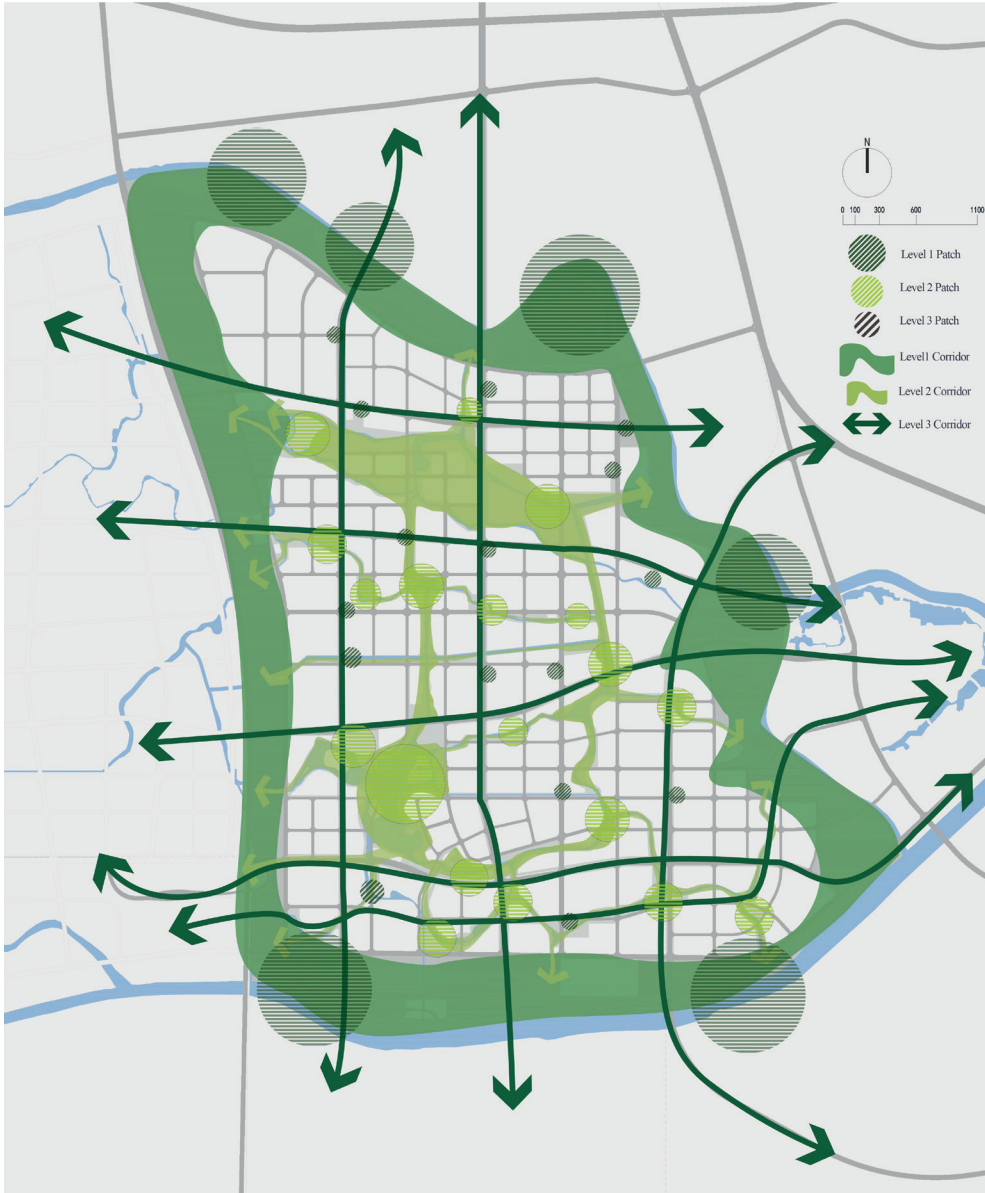


Fig. 4: Ecological Importance Assessment

Fig. 5: Greenway network of Hangbu New Town

3) Hierarchical sponges city system

Sponges city is a similar concept with LID, which is initiated in China. Based on the flood preventing and drainage system that consists of the dikes and ditches retained, combined with multi-level ecological retention system to achieve drainage, self-discharge, and natural infiltration, the proposal suggests to establish a hierarchical sponges city system.

The first level is the whole new town. Besides enclosed by peripheral dikes, the new town is also divided

into three districts by the main dikes and ditches inside. Drainage and irrigation station is planned in each of the three districts. The extra water will be carried to the drainage and irrigation station and finally pumped into Fengle River and Hangbu River. Several large wetlands are also planned along the peripheral dikes, which originally are the lower lands or ponds of Kutang.

The second level is the 16 flood retaining sectors or units in the three districts. Each sector is surrounded by existing dikes and ditches just

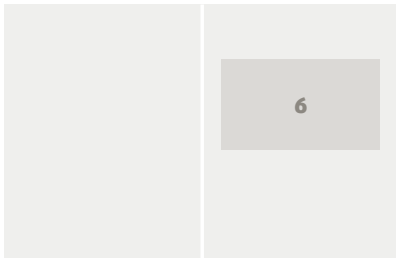


Fig. 6: Plan of green space in Hangbu New Town (flood adaptability is fully considered)

like the whole town. This nested structure forms an ecological security pattern, which is the typical character of the polder landscape.

The third level is the neighborhood. Pervious surface and rainwater collection are suggested in the construction. Rain garden and ecological retention ditches are planned in the neighborhood. Stormwater and living grey water in the dwelling unit (A) is discharged into the ecological detention zone (C) formed by the ponds of Kutang and Putian through the third-level ecological ditches (B) inside the neighborhood, where the water can be fully infiltrated; and at the same time, the accumulated surplus is either eliminated through the drainage pumping station, or eliminated through self-draining, or through the inflow of natural wetlands to the river (D) around the new town (Fig. 3).

3.2 ENHANCEMENT OF ECOLOGICAL BENEFITS

As illustrated in the map of ecological importance assessment (Fig. 4), the edge of each flood-retaining unit of the polder has the highest ecological importance. There are dikes with trees planted, ditches and ponds along the dikes forming the wetlands in polders. Thus, protecting the dikes and ditches will not only create the LID system in the new town, but also enhance the ecological benefits for the new town.

1) Protection of biotopes

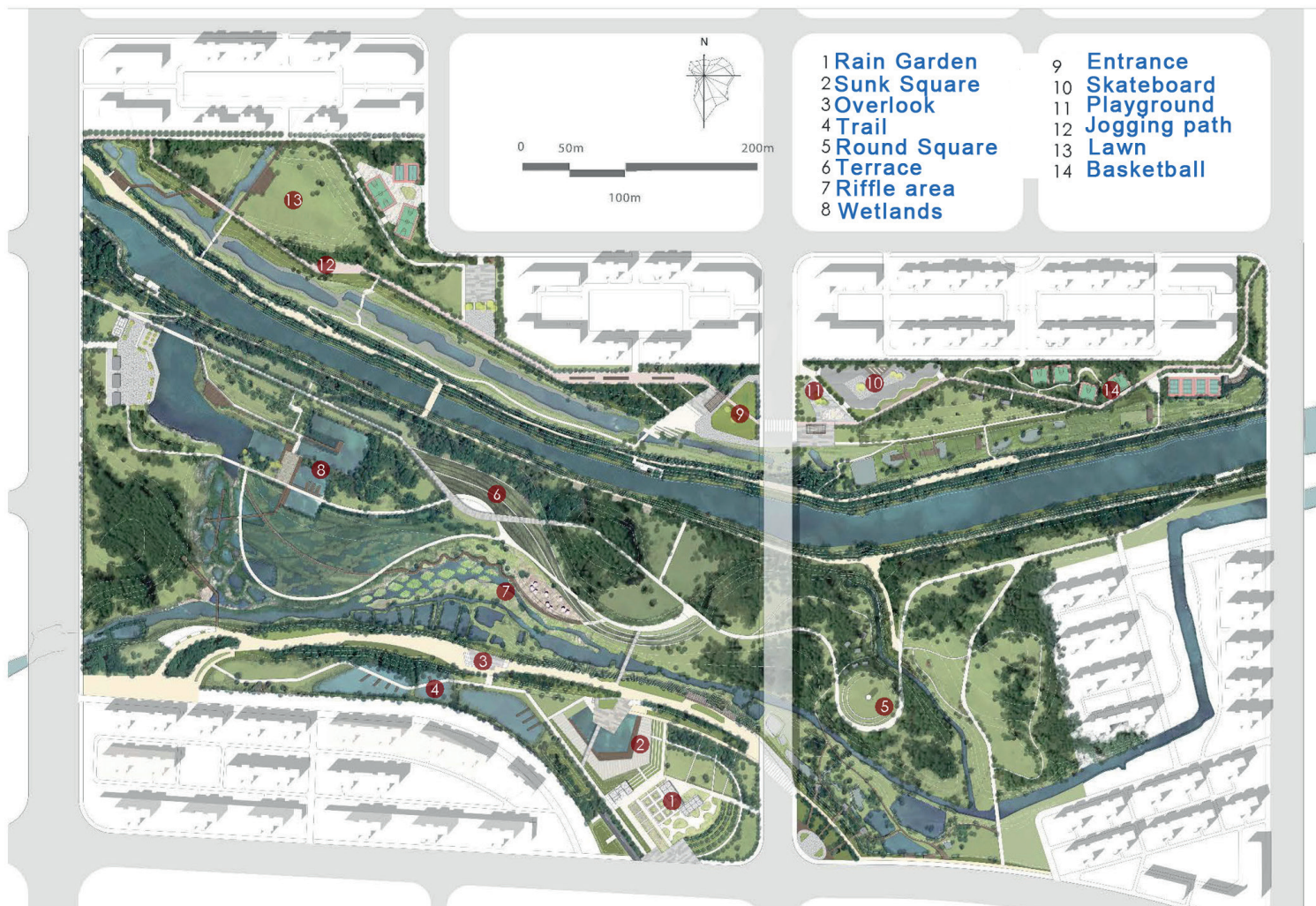
It is beneficial to protect the biodiversity of the new town by preserving the habitat and plant community on the dike and providing supporting ecosystem services. In our proposal, the retained dikes bring the new town 55 hectares of green space. Status quo of these greenbelts covered by growing well woods consisting of *pterocarya stenoptera*, *broussonetia papyrifera*, they are the natural habitat of many wild birds and small animals. In addition, the concept of small animals' passageway is also proposed in the planning, to reduce the interference of urban roads to the original animal activities.

2) Wetlands system

By protecting the existing dikes and the ponds of Kutang, planning new wetlands at the lower places, we established a wetlands system in the new town. Several large artificial wetlands are planned along the peripheral dikes, they synthesize the function of saving, retaining and purifying the stormwater, as well as the country parks for the residents.

3) Greenway network

Similar to the hierarchical sponges city system, we proposed a greenway network in the new town planning (Fig. 5). The first level, a green belt of 300-800 meters wide is planned along the peripheral dikes, including the large artificial wetlands embedded in. The



second level is to connect the dikes and ditches retained by new planned green spaces, the flood adaptability of which is fully considered in planning and design (Fig. 6). The third level is the green land in the neighborhoods, urban parks, as well as road green spaces grid.

3.3 OPEN RESIDENTIAL COMMUNITY

The residential pattern of the new town is based on the spatial structure of polder landscape. Inside is residents' living and working space, outside is the recreation spaces, such kind of "cell-like" morphology is an innovation of residential community. It has several advantages:

a) Comparing to the traditional inward neighborhood, the new pattern puts the necessary service facilities of living in the neighborhood, while the amenities and recreational spaces around (Fig. 7). It is more open and promotes sociability.

b) These linear green spaces are also urban parks. Higher accessibility and reasonable distribution provides the residents with more convenience.

c) It also makes full use of the existing landscape resources. It integrates blue and green with dikes and ditches surrounding neighborhood, providing residents with an open space network close to nature and helping them relax their mind and body.

d) Taking "cell-like" groups as units can carry out more accurate flood control and risk avoidance planning.



Fig. 7: Bird view of residential pattern in Hangbu New Town



For example, special emergency evacuation zones are designated on the dikes of each group, and materials for emergency are prepared in advance.

4. CONCLUSION

John Lyle once used “floated seeds” as a metaphor for development and utilization of the land. Only based on the deep understanding of ecosystem, the development can be deeply rooted, acts as “living organism”, adapts to the changes of the land, performs its own regeneration.¹⁷ Currently, new town construction focuses only on economic growth, but ignores the objective rules of interaction among economic, environmental, and social aspects. It caused damage to

ecological security pattern, intensified the tension between man and the nature. This paper argues that the effective ways to solve this dilemma is to realize the landscape regeneration, strengthen the function of ecological system such as adaptation, resilience, restoration and growth. The premise is the understanding of the continuous driver and mechanism of regeneration.

The research is supported by “the Fundamental Research Funds for the Central Universities” No. 22120170022.

¹⁷ LYLE J. *Design for human ecosystems: landscape, land use, and natural resources [M].* Island press, 1999.

ÖSSZEFOGLALÓ

KULTÚRTÁJ-MEGÚJÍTÁS

- A JANGCE FOLYÓ MENTI POLDERTÁJ FEJLESZTÉSE AZ ÖKOTUDATOS TÁJGONDOZÁS HAGYOMÁNYAINAK MEGÚJÍTÁSÁVAL

A Jangce folyó mentén található Anhui tartományban a helyi lakosság a mezőgazdasági termelése során speciális, a helyre jellemző, ún. polderterületet alakított ki. A polderek (feltöltött területek), a folyó és a gátak az itt élő emberekkel és állatokkal együtt különleges társadalmi - ökológiai rendszert alkotnak. A polderterület nem csak ökológiai, hanem történelmi szempontból is különleges rendszer is, amely napjainkban a terület beépítése miatt új kihívások előtt áll. A cikk áttekintést ad a polderterület hagyományos tájhasználatáról, a vízgazdálkodás, a mezőgazdaság és a társadalom szerves egységéről. A világ számos országában vannak ehhez hasonló polderterületek (a legismertebbek Hollandiában), azonban a használat és a fenntartás mindenütt speciális; ez a kutatás kifejezetten a Jangce folyó mentén kialakult tájjal, a hagyományos feltöltött területekkel foglalkozik.

A Jangce menti területek esetében az első és legfontosabb szempont a területek fennmaradása szempontjából az **árvizek kezelése**: az év során egyenetlenül hulló csapadék miatt a tavaszi időszakot a szárazság, a nyarat pedig az áradások jellemzik. A vízgazdálkodás legfontosabb feladata a katasztrófák megelőzése a gyorsan lehulló nagy mennyiségű csapadék esetében és az öntözővíz biztosítása a száraz időszakokban. Az árvíz elleni védekezés legfontosabb eszközei a gátak, az árkok és a víztározók, melyek védik a mezőgazdasági területeket. A külső védőgátak biztosítják a terület általános védelmét, míg a belső, alacsonyabb gátak és árkok védik a mezőgazdasági területeket. A gátak elsődleges feladata a védelem, az árkok a védelem mellett a víz elszívogatását is végzik. A hierarchikus védelmi rendszer (gátak, árkok, tározók) tehát egyaránt szolgálja a védelmet és a csapadékvizek megtartását.

A polderek fenntartásában **megfelelő tájhasználat** kiemelkedő sze-

repet játszik. Kínában már egészen a korai időktől kezdve tudatosan törekedtek a polderek átfogó és teljes körű hasznosítására. A gátakra előszere-ttel telepítettek növényeket, hogy a gyökérzet javítsa a gátak állékonyságát, csökkentse az erózióveszélyt. Sok esetben először fákat ültettek a folyómederbe a talaj megfogására, és csak évekkel később alakították ki a gátat. Az eperfák, a különböző gyümölcsfák vagy a vadrizs különösen kedveltek voltak, mert a talaj stabilizálásán túl a termés révén jelentős gazdasági hasznot is hoztak. Hasonlóképp a gátakon és a gátak mentén ültetett fák és cserjék, a farmokhoz kapcsolódva, értékes zöldhálózatot hoztak létre, amit a helyi társadalom nagy becsben tartott. A polderterület alkotta tájkép szépségét számos vers örökítette meg.

A polderek lakói az évszázadok alatt szoros egymásrautaltságban éltek egymással, hiszen együtt kellett működniük a gát- és csatornarendszer fenntartásában. Így erős, együttműködő társadalmi struktúra jött létre, ami egyes területeken (pl. Furong) mind a mai napig megfigyelhető. Az itt lakó, gazdálkodó emberek ma is együtt élnek a természeti rendszerekkel: a polderek megvédik az itt élőket, míg az itt élők fenntartják a gátakat, csatornákat.

Hogyan lehet a polderek helyreállítását ötvözni új városok építésével?

A cikkben az Anhui tartományban található Hangbu város példáját dolgozta fel a szerző. A poldert, ahová az új város épül, a Fenge folyó, a Hangbu folyó és nedves élőhelyek határolják. A két érintett folyó a Csao-tóba folyik, mely Kína keleti részének egyik legjelentősebb tava. A hagyományos polderterület az elmúlt évtizedekben részben elveszítette funkcióját, a csatornák közlekedési használata eltűnt, a felgyorsult urbanizáció hatására a falvakból a városokba költöztek az emberek, s így a falvak elnéptelenedtek. A csatornák hulladékkal való feltöltése miatt a vízvisszatartó funkció megszűnt. A város tervezése során a korábbi polderterület felélesztésére tettek kísérletet. Sajnos a döntéshozók nem támogatták az elképzelést, de ennek ellenére a terv

megváltoztatta a hozzáállást, s új stratégiák készültek a polderrendszer és város szerkezetének összehangolására.

Kis beavatkozású fejlesztés (LID)

A fejlesztés során arra törekedtek, hogy az árvízi védekezés során felhasználják és helyreállítsák a polderek rendszerét. A tervezés során a következőkre törekedtek:

- a gátakat, magasítás után, felhasználják az ármentesítésre, és az új gátakat is a régi rendszerbe integrálják,
- új csatornákat ásnak ki a víz elszívogatására, melyek a folyók áradása mellett az esővizek megtartására is alkalmasak,
- ún. szivacsvárost (sponge city-t) alakítanak ki, ahol a csapadékvíz be tud szivárogni a talajba.

Ökológiai előnyök

Az áradások visszatartásának komoly ökológiai előnyei vannak. A gátakra fákat ültetnek, a gátak közötti poldereken ökológiailag értékes nedves élőhelyek alakulnak ki, melyek az új város számára ökológiai hasznot jelentenek. A gátakkal védett területek 55 ha zöldfelületet jelentenek a város számára, ahol az őshonos növényzet mellett az állatvilág is meg tud telepedni.

A gátrendszer és a Kutang-tó megőrzése, valamint új nedves élőhelyek kialakítása a meglévő nedves élőhelyek megőrzését is elősegíti. A nedves élőhelyek révén javul az esővízmegtartó kapacitás és a víztisztaság is.

A vízvisszatartó hálózattal párhuzamosan egy **zöldhálózat** kialakítását is tervezik a városban, mely a város teljes területét behálózza és összeköti a környező polderekkel.

Lakónépesség

A polderterületre hasonlóan a város tervezése során a társadalmi kérdésekkel is foglalkoztak, s az új város szerkezete a polderek szerkezetéhez alkalmazkodik. A város belső része a lakó és dolgozó funkciókhoz alkalmazkodik, a külső területek pedig a rekreációs funkciókat szolgálják ki. Ez a szerkezet elősegíti a szomszédos viszonyok kialakulását.

TÁJJELLEGVÁLTOZÁS KÉPI
ÉRZÉKELÉSÉNEK ÉRTELMEZÉSE
KÉRDŐÍVES VIZSGÁLATTAL
2D GOOGLE EARTH-FELVÉTELEK
ALKALMAZÁSÁVAL

*INTERPRETATION OF THE VISUAL
PERCEPTION OF LANDSCAPE
CHANGE BY A QUESTIONNAIRE
SURVEY USING 2D
GOOGLE EARTH IMAGES*

SZERZŐ/BY: TIRÁSZI ÁGNES,
KONKOLY-GYURÓ ÉVA





BEVEZETÉS

A területhasználat és a felszínborítás változása jelentős részben a gazdasági folyamatokat befolyásoló európai politikák következménye. E változások fenntarthatóságra gyakorolt hatásainak értékelésére szolgáló módszert dolgozott ki az EU 6. Kutatási keretprogramja által finanszírozott SENSOR projekt.^{1,2} A kifejlesztett digitális modell a „SIAT” (Sustainability Impact Assessment Tool)³ egy döntéstámogató eszköz, amely különböző jövőbeni területhasználat-változási scenáriók következményeit mutatja be a betáplált indikátorok által, jelölve hogy mennyire felel meg a fenntarthatóság kritériumainak. A projektben a fenntarthatósági hatásvizsgálatban alkalmazható, területhasználat változására érzékeny tájindikátorokat a Soproni Egyetem tájkatató csoportja dolgozta ki. A két indikátor, amelyeket e lap hasábjain ismertettünk,⁴ a felszínborítás állandóságát, illetve változását, valamint a vizuális attraktivitást méri.

A modell számára szükség volt a tájváltozás fenntarthatósági küszöbértékek meghatározására. A felszínborítás-változásnál ehhez a tájkarakter átalakulására gyakorolt hatást vettük alapul.

A tájkarakter érzékelésében döntő szerepet kap a területhasználat, illetve az ennek nyomán létrejövő felszínborítás arányai, mintázata és ezek változása.^{5,6} A tájjellegváltás vizsgálatával foglalkozó kutatásokban azonban a változások mértékének és ezek okainak statisztikai elemzése mellett a látvány elemzésével kapcsolatos tájész-tétikai témakörök gyakorta a figyelmen kívül maradnak. Kritika éri azokat szubjektivitásuk, valamint az általános elfogadott módszerek hiánya

INTRODUCTION

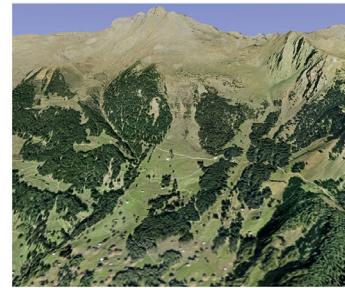
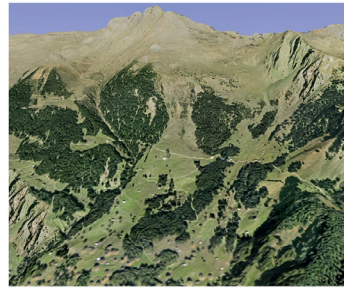
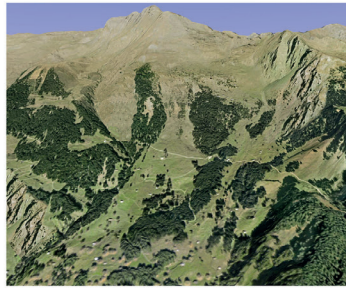
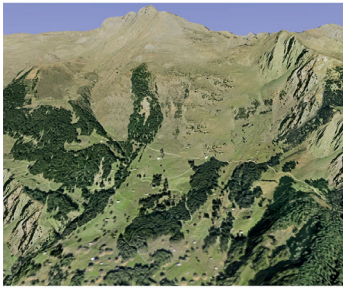
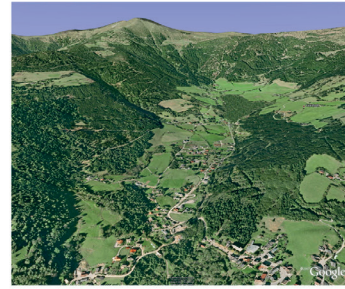
Changes in land use and land cover are predominantly driven by economic processes affected by European policies. A method for assessing the impact of these changes on sustainability was developed in the SENSOR project funded by the 6th EU Research Framework Program.^{1,2} The digital model which was developed, called "SIAT" (Sustainability Impact Assessment Tool),³ is a decision support tool that presents the consequences of various future land use scenarios by indicators, showing their compliance with the sustainability criteria. In the project, the landscape research team of the University of Sopron developed land use sensitive landscape indicators that were used in the SIAT. Two indicators that measure the continuity of land cover and the visual attractiveness were presented in a past edition of this journal.⁴

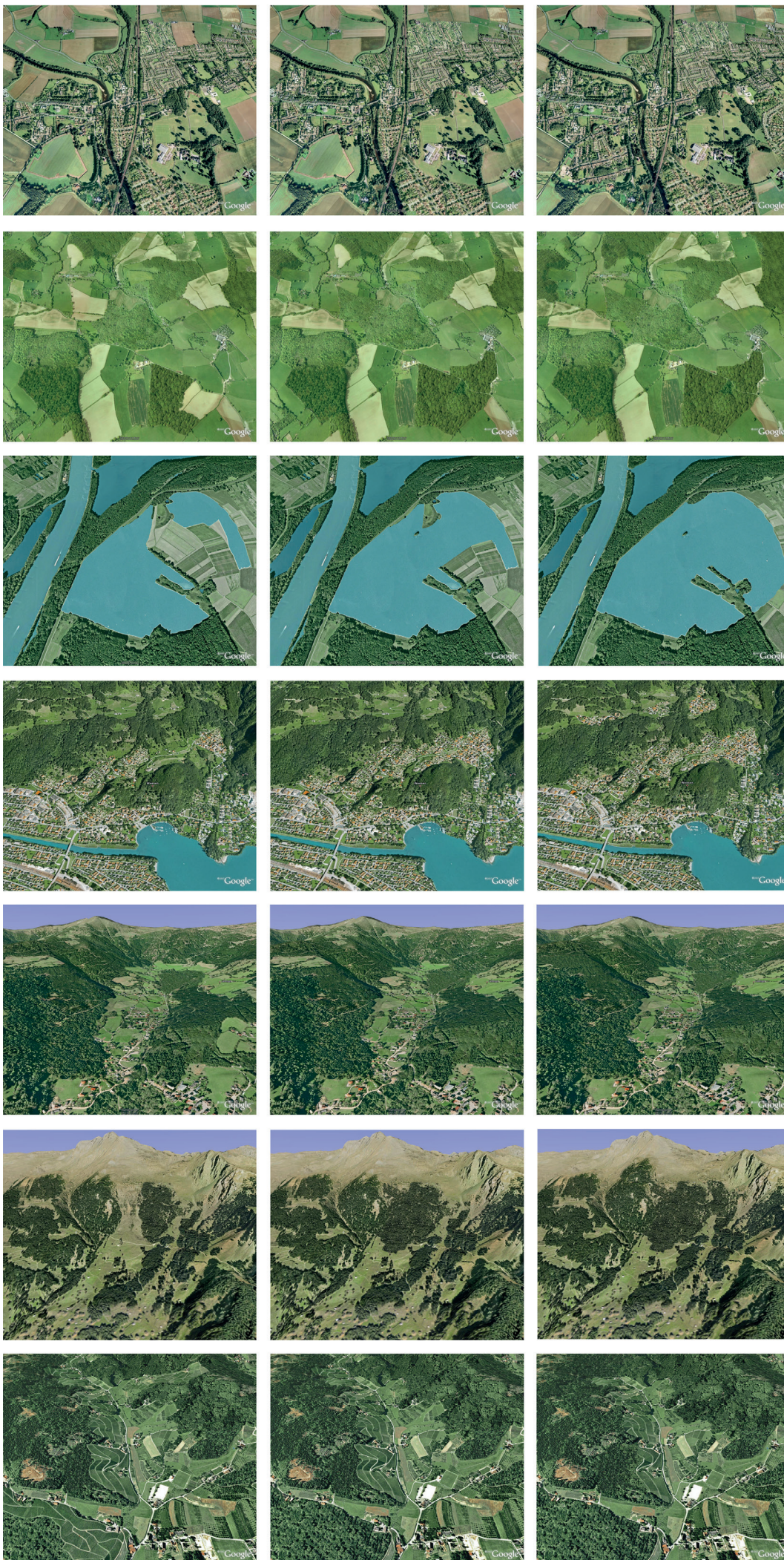
For the digital model we had to define the sustainability thresholds of the landscape cover change. We chose to measure the impact of landscape cover change on the transformation of the character of a landscape. Land cover pattern as results of land use play a key role in the perception the character of landscape.^{5,6} Still the landscape aesthetic/perceptual issues are often ignored in research on landscape transformation based on the statistical analysis of the change and identification of their causes. Perception is criticised due to its subjectivity and the lack of generally accepted methods.

At the same time, the European Landscape Convention focuses on the perception of the landscape. This has led to an increasing demand for visual

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1. ábra/fig.:

A kérdőíves vizsgálatokhoz készült Google Earth felvételek felszínborítás változást bemutató vizualizációi /

Google Earth based visualizations of land cover changes used for questionnaire survey

miatt. Ugyanakkor az Európai Táj Egyezmény lényegi hangsúlyt helyez a táj érzékelésére, a percepcionális vonásokra. Ennek nyomán egyre nagyobb igény jelentkezik a vizuális értékelés eredményeire a tájpolitikában, a tájgazdálkodásban és a tájtervezésben.^{7,8,9,10,11,12} A tájpreferenciákkal foglalkozó kutatásokban főként a tájakat ábrázoló fényképekről alkotott vélemények szociológiai felmérése terjedt el.^{13,14,15} A fotók felhasználása megjelenik a tájindikátorok képzésében is.^{16,17}

A táj és a tájjelleg változásának vizsgálata során népszerűek a 2D-s és 3D-s tájvizualizációk, ami magyarázható azok hangsúlyos szerepével a tájjellemzők megértésében és közlésében.^{18,19} Ma már széles körben használnak különböző típusú tájvizualizációs módszereket a környezet- és tájértékelésnél, amelyek között a választást alapvetően az adatigény, az alkalmazás egyszerűsége, és a várható eredmény minősége határozza meg.²⁰ A felszínborítás változásának bemutatása e technikák segítségével különösen alkalmas arra, hogy érzékelhetővé tegyék a tájképi következményeket.²¹ Gyakran a jövőbeli felszínborítás-átalakulási scénáriókat fotorealisztikus, azaz valóság-hű képet alkotó szoftver segítségével jelenítik meg és ezek alapján becsülik a lehetséges változások táji hatását.^{22,23,24,25}

A két- és háromdimenziós vizualizációs eszközöket legszélesebb körben urbánus környezetben alkalmazták,^{26,27} illetve erdőtelepítések, erdőszerkezet-átalakítások és fásítások megjelenítésére és bemutatására használták.^{28,29,30,31,32,33,34,35,36} Néhány tanulmány foglalkozik a mezőgazdasági tájak átalakulásának vizuális következményeivel is.^{37,38,39,40}

Kérdőíves felmérésben is megfigyelhetjük a vizualizációs technikák alkalmazását a tájak alakulását befolyásoló stratégiák (pl. erdőstratégiák) várható hatásainak értékelése során.^{41,42} A tájpreferencia kutatá-

evaluations in landscape policy, landscape management and landscape planning.^{7,8,9,10,11,12} In landscape preference studies, the sociological survey of stakeholders and opinions of local inhabitants based on landscape photographs is generally used.^{13,14,15} Photos have also recently appeared in landscape indicator development.^{16,17}

For the assessments of landscape character changes 2D and 3D landscape visualisations are widely used, due to their prominent role in understanding and communicating landscape features.^{18,19} Today the choice amongst the different types of landscape visualisation methods applied in environmental and landscape assessments is driven by the data availability, the ease of use, and the quality of the expected results.²⁰ Presentation of land cover change by these visualisation techniques is particularly suitable for showing the visual consequences of changes affecting the landscape.²¹ Future land cover transformation scenarios are often presented with software, providing photorealistic images on landscapes and estimates on the potential landscape changes.^{22,23,24,25}

The two- and three-dimensional visualization tools were used mostly in urban environments^{26,27} and for depicting afforestation and forest structure transformation.^{28,29,30,31,32,33,34,35,36}

Some studies also deal with the visual assessment of changing agricultural landscapes.^{37,38,39,40}

Visualization techniques showing the expected impacts of strategies on landscapes also appear in the surveys based on questionnaires (e.g. forest strategies).^{41,42} In landscape preference studies two and three-dimensional visualizations, photographs are often used to illustrate different landscape features and land cover structures.^{43,44} Among these preference surveys there are often issues on semi-natural landscapes, mountains, deserts, waters, agricultural and forest areas.^{45,46}

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sokban szintén gyakorta alkalmaznak két és háromdimenziós vizualizációkat, fényképeket különböző tájalakotók, felszínborítások szemléltetésére.^{43,44} E preferenciakutatások témái között gyakorta természetközeli tájak, hegyek, sivatagok, vizek, mezőgazdasági és erdőterületek szerepelnek.^{45,46}

Hazánkban a tájak, tájképek esztétikai minősítése az 1990-es évekig nyúlik vissza,^{47,48} a tájpreferenciák vizsgálata fotók, vagy képeslapok felhasználásával végzett kérdőíves felmérések által az ezredforduló után jelent meg.^{49,50,51}

A jelen tanulmányban bemutatott vizsgálat során arra kerestük a választ, hogy a különböző mértékű felszínborítás-változások mely szintjén következik be a tájjelleg változása a megkérdezettek véleménye szerint. Létezik-e, és meghatározható-e a látvány szempontjából leginkább meghatározó felszínborítás-kategóriák (település, erdő, szántó, gyepek, vízfelszín, vegyes kertiségek) esetében olyan változási küszöbérték, amelynél a táj jellege megváltozik? Mennyire esnek egybe a laikusok válaszai a szakértők által megadott küszöbértékekkel?

ANYAG ÉS MÓDSZER

A táj jellege nagyrészt minőségi ismérvek alapján írható le, amelynek nincsenek mennyiségi küszöbértékek, mint más környezeti elemek pl. víz-, levegő-, talajminőségi paraméterek esetében. A táj vizuális hatáselemzéséhez készült útmutató^{52,53} mellett több tájképelemzési módszertan^{54,55,56,57,58} említést tesz a szakértők által elfogadott küszöbértékekről, azonban nem közöl módszertant azok meghatározására. A küszöbértékeket jelen esetben a felszínborítás-változás fotorealisztikus vizualizációja és ennek felhasználásával végzett kérdőíves felmérés alapján határoztuk meg.

A kutatás anyagát a jellegzetes felszínborítás-mintázatot mutató, egymástól jelentősen eltérő tájtípusok

In Hungary, the aesthetic assessment of landscapes goes back to the 1990s.^{47,48} Landscape preference studies based on questionnaires with photographs and old postcards started in the 2000s.^{49,50,51}

In our study, based on enquiries, we aimed at revealing the level of changes that causes transformation in the landscape character. We searched for the answer to the following questions: Is it possible to define a threshold for the changes of the visually most relevant land cover categories (settlement, forest, arable land/grassland, water surface, complex predominantly garden areas) resulting in a different landscape character? How do thresholds of the answers of experts match with those given by lay people?

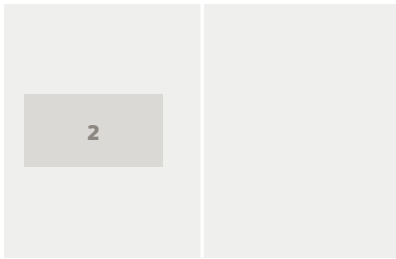
MATERIAL AND METHOD

The landscape character can be essentially described by qualitative criteria which do not have quantitative thresholds like other parameters of environmental elements, e.g. water, air and soil quality. In addition to the guidelines for visual impact assessment,^{52,53} several landscape visual assessment tools^{54,55,56,57,58} mention thresholds adopted by experts without providing an exact method for their definition. The thresholds in our study were defined by a broad questionnaire survey based on photorealistic visualization of land cover change.

Our research material consisted of the different landscape types with typical land cover patterns. Representative sample squares of different landscape types were presented by Google Earth satellite imagery.

By selecting the sample squares, we made a distinction between lowlands and hilly/mountainous areas, because of the significant differences in visibility and land cover patterns. However, the satellite images show the landscapes from above, so the differences in

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2. ábra/fig.:

Felszínborítás változását bemutató fotósorozat: beépített területek növekedése mezőgazdasági területeken, Hurworth, Egyesült Királyság (A fotósorozat), ahol 1 az

5%-os, 2 a 10%-os, 3 a 15%-os, 4, a 20%-os, 5 a 25%-os, 6 a 30%-os terület-használati arányt ábrázolta / Photo series from Google Earth illustrating land cover changes: increase of built-up areas on

agricultural areas, Hurworth, England (Photo series A), where 1 means the built up area of 5% from total, 2 means 10%, 3 means 15%, 4 means 20%, 5 means 25%, 6 means 30%



alkotják. A tájtypusok reprezentatív mintaterületeit Google Earth-űrfelvételekkel mutattuk be, azonos méretű négyzetes kivágatokon.

A mintanégyzetek kiválasztásánál elkülönítettük a sík és a hegyvidéki területeket, mert más a beláthatóság, és jellemzően más a felszínborítás mintázata is. Igaz, az űrfelvételek többnyire felülről mutatják az adott tájrészletet, így a beláthatóság különbségeit eltüntetik, de a változatosság, a tájmozaikot összetevő foltok mérete és komplexitása jellemzően alacsonyabb a síkságon. Ez utóbbinak feltételezésünk szerint hatása van a karakterváltozás érzékelt határértékére.

Az alkalmazott felszínborítás-kategóriák kiválasztását több tényező befolyásolta. Igyekeztünk olyan típusokat választani, melyek változása a valóság-

ban is a legjellemzőbb átalakulási folyamatokhoz köthető, továbbá amelyeknek jelentős tájképi hatásuk is van, így a tájkarakter szempontjából leginkább relevánsak. Emellett meghatároztuk választásunkat, hogy mely adatforrások voltak elérhetőek a SENSOR projektben alkalmazott felszínborítás-változást vizsgáló CLUE modellben.⁵⁹

Vizsgálatunk során űrfelvételeken fotorealisztikus vizualizációval mutattunk be felszínborítás-változásokat, majd kérdőíves felmérés alapján értékeltük a tájkarakter változásra gyakorolt hatásukat.

A felszínborítás-változás vizualizációja

A táj átalakulását a fenti Google Earth-mintanégyzetekben mutattuk be.

⁵⁹ Verburg P.; Soepboer W.; Limpiada R.; Espaldon M.; Sharifa M.; Veldkamp A. 2002: Land use change modelling at the regional scale: the CLUE-S model. *Environmental Management*, Vol. 30. pp. 391-405.

visibility are eliminated, but the diversity, the size and complexity of the landscape mosaics are typically lower on lowlands. We assumed that these features have an impact on the perceived thresholds of landscape character change.

The selection of the land cover categories was influenced by several factors. We sought land cover types representing the most typical landscape change processes, which have also significant visual impacts and are therefore most relevant to landscape character. In addition, we had to adapt to land cover categories available within the CLUE model that was responsible for assessing the land cover change in the SENSOR project.⁵⁹ In our study, we used photorealistic visualization of the land cover transformations and their impact on landscape character changes was evaluated by questionnaire surveys.

Visualisation of land cover change

We presented landscape changes in the above mentioned Google Earth sample square sites. We have shown hypothetical future transformations of existing landscapes. Respondents were unfamiliar with the real sites. With Adobe Photoshop software, we created several series of images, on which we visualized the land cover changes of each selected category. The following transformation types on flatlands, and on mountains were visualised:

I. Land cover changes on lowlands:

- increase of built-up areas in agricultural areas (photo series A),
- increase of forests in agricultural areas (photo series B),
- water surface growth in agricultural area (photo series C).

II. Land cover changes on hilly and mountainous landscapes:

- increase of built-up area in agricultural area (photo series D),
- increase of forest in agricultural area (photo series E),
- changes of the boundaries of the forests in high mountains, afforestation of grasslands and bare land (photo series F),
- growth of forests in complex agricultural areas (photo series G).

We presented land cover changes on satellite image pairs where the first image was stable, showing the present state and its pair displayed the increased ratio of a given land cover type in six steps, from 5 to 30%. In each case, the growth of the selected land cover type was illustrated in sequences of 5% (Figure 2).

The questionnaire survey

The threshold values for land cover changes, which result in a different landscape character in the various landscape types were defined by questionnaire surveys. We analysed the responses of two participating groups: experts and lay people.

Interviewees were asked to choose that photo pair out of the six, which they considered a change of landscape character. The photo pairs were identified with a serial number and the respondents only had to select these in the answer. They did not know either the land cover categories nor the percentage, so the perception-based response was provided without exact knowledge of the background data.

The survey took place between 2007-2008. The respondents were

59 Verburg P.; Soepboer W.; Limpida R.; Espaldon M.; Sharifa M.; Veldkamp A. 2002: *Land use change modelling at the regional scale: the CLUE-S model. Environmental Management, Vol. 30. pp. 391-405.*

Az úrfelvételeken valós tájak feltételezett átalakulását mutattuk be, melyeket az értékelők a valóságban nem ismertek. Adobe Photoshop szoftver segítségével képpárokból álló fotósorozatokot készítettünk, melyeken a felszínborítás változását vizualizáltunk.

A síksági, valamint a domb-és hegyvidéki tájak mintaterületein az alábbi változástípusokat mutattuk be.

I. Felszínborítás változása síkságon:

- beépített terület növekedése mezőgazdasági területen (A fotósorozat),
- erdőterület növekedése mezőgazdasági területen (B fotósorozat),
- vízfelszín növekedése mezőgazdasági területen (C fotósorozat).

II. Felszínborítás változása

domb és hegyvidéken:

- beépített terület növekedése mezőgazdasági területen (D fotósorozat),
- erdőterület növekedése mezőgazdasági területen (E fotósorozat),
- erdőhatár változása magashegységekben, gyepek és kopárok beerdősülése (F fotósorozat),
- erdőterület növekedése vegyes, kertés hasznosítású területen (G fotósorozat).

A felszínborítás-változást képpárokon jelenítettük meg. Hat lépésben, 5-30%-os értékkel növeltük egy-egy kategória kiterjedését. Minden esetben az adott felszínborítás-típus képen látható összterületét ábráztuk 5%-tól 30%-os területarányig (2. ábra).

A kérdőíves felmérés

A felszínborítás változások küszöbértékeit, amelyek eltérő tájkaraktert eredményeznek a különböző tájtypusokban, kérdőíves felméréssel határoztuk meg. A felmérésben résztvevő két csoport, laikusok és szakértők válaszait elemeztük.

Az interjúalanyokat arra kértük, hogy válasszák ki azt a fotópárt, amelyen már határozottan érzékelhető a tájjelleg

megváltozása. A fotópároknál az egyik kép mindig a jelen állapotot ábrázolja a mellette bemutatott másik kép pedig egy adott felszínborítás 5%-os ugrásokkal megnövelt területarányát. A képpárokat sorszámmal jelöltük és a válaszadóknak csak ezt kellett a válaszban megjelölniük. Ők nem ismerték a százalékos adatokat, így biztosítottuk a háttéradatokat pontos ismerete nélküli, pusztán az érzékelésen alapuló válaszadást.

A felmérés a 2007-2008. években történt. A megkérdezettek az ország földrajzilag jól elkülöníthető tájain élők, eltérő korúak és neműek, továbbá eltérő végzettségűek, illetve különböző képzésekben részt vevő egyetemi hallgatók. A felmérés során összesen 490 db kérdőív készült laikusok körében és 20 db kérdőívet szakértők töltöttek ki. Szakértőknek tekintettük a tájjal foglalkozó egyetemi oktatókat, kutatókat. A laikus csoport megkérdezése a szakértői álláspontokkal való összevetés céljából történt. A kor megoszlást tekintve, a válaszadók 70%-a 21-30 év közötti természetvédelmi szakmérnök, környezetmérnök, erdőmérnök és tájépítész egyetemi hallgató. A nemek megoszlása: 58% férfi és 42% nő.

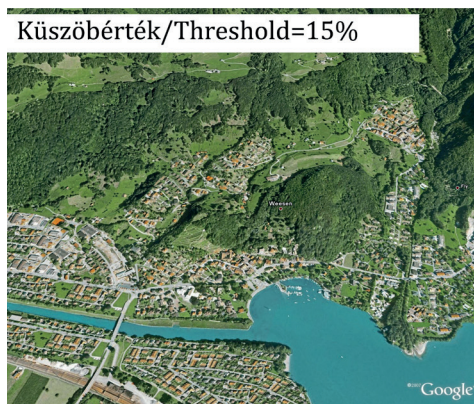
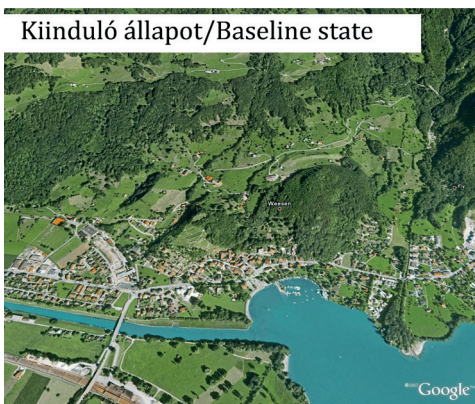
EREDMÉNYEK

Beépített területek növekedése

Síksági mezőgazdasági területeken a beépített felszínnek 15%-os területarányú növekedése jelentette azt a küszöbszintet, amely mindkét megkérdezett csoport véleménye alapján tájjellegváltozást okoz (3. ábra).

Dombsági-hegyvidéki térszíneken a beépítettség növekedését a megkérdezettek a síkságokéval megegyezően értékelték. Itt szintén 15%-os az a növekedési mérték, ami a megkérdezettek szerint a tájjelleg változását vonja maga után (4. ábra).

A két görbe futása kissé eltérő, ami a szakértők érzékenységével magyarázható. Esetünkben a 10 és 15%-os



3. ábra/fig.:

Kiinduló állapot és a megállapított küszöbérték (szakértők és laikusok) beépített területek növekedése esetében, síksági mezőgazdasági területeken, Hurworth, Egyesült Királyság / Baseline and defined threshold (experts and laymen average) for the increase of built-up areas on agricultural areas, Hurworth, England

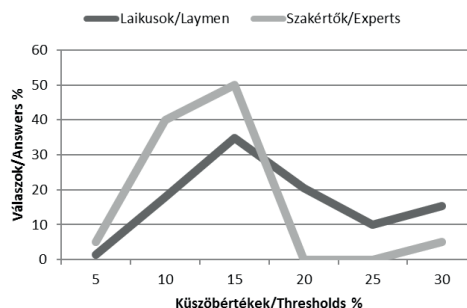
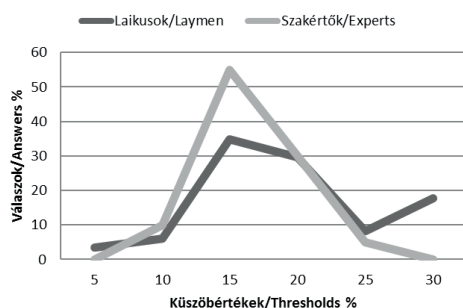
Baseline and defined threshold for the increase of built-up areas in hilly-mountainous areas, Dettenheim, Germany

5. ábra/fig.:

Felszínborítás-változások okozta tájfelváltozás küszöbértékei síksági (bal ábra) és dombosági (jobb ábra) mezőgazdasági területek beépülése esetén / Thresholds for the increase of built-up areas in agricultural lowlands (left) and hilly-mountainous areas (right)

4. ábra/fig.:

Kiinduló állapot és a megállapított küszöbérték beépített területek növekedése esetén tóparti, dombosági mezőgazdasági területeken, Dettenheim, Németország /



university students living in regions of the country with different geographical settings, with different ages and gender, education background and degrees or qualifications. Altogether 490 questionnaires were answered by lay people and 20 questionnaires were filled in by experts during the survey. We considered experts working in the field of landscape science, mainly university professors and researchers. Questioning the non-experts was crucial for the comparison of the results with expert knowledge. Respondents were nature conservation engineers, environmental engineers, forestry engineers and landscape architect students; 70% were between 21 and 30 years. The gender distribution was 58% men and 42% women.

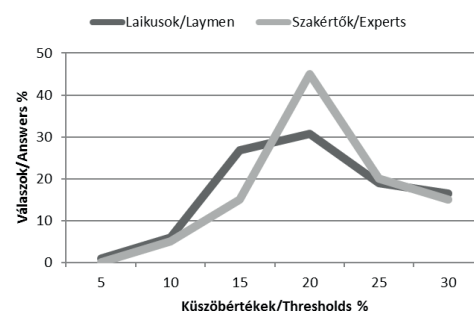
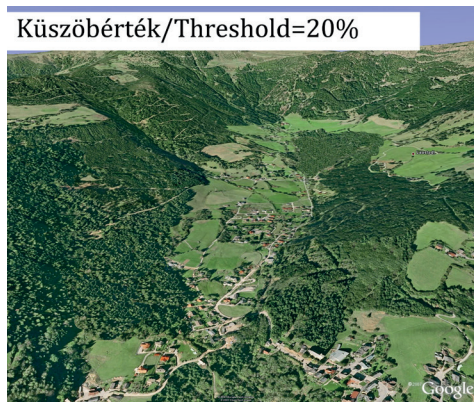
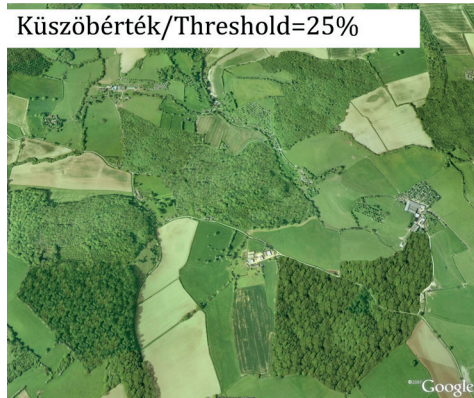
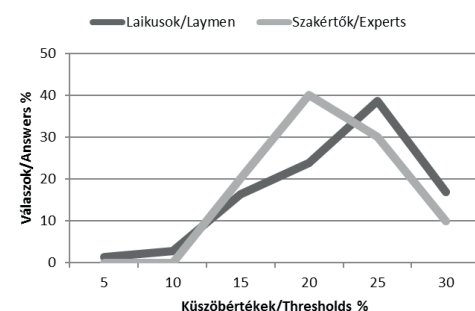
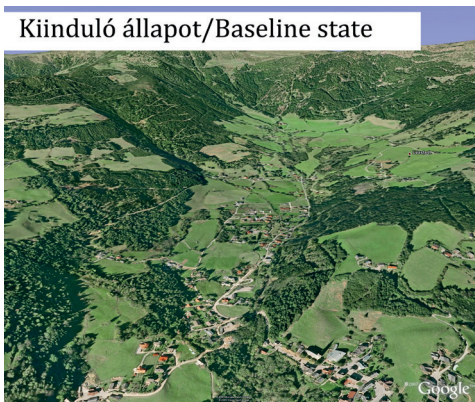
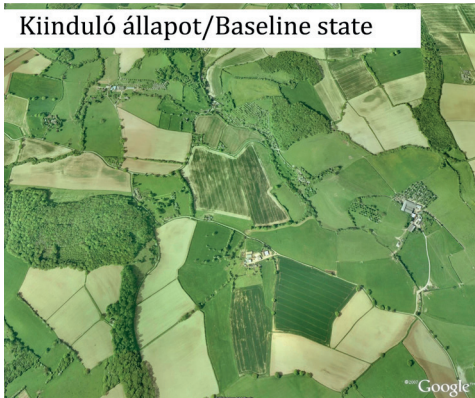
RESULTS

Increase of built-up areas

On agricultural lowlands, the 15% increase in built-up areas was the threshold level, which resulted in landscape character change based on the perception of both interviewed groups (Figure 3).

In hilly-mountainous areas, the result for the expansion of built-up areas was the same as in lowlands. Here also, respondents identified a rate of 15% as the threshold for landscape character change (Figure 4).

The two curves on the diagram run slightly differently, which can be explained by the higher sensitivity of experts. They notice landscape character change at the thresholds of 10



| | |
|---|----|
| 6 | 9 |
| 7 | 10 |
| 8 | 11 |

6. ábra/fig.:

Kiinduló állapot és a megállapított küszöbérték (laikusok) erdőterületek növekedése esetében, síksági mezőgazdasági területeken, Sollers Hope, Egyesült Királyság / Baseline and defined threshold (laymen) for afforestation of agricultural lowlands Sollers Hope, England

7. ábra/fig.:

Kiinduló állapot és a megállapított küszöbérték erdőterületek növekedése esetén, dombosági mezőgazdasági területeken, Laastadt, Ausztria / Baseline and defined threshold for afforestation on hilly agricultural areas, Laastadt, Austria

8. ábra/fig.:

Felzárkóztatás-változások okozta tájlevegőváltozás küszöbértékei erdőterület növekedése esetében, síksági és dombosági mezőgazdasági területeken / Thresholds for afforestation on agricultural lowlands (left) and agricultural hilly, mountainous areas (right)

9. ábra/fig.:

Kiinduló állapot és a megállapított küszöbérték (laikusok) erdőhatár változása magashegységekben, gyepek és kopárok

beerdősülése esetében, Schwende District, Svájc / Baseline and defined threshold (laymen) for changes in the boundary of the forests in high mountains, afforestation of grasslands and bares, Schwende District, Switzerland

10. ábra/fig.:

Kiinduló állapot és a megállapított küszöbérték erdőterület növekedése esetén, vegyes, kertes hasznosítású területen, Bottenau, Németország / Baseline and defined threshold (laymen) for the growth of forests in complex agricultural areas, Bottenau, Germany

11. ábra/fig.:

Területhasználat változások okozta tájlevegőváltozás küszöbértékei, erdőhatár változása magashegységekben, gyepek és kopárok beerdősülése (bal ábra) és erdőterület növekedése vegyes, kertes hasznosítású területen (jobb ábra) / Thresholds for changes in the boundaries of the forests in high mountains, afforestation of grasslands and bares (left) and for the growth of forests in complex agricultural areas (right)

küszöbértéknél érzékelhető a változás. A laikusok válaszai kevésbé egyértelműek, a 15%-os küszöb mellett a 20 és 30%-os értékhez tartozó válaszok aránya is meghatározó. Ellenben ugyanezen folyamatra a síksági térszíneken a szakértők és nem-szakértők válaszai hasonló tendenciát mutatnak, mindkét csoport válaszai alapján készített görbe határozott egycsúcsú a 15%-os értéknél (5. ábra).

Erdőterület-növekedés küszöbértékei

A síksági mezőgazdasági területek erdőterület alakulása esetében a szakértőknél 20%, a laikusoknál 25%-os küszöbszint eredményezi a tájlevegő változását (6. ábra).

Ugyanez a folyamat domboságokon, hegyvidékeken mindkét megkérdezett

csoport válaszai alapján a 20%-os erdőterület-aránynál meghatározó. Ez a síkságon tapasztaltakhoz képest nem mutat jelentős eltérést (7-8. ábra).

A két megkérdezett csoport válaszait összefoglaló görbék mindkét tájtypus esetében egycsúcsúak. Síkságon azonban a szakértők valamelyest érzékenyebbek, miszerint ők 5%-al alacsonyabb küszöbértéket határoztak meg, míg dombosági és hegyvidéki területeken inkább a laikusok érzékenysége rajzolódik ki (8. ábra).

Az éghajlatváltozás hatásait szemléltető fotósorozat, az erdőhatár feljebb húzódását illusztrálja. A megkérdezettek többsége itt magas, 25-30%-os küszöbértékeket határozott meg, vagyis ez a területhasználat-változás csak jelentősebb változásnál érinti a tájlevegőt (9. ábra, 11. ábra).

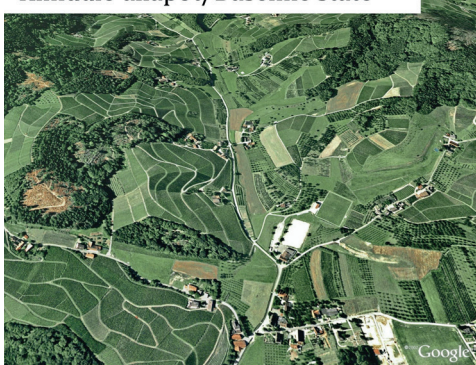
Kiinduló állapot/Baseline state



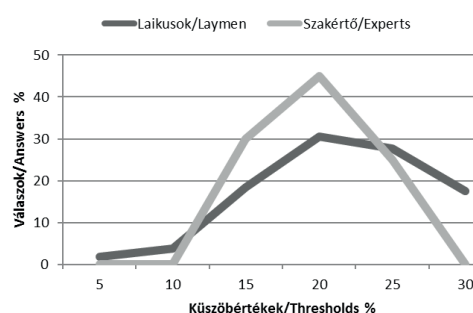
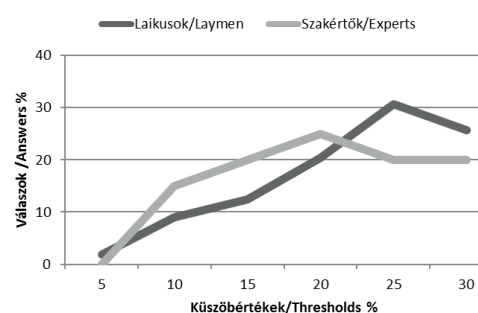
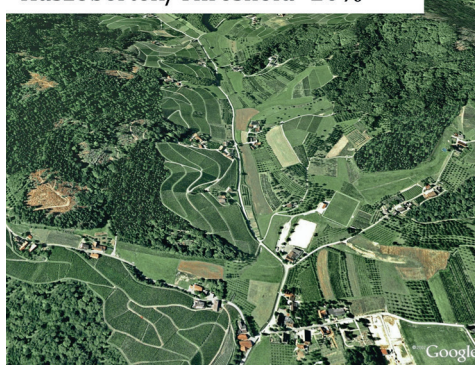
Küszöbérték/Threshold=25%



Kiinduló állapot/Baseline state



Küszöbérték/Threshold=20%



and 15%. Non-experts answers are less clear, beyond the threshold of 15%, responses the values of 20 and 30% are also outstanding. Conversely, on lowlands, responses of experts and non-experts show a similar tendency and the curve illustrating the responses of the two groups shows one-peak at 15% (Figure 5).

Thresholds of forest expansion

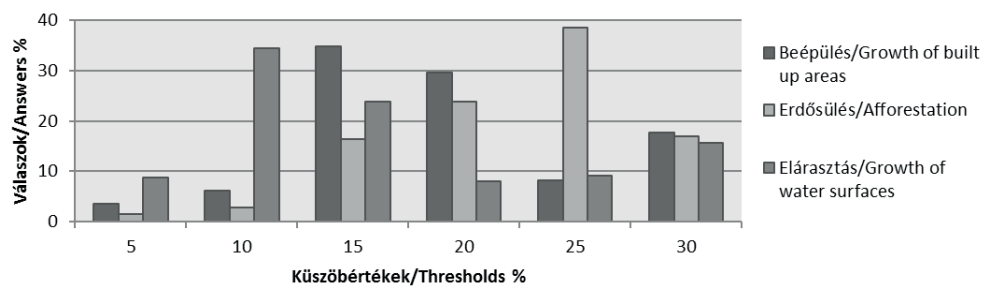
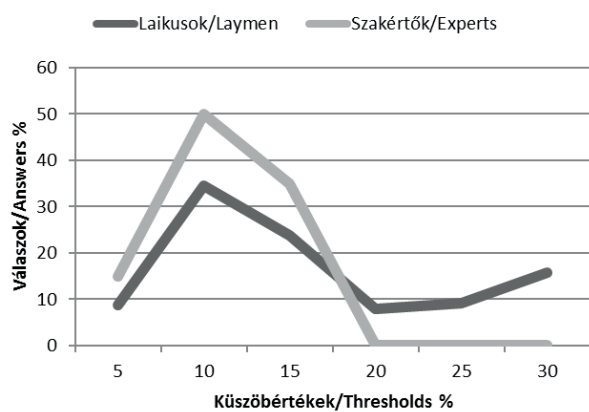
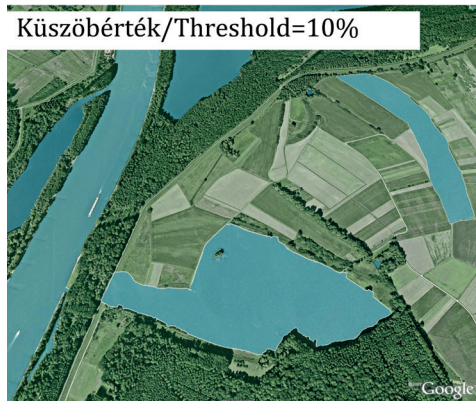
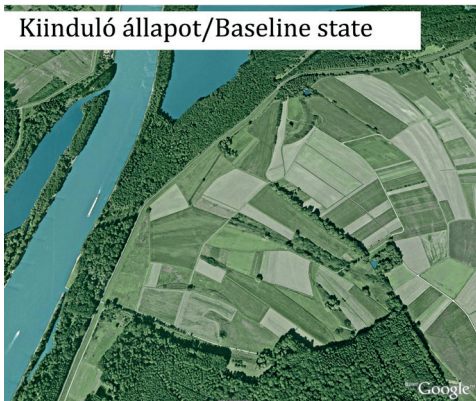
When evaluating forest growth on agricultural lowlands, the threshold of landscape character change defined by experts was 20% and by laymen was 25% (Figure 6).

The same process in hilly and mountainous areas result in a similar threshold. A 20% increase of forest area was considered as definitive according

to the responses of both groups. This does not show any significant difference from lowlands (Figure 7-8).

Summarizing the responses of the two respondent groups, the curves of the diagrams for both landscape types has one peak. However on lowlands, experts are somewhat more sensitive as they have set the threshold 5% lower than laymen, while in the hilly and mountainous areas, the sensitivity of non-experts is more visible (Figure 8).

The photo series illustrating the effects of climate change shows the upwards movement of the forest boundary. The majority of respondents defined a higher threshold of 25-30%, indicating the weaker impact of this process on character change (Figure 9, Figure 11).



A vegyes, döntően kertés hasznosítású területeket érintő erdősülés 20%-os küszöbnél okozza a tájjelleg változását a megkérdezettek szerint. Ez a küszöbszint a szakértők esetében nyilvánvaló, míg a laikusoknál a többség 20-25%-ra teszi a küszöbértéket. A korábbiakhoz hasonlóan, itt is a szakértők tették alacsonyabbra tájjelleg-változás határértékét (10-11. ábra).

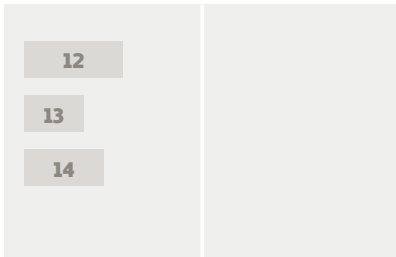
Vízfelszínnek növekedése

A mezőgazdasági területeken a vízfel-szín növekedésére az előző példákhoz képes lényegesen érzékenyebben reagáltak a megkérdezettek. Ez esetben mindkét csoport már 10%-os terület-aránynál jelezte a küszöböt. A görbék futása megegyezik; már az 5%-os vízfel-színarányt is sokan tájjellegváltozásnak

értékelik (12-13. ábra). Ez a változás az úrfelvételeken a leghatározottabban érzékelhető, de így van ez a valóságban is. A vízfelület olyan különleges felszín, ami mind környezeti, mint látványhatásában nagyon erőteljes, így reális az alacsonyabb küszöbérték.

Összesítve a síksági mezőgazdasági területeket érintő területhasználat-változásokat azt tapasztaljuk, hogy feltételezéseinknek megfelelően a vízfelület növekedése a legerőteljesebben karakterformáló a tájban, a küszöbérték itt 10%. Ezután következik a beépítés 15%-os, majd az erdőterület-növekedés 25%-os küszöbértékekkel (14. ábra).

A dombosági területeket érintő területhasználat-változásokat elemezve azt figyeltük meg, hogy a beépítés növeke-



12. ábra/fig.:

Kiinduló állapot és a megállapított küszöbérték síksági mezőgazdasági területek vízfelszín alakulása esetén Dettenheim, Németország / *Baseline and defined threshold (laymen) for water surface growth in agricultural area, Dettenheim, Germany*

13. ábra/fig.:

Területhasználat változások okozta tájjelleg változás küszöbértékei vízfelszín növekedése esetén, síksági mezőgazdasági területen / *Thresholds for water surface growth in agricultural lowlands*

14. ábra/fig.:

Területhasználat változások okozta tájjelleg változás küszöbértékei síksági mezőgazdasági területeken / *Thresholds for different land use changes on agricultural lowlands*

Afforestation related to mixed, predominantly garden areas resulted in landscape character change at a 20% threshold according to the respondents. This level of threshold is obvious to experts, while the majority of lay people defined a threshold of 20-25%. As before, experts identified lower threshold values for change to a landscape character (Figure 10-11).

Growth of water surfaces

Respondents were significantly more sensitive to the increase of the water surfaces in agricultural areas, compared to the previous examples. In this case, both groups defined the threshold at a ratio of 10%. The diagram curves run similarly; many of the respondents noted even the 5% water surface growth resulting in a change of the landscape character (Figure 12-13). It is true that water was the most salient feature in the photos as it is in reality. Water is a special surface that is highly dominant both in its environmental and visual effects, and thus the lower threshold is real.

Summarizing the land-cover changes in agricultural lowlands, we concluded that with a threshold of 10%, the growth of water surfaces has the strongest impact on the formation of the landscape

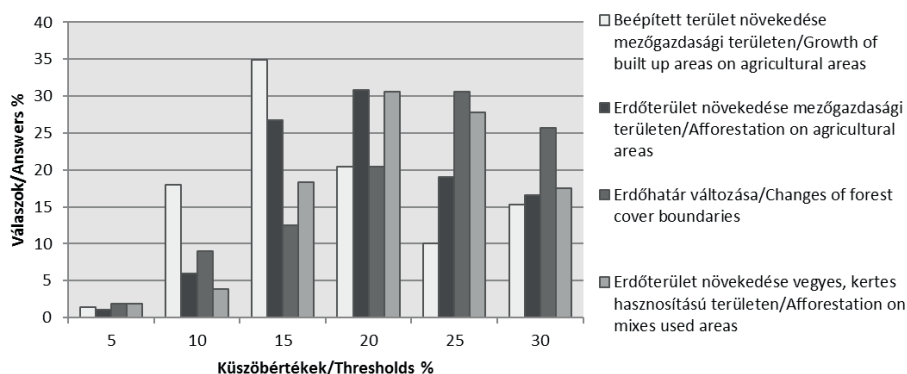
character. Next is the increase of built-up areas, with a threshold of 15%, followed by the growth of the forest areas with a 25% value (Figure 14).

Analysing the land use changes on hilly areas, we observed that the most significant effect was the expansion of built up areas. Afforestation of areas with divers land cover indicate a threshold of 20-25%, which is similar to lowlands. On the hills we did not model the growth of the water surface because this scenario is less realistic. (Figure 15).

Summary

The purpose of the survey was to define thresholds of landscape character change caused by the transformation of land cover. By surveying groups of different ages, education and interests, we defined indicative thresholds of perception of land cover change altering the character of a landscape.

The thresholds defined by the questionnaire survey vary within a range of 10 to 25% (Figure 16 and Table 1). It is visible that in most cases the answers of the two-interviewee groups were similar. In two cases (B, F series), non-experts reacted more sensitively to forest increases in agricultural and mountainous areas.



désének a legjelentősebb a tájjelleg alakító hatása. A különböző felszínborítású területek erdősülése 20-25%-os küszöböt jelez, ami szintén hasonló a síkságokhoz. Domságokon nem modelleztük a vízfelszín növekedését, mert ez itt kevésbé reális szcenárió (15. ábra).

Összegzés

A felmérés célja a felszínborítás-változás révén bekövetkező a tájjelleg-átalakulás küszöbértékeinek meghatározása volt. Különböző korú, végzettségű és érdeklődésű társadalmi csoportok megkérdezésével feltártuk, hogy a területhasználat változásának különböző fokozatainál hol található az a küszöbszint, ahol megváltozik a táj jellege.

A kérdőíves felméréssel meghatározott tájjellegváltozás küszöbértékei 10-25% közötti tartományban mozognak (16. ábra és az 1. táblázat). Látható, hogy a két megkérdezett csoport válaszai az esetek többségében megegyeztek. Két esetben (B, F sorozat), a mezőgazdasági és a magashegységi területek erdősülésére érzékenyebben reagáltak a laikusok.

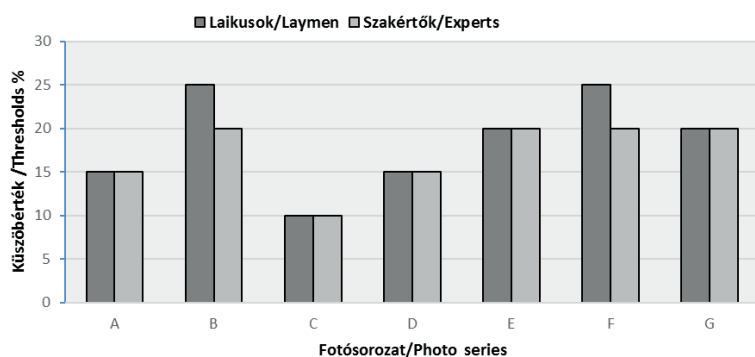
A tanulmány feltárt különböző tényezőket, amelyek szerepet játszanak a küszöbértékek eldöntésében. Így meghatározó a domborzat, hiszen a megkérdezettek eltérően érzékelik a síksági és domb- ill. hegyvidéki területeken végbemenő tájalakulási folyamatokat (erdők esetében érzékenyebben reagáltak a domb és hegyvidéki területek esetében). Ugyancsak meghatározó, hogy

mely területhasználatok változnak meg, hiszen a megkérdezettek jellemzően érzékenyebben reagáltak a beépített területek és vízfelszín növekedésére.

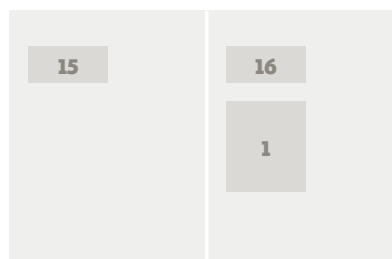
A jelenlegi tanulmányban a feltárta bővítik az ismereteket arról, hogy az egyének miképpen érzékelik a tájváltozásokat, mennyire érzékenyek a különböző térszíneken végbemenő eltérő tájváltozási folyamatokra. Mindezek segíthetik a tervezést abban, hogy az eltérő, a történelem során kialakult tájszerkezet és tájjelleg esetén milyen típusú területhasználat váltásokat kell kiemelten kezelni. További fontos feladat a tájképek választását befolyásoló tényezők vizsgálata mellett az objektív, számszerűsíthető mutatók képzése a tájjellegváltozást eredményező tájváltozási folyamatok preferenciavizsgálatához.

KÖSZÖNETNYILVÁNÍTÁS

A kutatás a SENSOR projekt keretében valósult meg. Ezúton mondunk köszönetet Jombach Sándornak és Tatai Zsombornak a vizualizációban való közreműködéséért, valamint a kérdőíves felmérésben segítségünkre álló intézeti munkatársaknak, kollégáknak és hallgatóinknak. ©



| Fotósorozat / Photo series | | Küszöbszintek % / Thresholds % | |
|--|---|--------------------------------|---------------------|
| | | Laikusok / Laymen | Szakértők / Experts |
| I. Területhasználat változása síkságon / Land use change on lowlands | | | |
| A | Beépített terület növekedése mezőgazdasági területen / Growth of built-up areas on agricultural areas | 15 | 15 |
| B | Erdőterület növekedése mezőgazdasági területen / Afforestation on agricultural areas | 25 | 20 |
| C | Vízfelszín növekedése mezőgazdasági területen / Increase of water surface on agricultural areas | 10 | 10 |
| II. Területhasználat változása domb-és hegyvidéken / Land use change on highlands | | | |
| D | Beépített terület növekedése mezőgazdasági területen / Growth of built-up areas on agricultural areas | 15 | 15 |
| E | Erdőterület növekedése mezőgazdasági területen / Afforestation on agricultural areas | 20 | 20 |
| F | Erdőhatár változása magashegységekben, gyepek és kopárok beerdősülése kopárok erdősülése / Afforestation on agricultural areas, heightening of forest-lines due to climate change | 25 | 20 |
| G | Erdőterület növekedése vegyes, kertés hasznosítású területen / Afforestation on mixed-used areas | 20 | 20 |



15. ábra/fig.:

Területhasználat változások okozta tájfelleg változás küszöbértékei dombosági/ hegyvidéki mezőgazdasági területeken / Thresholds for different land use changes on hilly and mountainous agricultural areas

16. ábra/fig.:

Laikusok és szakértők által meghatározott küszöbértékek az egyes változás-típusokban / Thresholds for different land cover scenarios defined by laymen and experts

1. tábla/table:

Laikusok és szakértők által meghatározott küszöbértékek az egyes változás-típusokban / Thresholds defined by laymen and experts in different changes of land

The study explored various factors that play a role in defining thresholds. Relief is important, as respondents perceived the lowlands and the hills in different ways. (Respondents were more sensitive to changes in forest cover on lowlands than in hilly and mountainous areas). It is also crucial to identify which land use category is changing, as respondents typically reacted more sensitively to the growth of built-up areas and water surfaces.

In the present study, our results broaden the knowledge about individuals' perceptions of landscape changes and about their sensitivity toward different land-cover transformation processes occurring in various landscape types. Results can help landscape planning as it shows what type of land use changes need to be handled

more carefully in different landscape structures and character types. Another important task is to study the factors influencing the landscape scenery and to provide objective, quantifiable indicators for landscape preference studies dealing with landscape change processes.

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