

Green and Blue Infrastructure for Sustainable Development of the City: Case Study of Vilnius City and its Region

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Key words: cadastre, spatial planning, urban renewal, biodiversity, park, management of landscape, Lithuania, Vilnius city.

SUMMARY

Contemporary cities are facing some big challenges of the post-industrial era, and good practice of ecological resources use is one of them. Different regeneration programs and ideas are being implemented in the cities and some of them have been turned into entire spatial compositional urban structure. Sustainable and balanced future development in urban territories is closely related with greenery's regeneration, green areas and water bodies incorporating into urban structure. The article gives an overview of Lithuanian experience of management of green and blue infrastructure in the cities, particularly in Vilnius city.

The main aim of this article is to suggest methodical development principles of urban structure, considered on the particularity of territories' spatial compositional systems. The article is a result of a certain research, in which transformations of territories' urban structure, compositional importance to visual identity of a city, and perspective strategy of territories socio-economic development were evaluated.

A comparative analysis of cultural and natural heritage management and revitalization programs that old parks, created by French landscape architects André near Vilnius in 1898–1899, are presented. Father and son André planned green systems in the cities of Latin America, particularly Montevideo city, Uruguay in 1890.

RESUMEN

Las ciudades contemporáneas se enfrentan a algunos de los grandes desafíos de la era post-industrial, siendo uno de ellos el buen uso de los recursos ecológicos. Se han ido implementando distintos programas de regeneración en la ciudad hasta convertirse, algunos de ellos, en una estructura espacial y compositiva de la misma. El desarrollo sostenible y equilibrado de la urbe, está estrechamente relacionado con la generación de zonas verdes y de agua en ella. El artículo da una visión general sobre la eficiencia y experiencia de Lituania en la gestión de este tipo de infraestructura ecológica, centrándose especialmente en la ciudad de Vilnius.

El artículo se basa en la investigación de las transformaciones en la estructura urbana, la importancia compositiva que da identidad visual a una ciudad y la perspectiva de desarrollo socioeconómico de las mismas. Su objetivo principal es sugerir principios metódicos de desarrollo estructural urbano, teniendo en cuenta las peculiaridades de los sistemas compositivos espaciales en los territorios.

Un análisis comparativo de gestión y revitalización del patrimonio cultural y natural anticipa que parques antiguos, creados en 1898–1899 por los franceses André, cerca de Vilnius, son presentados. Ambos André, padre e hijo, planificaron también sistemas verdes en ciudades de América Latina, especialmente en Montevideo – Uruguay – en 1890.

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1. INTRODUCTION

Sustainable and balanced development in urban territories is closely related with greenery's regeneration, green areas and water bodies incorporating into urban structure. Some scientific concepts shape this way of thinking and planning in terms of the green and blue network or infrastructure in cities: landscape ecology, conservation of biodiversity, social (and also economic) development factors. This methodological concept is presented and discussed in some international conferences, e.g. EFLA Regional Congress "Green Infrastructure: from global to local" in St. Petersburg, Russia and Uppsala, Sweden on 11–15 June, 2012 (Melnichuk, Ignatieva, 2012); FIG Working Week 2012 "Knowing to manage the territory, protect the environment, evaluate the cultural heritage" in Rome, Italy on 6–10 May, 2012 (Prigent, 2012; Deveikis and Deveikiene, 2012). The 8th FIG regional Conference named "Surveying towards Sustainable Development" is perfectly related to analysis of theoretical and practical aspects of ecological resources use in city planning or urban renewal process.

Urban planners and developers have no doubts that urban green zone environment has value and influence attractiveness of adjacent urban quarters on the real property market. The authors of the presentation and article stick to the principle that urban green zones and green plantation are important elements of urban structure, development, conversion or "browfield" investment projects. We should find place for green zones in the urban development territories. However, this requires joint efforts of urban developers and planners as well as methodological and legal grounds. The case study of Lithuanian experience of the management of green and blue infrastructure in cities, particularly in Vilnius city, is presented in our article. The main aim of this article – suggest methodical development principles of urban structure, considered on territories spatial compositional systems particularity. The article is to result of a certain research, in which transformations of territories urban structure, compositional importance to visual identity of a city, and perspective strategy of territories socio-economic development and redevelopment were evaluated. Legal basis is very important in this case.

The overview of the cultural or green systems heritage as well as old parks created by French landscape architects, father and son, André at the end of the 19th century near Vilnius in Lithuania will be useful and interesting to colleagues from South America and from Uruguay particularly. French architect Edouard François André (1840–1911) planned the greeneries in Montevideo city in 1890. A brief overview is given on the main references and previous publications about the cultural heritage created by E. F. André around the world.

2. METHODOLOGICAL AND LEGAL FRAMEWORK

The Republic of Lithuania has ratified or equally approved the cultural heritage protection provisions of the UNESCO World-wide Cultural and Natural Heritage Protection Convention (1972), the Convention of the European Council on the Protection of the Architectural Heritage of Europe (Grenada, 1985), the revised European Archeological Heritage Protection Convention (Valletta, 1992), the European Landscape Convention (Firenze, 2000), as well as some other international Conventions and Treaties, and European Directives. Development or adoption of any new legislation in the field of cultural or/and natural heritage protection and regeneration is based on the priority of the requirements stipulated in the above-mentioned instruments.

Today the following legal instruments directly regulate the recording, protection, usage and management of green and water bodies systems in rural and urban territories of Lithuania:

- The Law on Protected Areas of the Republic of Lithuania (1993; 2003). This law regulates natural and cultural values' protection according to the regime of natural reserves, national and regional parks, and other protected areas. It is a law on protection of landscape values also.
- The Law on Immovable Cultural Heritage Protection of the Republic of Lithuania (1995, 2004). It regulates the protection, usage and management of cultural heritage areas and sites (e.g. parks, places) according to their cultural weight.
- The Law on Land (1994; 2004). It stipulates the tenure of land, the relations in management and use of land, as well as management and administration processes related to land. The latest version of this law largely focuses on land administration, land management, and appropriation of land for public needs, land consolidation procedures.
- The Law on Construction (1996; 2003). It stipulates organization and implementation of building or construction processes, defines the sequence of project preparation, as well as the requirements for process participants, including land surveyors, architects, projects developers.
- The Law on Territorial Planning (1995; 2004). This law regulates the issues of territorial and spatial planning, sets the requirements for the contents of planning provisions and the requirements imposed to respect of territorial planning documents.
- The Law on Greenery (2007). This law which came into force as of 1 January 2008 as well as a package of by-laws should create a legal background for the development and maintenance of urban green zone system, clear regulation of green zones, economic assessment of green zones, legitimating of green zone parcels and their registration in the Real Property Register.

The majority of these laws and other regulations come in updated editions coordinated with the EU Treaty and the EC Directives. It makes the urban planning process in Lithuania an integral part of the process and the network of management of the sustainable development in Europe (Council Conclusion on Architecture, 2008; Opinion of the European Economic and Social Committee, 2004). The legislative instruments stipulating the processes of

implementation of urban renewal projects, urban green and water systems development are inadequate.

The Law on Greenery stipulates that land parcels of green zones shall be entered into the Real Property Cadastre following the established procedure. The Law on Real Property Cadastre, Regulations on Real Property Cadastre, and Law on Real Property Register regulate administration of the Real Property Cadastre and Register. Legal provisions on these issues should be harmonised in a better manner (Deveikis, Deveikiene, 2008; 2010).

3. THE THEORETICAL AND PRACTICAL ASPECTS OF TOWN PLANNING

3.1 Town Planning Ideas – towards a more sustainable urban form

Modern town planning theory and practice was born in 19th century on time of the Industrial Revolution. The great industrial cities with rapid growth of population and urban or industrial facilities and utilities were in need for common urban policy and new urban planning decisions. The urban planning was influenced by many factors, not the least of which was the city's living conditions, sustainability. The renovation of Paris by Baron Haussmann (1809–1891), the *Haussmann Plan* or a large modernization programme of city between 1853 and 1870, inspired some of the important architectural movements including The City Beautiful movement in the United States. Cities like Chicago and other cities in USA, London and Montevideo, and Moscow also have Haussmann influences in their city plans (Haussmann's renovation, 2012).

The renovation of Paris was meant to be total. Such considerable work required many different collaborators. Engineers Eugène Belgrand (1810–1878) and Jean-Charles Alphand (1817–1891) dealt with parks and plantations in collaboration with gardeners Jean-Pierre Barillet-Deschamps (1824–1873), Edouard André (1840–1911). Haussmann expanded the fundamental role of the Paris Map Services, who was in charge of drawing the new avenues and enforcing the constructions rules; in this area “geometry and graphic design play a more important role than architecture itself”, said Haussmann in *Mémoires*. Cleaning up living areas implied not only a better air circulation but also better provision of water and better evacuation of waste. A network of large avenues and rings of boulevards were completed. The connection between great boulevards required a creation of squares on the same scale. The works of Haussmann team converted great squares at crossing points across the whole city (the *Chatelet*, *place de la République*, *place de l'Alma*, square *des Batignolles* etc.). Green spaces in Paris – on the east and west borders of the city, the *Bois de Vincennes* and the *Bois de Boulogne*; the *Parc des Buttes Chaumont*, the *Parc Monceau*, and the *Parc Montsouris* offered citizens a beautiful scenery and a place to relax and to be with nature. Also, there were squares built in each district, and trees were planted along avenues (Haussmann's renovation, 2012).

Three prominent and influential city planning theoreticians have made a great influence and authority of the development of urban construction planning and regulation in Europe. Austrian Camillo Sitte (1843–1903) with his book in German language *City Planning According to Artistic Principles* (1889; between 1889 and 1922 it was edited five times; it was translated into French in 1902, but was not translated into English until 1945). For Sitte,

the most important is not the architectural shape or form of each building, but the inherent creative quality of urban space, the whole as much more than the sum of its parts.

Ebenzer Howard (1850–1928), the Garden City theoretician and author of a book titled *To-Morrow: A Peaceful Path to Real Reform* in 1898 and a new edition of this book in 1902 with a different title *Garden Cities of To-Morrow*, describing his vision of Garden City’s physical characteristics and how a cluster of them might be created as population increased. Howard was not a designer, and he stated that the plan for a town on an actual site would doubtlessly depart from the one he described. He also labelled each of his drawings (Figure 1). “Diagram only. Plan cannot be drawn until site selected” (Howard, 1902).

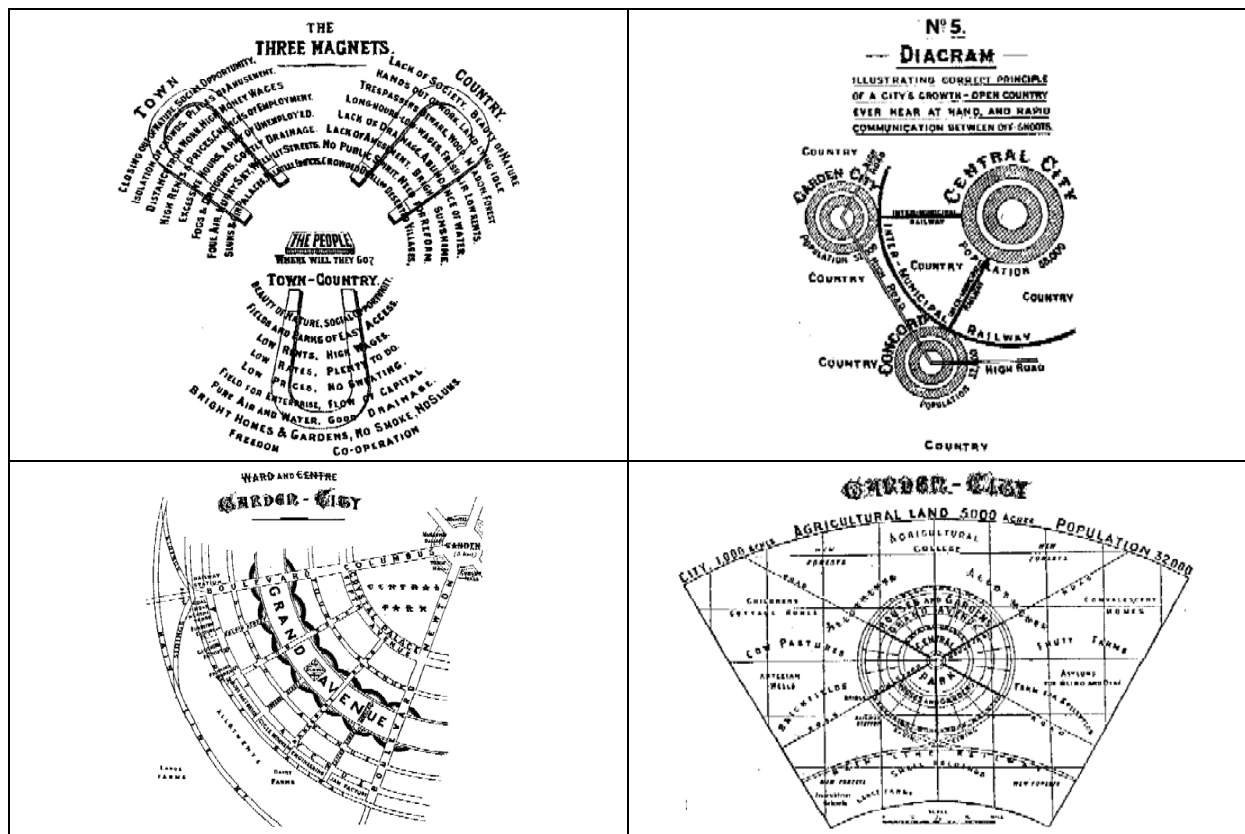


Figure 1. The diagrams from a book titled *Garden Cities of To-Morrow* by E. Howard, 1902.

Source: <http://www.library.cornell.edu/Reps/DOCS/howard.htm>

English engineer, architect and town planner Raymond Unwin (1863–1940) has developed the principles of social cities planning and building rapidly and economically with the Arts and Crafts Movement tradition. R. Unwin became technical adviser to the Greater London Regional Planning Committee in 1929; he was the president of RIBA, Royal Institute of British Architects from 1931 to 1933. In 1936 he was appointed the visiting Professor of Town Planning at Columbia University and awarded an honorary doctorate by Harvard University in 1937.

South American cities like Buenos Aires, Montevideo at the period from 1850 to 1880 are two configurations of a public space: Spanish tradition – without the green plantations and a French tradition’s public space – within the plantations. Since 1880, French tradition predominates in the public spaces – *plazas* of Buenos Aires and other cities of the *La Plata* (Berjman, 2001). Many French town planners and landscape architects were working in these cities: brothers Racine’s, Charles (1859–1934) and Louis-Ernest (1861–1903), Edouard Gautier (1855–1929), Jules Charles (Carlos) Thays (1849–1934) instilled the achievements of a French urban park and/or green spaces (*plazas verdes*) tradition into La Plata cities (Berjman, 2001; Montanez, 2001).

German geographer Walter Christaller (1893–1969) applied the Central Place Theory (1933) for human settlements and the urban systems planning. These ideas were the basis for creating the Lithuanian regional planning and urban settlements system on integrated hierarchy network from the regional centers, districts or municipalities’ centers to a local centers and a rural settlements developed by Kazys Seselgis (1915–1998) in 1962–1964 (Jakaitis, 2011). In the mid last century well-known theory of the city planning built on the development of a social infrastructure and easy access to it (Frey, 1999). Also, many modern theories of the city planning in later years were developed.

The concept of “green and blue infrastructure” shapes the way of thinking in terms of landscape ecology and refers to land and plantations ecosystems (green network) and water ecosystems (blue network) protection. The green and blue network becomes a tool for urban planning and for local communities involvement. This is a new way of thinking about the city, its space and people.

3.2 The historical background for sustainable urban development

Historical parks and other urban green spaces in the city are a part of the urban cultural heritage. It is very important subject within the various structural elements, which mould the city landscape. One of the main criteria for the modernity of European cities is the percentage of landscaped green spaces in them and protected cultural and natural frame of the city (Council conclusion on architecture, 2005). Urban identity and social coherence are affected by aesthetical, psycho-emotional and social factors in addition to parameters of a physical accessibility. The *genius loci* is a primordial aspect within the city sustainability as well as a background for sustainable urban development.

The city development must be balanced with the natural (physical) geographical conditions, economic forces, and cultural trends. It should be noted that the traditional stable (that means sustainable and balanced) city development ideology is now trying to add emphasis on self-culture factor. Culture is understood as a kind of factor in balancing the interests of ensuring the common living locus as the essential guarantee of human rationality, because only a high cultural level of society is a position to realize the sustainable development goals and objectives.

The sustainable use of old cultural resources, the revitalisation of cultural heritage in own city territorial (urban) and surrounding or suburban areas is one of the main paradigms for the sustainable cultural landscape planning. We have various examples of the city planning and development with preserving the historical heritage, also as well as the “green heritage”. The

city of Montevideo is a good example of this paradigm. It is great pleasure to announce common cultural heritage in our country, Lithuania, and in Uruguay: the parks created by French landscape architect Edouard André Agency and by her students or its followers such as Carlos Thays and others (André, 1895; André et Courtois, 2001; Berjman, 2001; Montanez, 2001; Sebeckas et al., 2001; Omilanowska, 2009; Deveikiene, Deveikis, 2011).

A brief biographical note about landscape architect E. André is presented in textbox 1 in the next page. Many *plazas* in Montevideo as *Plaza Zabala*, *Plaza Constitucion*, *Plaza Independencia*, *Plaza Cagancha*, etc, also *Prado* and Central park, actual José Battle y Ordoñez (created in 1907–1911 by C. Thays), park *Cerito* was planned and drawn by E. André in 1890–1891 (Montanez, 2001). He made-to-measure the Master plan of Montevideo transformation into modern city.

In Lithuania we have the four parks created by E. André and his son René André (1867–1942). All of these landscape architecture ensembles were created at the domains / manors of a famous Lithuanian family, the counts Tyszkiewicz near Vilnius and in the town-resort Palanga. These residences of family Tyszkiewicz are set in places of natural beauty and exceptional landscape (one of these parks is presented in Figure 2). Publication regarding parks in Lithuania created by E. and R. André are numerous (André-Olivier, 2006; Deveikiene *et al.*, 2008; Deveikiene, Deveikis, 2011; Omilanowska, 2009; Pozzana, 2011; Sebeckas *et al.*, 2001).

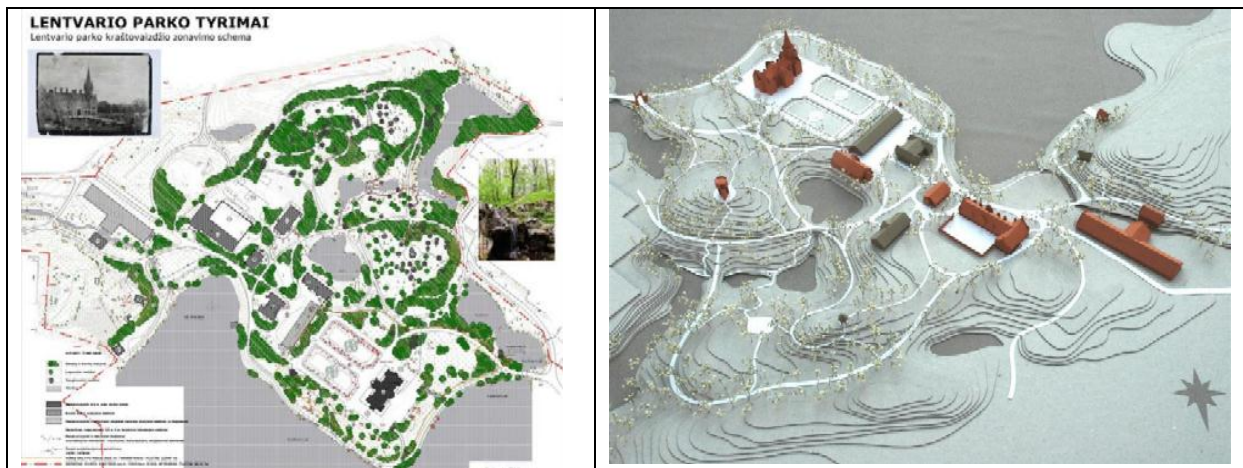


Figure 2. Research of the Lentvaris Manor Park created by French landscape architect E. André at the end 19th century. Left: digital plan compiled by V. Deveikiene et al., 2008–2009. Right: mock-up by James Norman Ferguson, 2008–2009. Source: Deveikiene, Deveikis, 2011; 2012.

It is particularly interesting to consult a book in French of E. André *General Treaty of the Composition of Parks and gardens*, published in 1879 and re-edited in 1983, 1986, in which E. André covered all aspects of the park creation business, the book still receives an attention from landscapers today as much as it outlines new directions of the profession. Major works by landscaper intended to create natural and picturesque effects, to use ripraps, flows of water, waterfalls, balustrades and greenery as viewing points, to contrast the methods used. Also it is interesting to consult the letters and logbooks of René André at the period 1898–1899, and article about Palanga Park at *Revue horticole* (1906) (Deveikiene, Deveikis, 2011).

Textbox 1. A brief historical note about the creation of French landscape architect Edouard André

Édouard François André (1840–1911) was a leading and famous French landscape architect and horticulturist, a theoretician of the art of parks, a writer, and an editor of the late 19th century. Young Edouard André spent a year at the Museum *d'Histoire Naturelle* in Paris, and at the age of 20 was appointed the gardener of the City of Paris. André participated in the design team that laid out parks and boulevards in Paris that transformed Paris into a Haussmann model modern city. His planting of the Park des *Buttes-Chaumont* became his signature piece. In 1866 André won an international competition for the design of Sefton Park, a large urban project in Liverpool, England. He went on to design numerous parks and gardens in France and across Europe including the transformation of the Citadel of Luxembourg into a large public garden and urban spaces, and the creation of the public garden of Monte Carlo, Monaco as a showcase for tropical plants. His garden and park design philosophy is summed up in *L'art des Jardins*, published in 1879 and re-edited in 1983; 1986.

E. André was a productive horticulturist as well. In 1875–76, he was sent by the Government of France on an expedition to South America where collected 3400 specimens including famous *Anthurium andreanum* and many Bromeliads. He maintained an experimental nursery and wrote numerous monographs and articles with particular expertise on Bromeliads. A book titled *Bromeliaceae Andreanae. Description et histoire des broméliacées récoltées dans la Colombie, l'Écuador et le Venezuela, par Éd. André, rédacteur en chef de la Revue, ancien voyageur botanique du Gouvernement français en Amérique du Sud* was published in Paris, [1889] (re-editions by Big Bridge Press, Berkley CA, 1983, and by C. M. E. Editions, Paris, 1998).

A book about this expedition in Columbia, Equator was published in *Tour du Monde* (1877–1883), also was re-published book *L'Amérique Equinoxiale* in 1999 in Paris.

In 1890–91 André visited Uruguay and worked for Montevideo city planning, which transformed a capital of the Uruguay into modern city with parks, squares (*plazas*) and boulevards (André, 1895; Montanez, 2001). His work, 52 pages, intituled *Rapport sur le projet de transformation et d'embellissement de la ville de Montevideo (Uruguay) présenté à la Junte económico-administrative par M. Édouard François André, architecte paysagiste à Paris* included the General Plan of the city Montevideo, the plans of the Miguelété (Prado) Park, of the Central Park, the plans of squares / *plazas* of Independence, of Constitution, of Flores, Sarandi and Artola (Montanez, 2001).

In 1892 E. André was appointed the Professor of Horticultural and Landscape Architecture at the French National School of Horticulture in Versailles. André is recognised as the author and promoter of the so-called “mixed style” of gardens design. The distinctive features used by André in his parks include harmonious placement and pleasing arrangement of artificial grottos, waterfalls, and mountain-style stone structures (André et Courtois, 2001).

In 1898–1899 Edouard André and his son René André (1867–1942) worked in Poland (2 parks) and Lithuania (4 parks). At four manors of count Tyszkiewicz brothers André was creating mixed parks in Palanga, Traku Voké (Waka), Lentvaris (Landwarow), Uzutrakis (Zatrocze). A characteristic feature of Andre’s designs is that he maximally emphasised the attributes of selected style: the extreme formalism of geometric gardens and extreme naturalism of scenic parks (Omilanowska, 2009). When designing his gardens, he had in mind both their aesthetic and purely practical values.

For further analysis of the E. André biographical information see an article by Phylis Andersen at *Arnoldia*, vol. 54, no. 2 and other editions (André et Courtois, 2001; Omilanowska, 2009; Deveikiene and Deveikis, 2011).

4. URBAN LANDSCAPE PROJECTS IN VILNIUS CITY

4.1. Evolution of the water status in the city: from a water streams as a worker to the waterfront attitudes

The water frame – the river streams, another water bodies, or the seacoast – determine the urban development and urban structure. The Neris River and its valley's, the Vilnia River, the Voke River and some natural lakes, and small water bodies present the water frame in Vilnius city and its suburbs (Figures 3 and 4). It embodies very important nature areas – the Verkiai Regional Park, Valakupiai forest, surroundings of Kalnu Park, Vingis Park, etc.

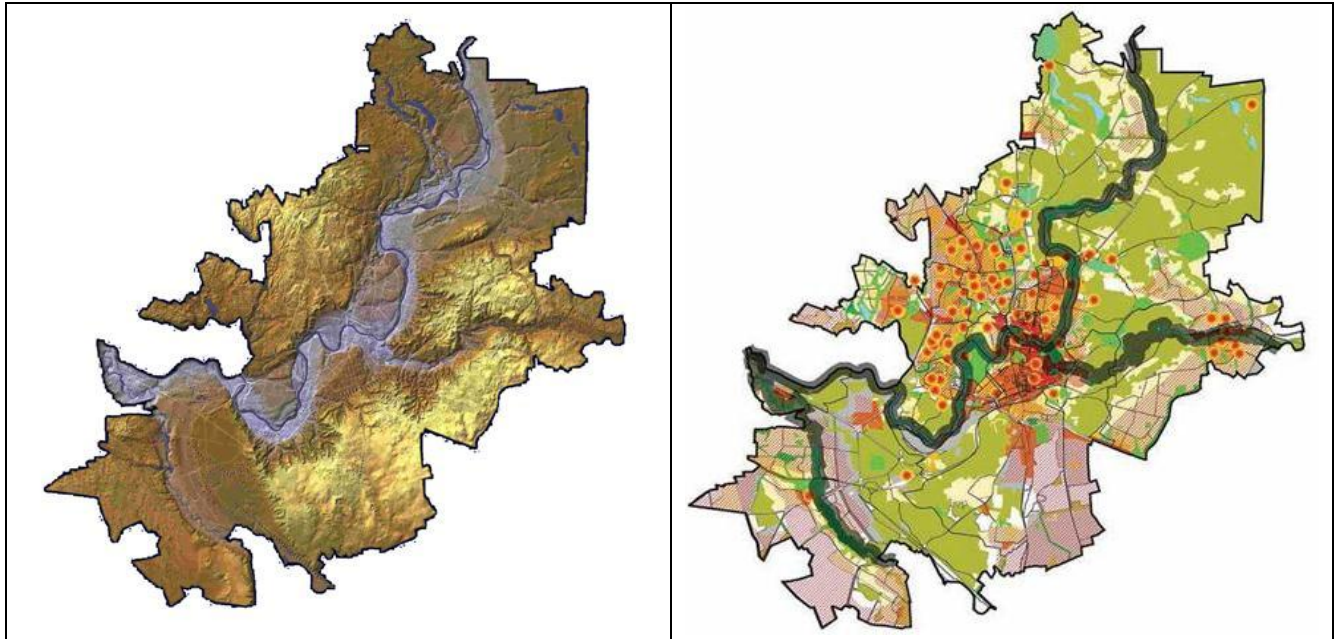


Figure 3. Topographical model of the territory of Vilnius city.

Figure 4. Water frame in the Master plan of the Vilnius city.

In the 15th and 16th centuries and later rivers were harnessed to power mills, the paper mills and other enterprises. At the end of the 19th century the Neris River was very important for wood transportations.

Nowadays the waterfront attitudes are developed in Vilnius city planning and in the built space policy.

4.2 The urban identity thanks to natural and cultural elements

Vilnius Old Town is a UNESCO World Heritage Site full of exquisite renaissance and baroque architecture objects, and one of its wonders is its setting. Not only it is at the foot of green hills, the Hill of Three Crosses, the Bekesh Hill, and the Duke Gediminas Tower Hill, but it has a large green space right at its centre through which two rivers flow (Figure 5). In the city

many important cultural heritage objects as the ancient gardens have survived. Most of the ancient gardens there are just a few of those which were overrun by town development and developed into public parks and squares.

The first and most important consideration about old green spaces or the green heritage is that it is an economic, ecological and aesthetic resource of urban infrastructure. We see the urban green areas as the most effective environmental protection tool and the background of urban ecological framework (skeleton), also the social and economic factor. Many old historical parks' revitalisation programmes or the feasibility studies are prepared in Vilnius city, e.g. Traku Voké Park, Bernardinu (Sereikiskiu) Park (Figure 6), Mission's Park, etc. According to the Master Plan of Vilnius city balanced spatial parameters of the landscape are preserved, the landscape management plans are prepared also. Special plans for protection zones; landscape preservation and revitalisation are being prepared now.

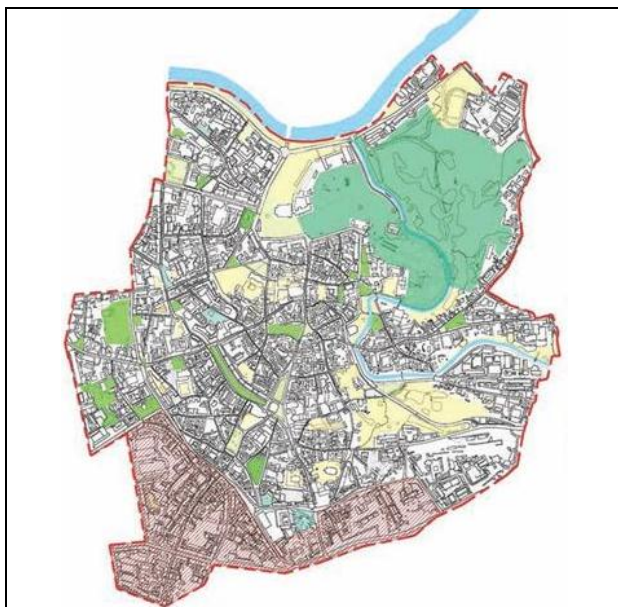


Figure 5. Vilnius Old Town green spaces structure



Figure 6. Sereikiskes Park Regeneration Project structure

Glorification of ownership rights, construction and territorial detailed planning process and methods as well as constantly increasing real property prices caused urban expansion in Lithuania, particularly in Vilnius city, denying environment and the existing set of values. The existing or potential green zones are often sacrificed to construct structures and buildings as only this enables to earn profit and benefit and to generate cash flows. Priorities for building-up, based on obtaining quick financial benefit, surpass all priorities of sustainable urban development. In many cities of Lithuania green zones became a neglected and mistreated urban reality.

The starting point of a good city planning and revitalisation programme is always the knowledge. The deeper is the knowledge, the more accurate will be the result. When dealing with historical parks we have in any way to consider that the past plays a very important role, and the revitalisation process is the moment in which the past turns towards the future. Following this principle, the strategy of Traku Voké Park conservation and development has been prepared (Pozzana, 2011), also the Special plans to manage this park, Lentvaris Park, and Uzutrakis Park were prepared previously. The strategy of Traku Voké or Lentvaris parks revitalisation programme has to start from recognizing all the existing features, understanding them as significant elements of Edouard André work, and at the same time it is necessary to implement all the possibilities to give new interest and identity to the park as a cultural heritage.

The present state of parks created by Edouard André in Lithuania is the result of a quite complex series of transformations and alterations. The four parks are quite different one from another, but all of them are living examples of André sensibility for the beauty of Lithuanian nature. The revitalisation programmes of these parks are in different stages and phases. The specialists prepared the Guidelines for the restoration of Traku Voké (Pozzana, 2011) and for other parks; but in any way it will be necessary to continue the researches about André projects, mostly using the Warsaw archives, and also the documentation of the Edouard André Association (France). We have more references about the projects and researches or studies *in situ* (André, 1906; André-Olivier, 2006; Deveikiene *et al.*, 2008; Deveikiene, Deveikis, 2011).

4.3 New urban landscape projects in Vilnius

Contemporary cities of the post-industrial era are facing some big challenges of abandoned territories. Different regeneration programs and ideas are being implemented in the cities and some of them have been turned into entire experimental urban labs. Nevertheless, landscape urbanism seems to take its right position and is very promising for sustainable and balanced future development in urban environment. One of the ways to develop the green regeneration is to use the potential of abandoned territories, which appear to be part of inner city's structure, while activating them, converting into recreational spaces and incorporating into the general system of urban recreation. The methods and solutions presented in the article are on the agenda of implementation at Vilnius City in historical environment and in the new development areas. Two case studies are reviewed: a conversion area Paupys in Vilnius Old Town and Gulbinai new residential area in Vilnius suburb.

Vilnius is a very green city and it has lots of recreational potential. However, it is not properly used and the system of urban recreation is fragmented. At the moment there is around 614 ha of the city's territory, which needs to be regenerated and this opportunity should be used to build up an even more accessible recreational network. Abandoned territories, such as sport stadiums developed during the Soviet regime, have a big potential to be activated as local recreational spaces as they are spreading quite gradually in the residential districts.



Figure 7. Conversion and planning proposal for Paplauja and Markučiai district in Vilnius city: recreational areas and green–blue corridors in urban structure. The material prepared by the Planning team at the workshop, 2008.

Water systems by applying integrated solutions are a tool for increasing aesthetical and functional quality of living and public spaces for their users from urban to local scales. Man-shaped water faces in forms of strands, swales and ponds have been used in connection to natural lakes and rivers in traditional urban development. Planned as a continuous system of rainwater basins stretching from the region to the city water elements is one of the strongest elements for creating an identity of newly developed areas in cities. Gulbinai, the new residential area in Vilnius suburb is good example of innovative “green–blue” town in the modern city (Figure 8). To achieve sustainability in using and managing the areas with ponds, swales and rivers in local environment is an innovative method of managing these public spaces. By giving over management of proximal public spaces with water elements to local urban communities public resource could be saved on moreover and these communities could get more consolidation.



Figure 8. Example of an innovative “green–blue” design and planning in Vilnius city. The rainwater management system is facilitating common environmental and landscape interests in the identified territory of “Gulbinai”. Source: Jakaitis, 2011.

On the basis of presented theories and practical case studies the article demonstrates how methods of integrating sustainable green spaces and water management solutions into urban tissue can bring higher aesthetical quality to urban landscapes and make more liveable spaces for city communities.

5. FINAL REMARKS AND CONCLUSIONS

The Charter of European Cities & Towns Towards Sustainability (1994) talked about the natural capital in cities and towns in art. I.6: “We, cities & towns, understand that the limiting factor for economic development of our cities and towns has become natural capital, such as atmosphere, soil, water and forest. We must therefore invest in this capital.” The green and blue infrastructure in the cities is this capital.

The cultural and natural heritage in Vilnius city and near Vilnius is very important for Vilnius city development. Three parks in Lentvaris, Traku Voke and Uzutrakis created by French landscape architects Edouard André and René André in 1898–1899, also other historic parks is the framework for green and blue infrastructure of the city with social, economic and aesthetic functions.

As the city landscape optimization problem expresses the aspirations of society against its structure, its decision largely depends on the intentions of the public cultural level, national economic development and education development level. Many new projects’ implementation issues are achieved for sustainability and city life quality in the last decade. The best solutions for Vilnius city landscape sustainability are the followings: to protect the natural morphology and biodiversity, to develop a different city structural (or urban–architectural) parts in the backgrounds of green and blue (water) infrastructure, to construct or converse territory (or living districts) as an element of city individuality in using the most valuable parts of the heritage.

In many of our articles we discuss issues pertaining to the cadastre and register of public spaces and primarily green zones (Deveikis, Deveikiene, 2008; 2010). A lot of green and water zones in the Lithuanian cities, also in Vilnius, do not have the established boundaries of cadastral parcels. Cadastral surveys have not been performed therein, and such parcels have not been registered with the Real Property Register. Municipal administrations are delaying to order and organise cadastral surveys of public spaces and public property.

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