

## THE CHANGES IN KAUNAS URBAN LANDSCAPE DURING THE PERIOD BETWEEN 2010 AND 2015

**Giedrė Ivavičiūtė**

Aleksandras Stulginskis University, Lithuania

Kaunas Forestry and Environmental Engineering University of Applied Sciences, Lithuania

Klaipėda State University of Applied Sciences, Lithuania

ivavice@gmail.com

### Abstract

The paper presents the comparative analysis of the Kaunas city landscape change during the period between 2010 and 2015. For this analysis, the land fund statistics of the Republic of Lithuania, which had been grouped into a relatively natural and anthropogenic landscape, were used. Landscape change is graphically shown in the figures. Lithuanian and foreign scientific literature and legal acts as well as planning documents were analyzed for the fulfillment of the work. The Kaunas city landscape analysis of the current situation was done. During the analysis the Kaunas city statistics were compared with the data of Kaunas County and the Republic of Lithuania.

The analysis showed that during the analyzed period the Kaunas city natural landscape area relatively increased by 1115.34 ha or 20.42 percent. The largest part of relatively natural landscape consisted of forests – 51.12 percent. During the period between 2010 and 2015, the anthropogenic environmental area increased by 47.33 hectares (2.80 percent.). In the period between the years 2010 and 2015, the Kaunas city anthropogenic landscape decreased by 1.189.41 hectares or 12.23 percent. This phenomenon was affected by the decrease of built-up areas of 1,233.36 hectares, or 14.10 percent. Built-up areas cover the largest part of the Kaunas city anthropogenic landscape – 88.09 percent. The analysis of the planning documents showed that after their implementation the built-up areas would increase, the aesthetic image of recreational environment would improve, the environmental condition would become of a higher quality.

**Key words:** landscape, anthropogenic landscape, the landscape change.

### Introduction

*Article relevance.* Landscape structure maintenance is the subject important and relevant to this day, as the landscape shapes the country's culture and is the component of natural and cultural heritage contributing to the quality of life and it consolidates Lithuanian identity, uniqueness in Europe and the world.

Over the last century Lithuanian cities have experienced several fundamental transformations of their urban form. From historical compact towns they became large cities with distinct characteristics of late-soviet era (Cirtautas, 2014).

In Lithuania, as well as throughout Central and Eastern Europe, territorial economic organizations, the territorial management system are radically changing, population migration is intensifying, urbanization is developing, other intensive public geographical processes are going on. Studies of those processes, with emphasis on the state and change of landscape structure are absolutely necessary in order to support and implement the principles of sustainable development, to form the optimal landscape that meets the needs of modern society.

The landscape structure optimality concept and its changes depend on public awareness, information and technical volatility (Skorpskas, 2001).

European Landscape Convention (European, 2000) describes the landscape as people perceived area, as determined by the nature and (or) the factors of human action and interaction.

It is noted that the landscape evolved and changed over time, exposed to nature and people.

In the convention, the concept of landscape differs from the concept contained in some documents in which the landscape is considered as 'property' (landscape concept of heritage sense) and evaluated (as 'cultural', 'natural' landscape and the like) as part of physical space (Recommendation, 2008).

Scientific opinion on the subjective dimension and the relevance of related sociological studies, while evaluating and developing the environment, is different. For example, professor P. Kavaliauskas criticizes the European Landscape Convention. According to him, of all the environmental concepts it stands out in terms of the dominant populist approach and even in the concept of landscape itself it emphasizes not the objective scientific understanding but the subjective one of the local population, which is focused on quality objective as the aspirations of the wording in relation to their surroundings landscape features, understanding. Meanwhile, scientists J. Stephenson, G. Swensen and G. B. Jerpasen emphasize the social dimension of the landscape and the local communities, planners and other specialists poll importance in the exploration and evaluation of landscapes (Gražulevičiūtė-Vileniške, 2014).

According to the degree of anthropogenic impact, the two following basic types of landscape are being singled out (Bučas, 2010): natural and cultural. Professor Bučas says that the natural landscape is designated as human economic or other activities

intact or only slightly touched natural landscape, as such in Lithuania, as well as in many other countries, with the exception of reserves, does not exist. G. Kisielienė agrees with the professor, arguing that the natural landscape can be seen only in Lithuanian reserves (Kisielienė, 2012).

The Environmental Protection Agency in the publication 'Lithuanian natural environment, state, processes and development' (Aplinkos, 2008) stated that in general, the current Lithuanian cultural landscape of the territorial structure of the main features led to purposeful planning, experienced in strong centralized management.

Therefore, rural (agrarian) and urban (urbanized) landscape structures reinforce prints clearly defined by coded planning purposes and sought to benchmarks and a variety of the mentioned prints shape the structural diversity of cultural landscape of these days.

However, the landscape spatial structure diversity of the Republic of Lithuania and the types of identification study state (Lietuvos, 2005) that the cultural landscape consists of 15 percent of the Earth surface, 5 percent consist of incomplete, weak and marginalized anthropogenic structured nature landscape, 80 percent of the Earth consist of natural landscapes, from which 65 percent - marine, terrestrial nature covers 15 percent of the Earth's surface, or 38 percent of the entire planet's land.

Natural frame in Lithuania amounts to 61.4 percent of the whole territory of the country and it represents a large proportion of natural and semi-natural areas (Mieliuskas & Palaima, 2012).

According to the National landscape plan, the cultured agrarian nature landscape model should dominate in Lithuanian landscape formation. By one-fifth of the territory cover a mixture of forested little cultured and natural forested landscapes (Lietuvos, 2012).

In Lithuania, cities and other residential areas are spread evenly throughout the country and are well enough to reach, which makes it rational to distribute economic and social potential, to more rapidly expand regions lagging behind, to reduce the disparities in development (Nacionalinė darnaus, 2011).

However, anthropogenisation affects the natural environment, so the expansion of cities, its areas are decreasing and components are vulnerable. Thus, the landscape changes are connected with urban sprawl, the change in urban and natural areas ratio, landscape condition (from psychoecological point of view).

The modern city is faced with new forms and functions (Loureiro, 2014). Cities are experiencing prosperity and decline phases. With the change of policy and external environment, social processes, that influence urban change, are changing as well (Wekel & Koriakina, 2014).

The changes in the landscape caused by global urbanization, form territories distinguished for new, unusual characteristics or their combinations. In order to better understand processes going on in the area of city's influence, scientists are developing theoretical models of urban and rural environmental interactions (Brinkytė & Gražulevičiūtė - Vileniškė, 2013).

Lithuanian landscape studies show that these issues are highly relevant and should be carried out continuously (Balevičiūtė & Veteikis, 2012).

The biggest gap is targeted studies of cities and towns involving long-term historical perspective. Lithuania is in exceptional situation – the country is at the intersection of Western and Eastern cultures, so a lot of its significant historical events are related to changing regimes and ideologies. This uniqueness determines imbalances and strains of specific urban structures characteristic to the development of cities and towns, eclectics and change of architectural styles, sporadity of cultural layer (Rubavičius, 2013).

*The object* of the research – Kaunas city landscape.

*The aim* of the research is to carry out the analysis of the changes in Kaunas City landscape during the period between 2010 and 2015.

*Goals* of the research:

1. To describe and analyze the current situation of natural and urban landscape elements of Kaunas city.
2. To analyse the changes in Kaunas city landscape during the period between 2010 and 2015.
3. To anticipate trends in landscape change.

## Materials and Methods

Comparative, analytical as well as statistical and logical analysis methods were used for the research.

The article analyzed Lithuanian and foreign scientific literature and legal acts.

The analysis of the scientific literature revealed conflicting opinions on the issues of the term of landscape and naturalness of landscape. Also, the following planning documents were analysed in the work: the general plan of the Republic of Lithuania, the National landscaping plan, the general plan for Kaunas city territory and so on. The collected material was analyzed, systematized and generalized.

The land fund statistics of the Republic of Lithuania (Nacionalinė žemės, 2010 – 2015), graphically depicted in figures, were used for the fulfilment of the research of the Kaunas city landscape change for the years 2010 – 2015. During the study, Kaunas city landscape was divided into relatively natural landscape, anthropogenic and anthropogenized landscapes. Each type was analyzed, a five-year change was set.

During the analysis the Kaunas city statistics were compared with the data of Kaunas County and the Republic of Lithuania.

The paper presents the Kaunas city landscape change causes, problems and trends of the planned change.

## Results and Discussion

### *The current situation of Kaunas city landscape*

Kaunas – the second metropolitan city in Lithuania, a large centre of industrial, cultural, technological and scientific potential. The city is located at the intersection of the main Lithuanian roads and national and international integration axes; it is crossed by two international transport corridors, existing and planned European gauge railway tracks, potential river corridors, not far away – the airport and a free economic zone (Zaleckis, Kaimičaitytė – Virbašienė, & Ramanauskas, 2013).

Kaunas city has a municipal status; it is divided into 11 subdistricts. The city covers an area of 15,688.47 hectares, i.e. 1.94 percent of Kaunas County and 0.24 percent of the area of the Republic of Lithuania.

Landscape structure of the city of Kaunas consists of both natural and anthropogenic components that intertwine with each other and form the urban landscape. Kaunas city is situated on the plain, which has risen over the sea level averagely by 70-80 meters.

According to Lithuanian physical-geographical classification, the territory of Kaunas city belongs to Baltic lowlands area, the Nemunas midland and the Neris lower reach plateau zone, which includes the central lowlands and highlands Baltic contact zone. According to biogeographical classification, according to wildlife Kaunas city falls to the east of the Baltic province, Nemunas Valley unit. In urban areas, coherent and strong moderate as well as bulk moderate primers are spread fully (Kaunas, 2011). The prevailing are heavy loam and clay soil types.

Nemunas and Neris river valleys and their slopes – the main axes of the Kaunas city natural frame.

In the Republic of Lithuania, protected areas consist of 15.71 percent of the country's area (Saugomų, 2016). In Kaunas municipality, there are 1,822.42 hectares of protected areas (excluding 'Natura 2000'), i.e. 11.60 percent of the analyzed municipal area. Kaunas city parks and squares occupy 731.91 hectares and consist of 4.66 percent of the Kaunas city area. Central greeneries occupy 218.42 hectares (1.39 percent), regional greeneries – 406.02 ha (2.59 percent.), cultural, historical parks – 122.84 ha (0.78 percent.), i.e. 11.60 percent of the analyzed municipal area.

The natural situation and historical circumstances determined the Kaunas city urban-architectural structure. Nemunas and Neris rivers, relief formed by small streams, green areas created peculiarities of the territory urbanization. There are 1,232 objects of cultural heritage in Kaunas city, of which 1,043

objects include immovable and 189 – movable cultural heritage.

The Kaunas city urban structure was formed over a long period of time and is a result of the urban development of many centuries. The future urban development will depend on the economic, social and political processes taking place in Lithuania.

### *Kaunas city landscape change*

Natural conditions within the designed Kaunas city have uniqueness and until the beginning of the twentieth century had a huge impact on the territorial development, spatial structure and landscape identity of the city. Therefore, in order to continue to build a distinctive Kaunas city landscape, it is necessary to maximize the value of the natural conditions of the city, its distinctive character during the formation of urban structures.

The naturalness of landscape structure in the city can be classified into the following groups: relatively natural areas, anthropogenic impact areas, anthropogenic areas.

The relatively natural landscape in this article is understood as a landscape, which has preserved the greater part of the natural components, with the experience of transforming human influence though. Anthropogenic environment is perceived as favourable for life environment, slightly changed by human activity, which preserves the natural and cultural coexistence options. Anthropogenic areas – the environment transformed by human activity.

Lithuanian natural frame consists of over 60 percent of the area of the country, its territorial management and planning is complex. The Kaunas city natural frame consists of about 45 percent of the municipal area and is a natural part of the country's natural frame.

*The relatively natural landscape of the city of Kaunas.* In 2010, natural landscape covered 4,346.28 ha, i.e. 27.66 percent of the Kaunas city area, in 2015 – 5,461.60 hectares, or 34.81 percent. Within five years, relatively natural landscape area increased by 1115.34 ha (Fig. 1). This was influenced by the development of the areas of forests and meadows as well as natural grasslands. During the period between the years 2010 and 2015 the forest area in Kaunas city increased by 5.16 percent, in Lithuania – by 4.27 percent, in Kaunas County – 2.77 percent. In Kaunas city, meadows and natural grassland areas increased by 82.31 percent, while in the country and county the decline in these areas was set, as appropriate: 41.57 percent and 11.13 percent.

In 2015, the largest part of the relatively natural landscape consisted of forests – 51.12 percent and water bodies – 24.39 percent, the smallest part – wetlands (0.03 percent.).

Forests assigned to the subgroup of urban forest have integrated both recreational and ecological functions and under Kaunas city conditions, in which most of these forests are located on the slopes of little-used recreation, their ecological function is even more important. Urban natural landscape, greenery play an important ecological, aesthetic and recreational role, but attention and resources for their maintenance are insufficient.

*Kaunas city anthropogenized landscape.* In 2010, Kaunas city anthropogenized environmental area totaled 1,644.17 hectares and amounted to 10.46 percent. Kaunas city area, in 2015 was 1,691.50 hectares (10.78 percent.).

After analyzing the data obtained, one can see that the area of anthropogenized environment during the period between the years 2010 and 2015 increased by 47.33 ha (2.80 percent) (Fig. 2). The increase of trees and shrubs plantations resulted in the development of this landscape, which increased by 463.06 ha or 82.03 percent during this period. Tree and shrub plantings in 2015 occupied 564.53 hectares or 33.36 percent of the Kaunas city anthropogenized landscape area. Trees and shrub plantation development was influenced by the development and expansion of recreational areas, arrangement of green paths, etc.

In Lithuania and Kaunas county, during the period between the years 2010 and 2015 the increase of these areas was identified as well: in the country – 23.56 percent, in the county – 11.25 percent.

Greeneries and plantations growing there make up an aesthetic environment of the city, connect buildings and facilities with urban or natural landscape.

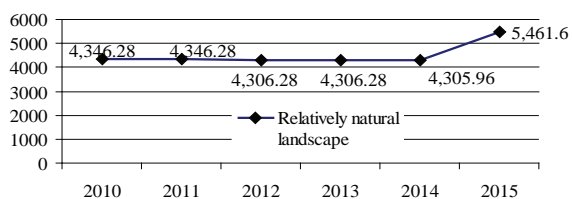


Figure 1. Relatively natural landscape change in Kaunas city in hectares during the period between the years 2010 and 2015.

*Anthropogenic Kaunas city landscape.* Anthropogenic areas include: built-up areas, roads, damaged land. In 2010, anthropogenic landscape covered 9,724.78 hectares and amounted to 61.88 percent of the Kaunas city area, in 2015 – 8,535.37 hectares (54.40 percent.). During the period between the years 2010 and 2015 the anthropogenic landscape of Kaunas city decreased by 1,189.41 hectares or 12.23 percent (Fig. 3). This was affected by the decrease of built-up areas by 1,233.36 hectares or 14.10 percent. The decrease resulted in the development of

individual and tied green plantations, afforestation of public spaces and recreational areas, management of abandoned areas, conversion of old, unused stadiums into the natural environment, as well as the integration of green areas into residential, public, commercial and industrial areas.

Meanwhile, in the Republic of Lithuania and Kaunas county the built-up areas during the analysed period have increased: in the country – 25.35 percent, in the county – 15.66 percent.

Built up areas occupy the largest part of anthropogenic landscape of Kaunas city – 88.09 percent.

Road area is gradually increasing every year, and in 2015 it ranked 1,004.38 ha. The area increased by 38.69 hectares or 3.85 percent. Transportation need is rising constantly, thus increasing the number of cars on roads, which has a significant impact on road and street network load. With the growing number of cars, road and street network development is being installed, the gradual reconstruction of the existing network goes on, the permanent surveillance is being improved.

During the analyzed period, the affected land area has increased by 47.32 percent and in 2015 it covered 11.96 hectares and made up the smallest part of anthropogenic landscape – 0.14 percent. However, both in Lithuania and the county violated land area decreased: in the country – 0.95 percent, in Kaunas County – 3.90 percent.

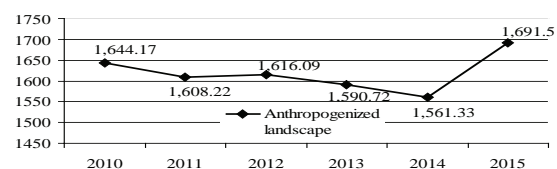


Figure 2. Anthropogenized landscape change of Kaunas city in hectares during the period between the years 2010 and 2015.

Summarizing the relatively natural, anthropogenized and anthropogenic spatial data of the city of Kaunas, it was found that relatively natural areas increased by 1115.34 ha, anthropogenized areas also increased by 47.33 ha and anthropogenic areas decreased by 1,189.41 hectares (Fig. 4).

While analyzing percentage distribution, it was determined that anthropogenic landscape in 2010 accounted for the most part of the city of Kaunas (61.88 percent.), in 2015 – 54.41 percent. It was found that the reduction of anthropogenic landscape was influenced by the decline of built-up areas caused by the development of individual and tied green plantations and recreation areas. Anthropogenic landscape occupied the smallest part of Kaunas city:

in 2010 – 10.46 percent, in 2015 – 10.78 percent.

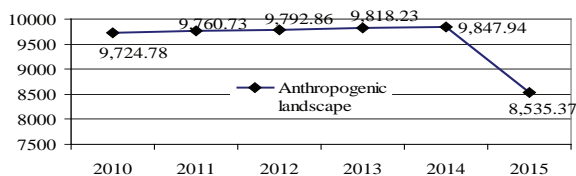


Figure 3. Anthropogenic landscape change in Kaunas city in hectares during the years 2010 and 2015.

The structure of urban areas is influenced by the natural environment in which the city was established and was expanding. Therefore, the city landscape – an important factor of the city's farming lands structure affects the distribution of natural farming lands (Milius & Ribokas, 2004).

The main factors influencing the quality of the living environment of the city are *urban natural and semi-natural and built-up areas ratio (rate of naturalness)*, which in the city of Kaunas in 2015 was 34.81 / 10.78 / 54.41. The optimal ratio of relatively natural and anthropogenized areas and anthropogenic territories in European cities makes up 1/3 of the city area. The above analysis shows that the ratio of the mentioned areas in Kaunas city corresponds to the European urban planning guidance.

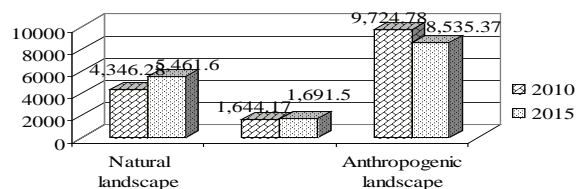


Figure 4. Kaunas city landscape change during the period between the years 2010 and 2015.

*Territorial-urban problems of Kaunas city.* Kaunas is situated in the center of Lithuania and is surrounded by demographically, structurally and ethnically balanced districts without greater economic and social contrasts.

Kaunas city has many advantages, but there are unresolved territorial-urban problems as well: Kaunas city asymmetric configuration, unevenly developed area, insufficiently balanced architecture of workplaces, housing, recreation areas, urban physical and urban environment features, communications of the urban parts passing through the center, the lack of attention to the natural environment, neglected and therefore unattended green areas of riversides and slopes, the lack of the functional quality in the central part and its adjacencies, deteriorated urban environment.

*Expected future changes.* The accuracy of the projection of the city landscape condition depends on the chosen method. The only source on which it is possible to accurately predict the landscape change is – the planning documents. The analysis of the general plan of Lithuanian territory (Lietuvos, 2002), the National Landscape Management Plan (Lietuvos, 2012), Kaunas Metropolitan Area General Plan (Kauno, 2013) showed that one of the goals is not to reduce green space, as well as to develop recreational infrastructure, to upgrade and expand recreational small architectural objects, to update and expand pedestrian and cycling systems, to equip 6 beaches, to renovate apartments and their environment. The plan provides for the development of apartments in the areas of multi-high intensity and mixed construction, construction of individual houses in undeveloped areas on the periphery of the city. 13 undeveloped business and industrial areas are being projected. It is also intended to deal with the parking and traffic problems of Old and New Town and other microdistricts.

It can be argued that after the implementation of Kaunas city master plan, built-up areas would increase, aesthetic view of the recreational ambient would improve, visual status of living environment would become of higher quality.

Sustainable urban development is inseparable from the public welfare, vibrant economy, healthy environment as well as from active and constructive community.

## Conclusions

1. According to Lithuanian physical-geographical classification, the Kaunas city territory belongs to the Baltic lowlands area, the plateau region of the lower reaches of the river Neris and Nemunas midland, the composition of the soil type - heavy loams and clays; terrain – smooth. Protected areas constitute 11.60 percent of the entire Kaunas Municipality area.
2. During the period between the years 2010 and 2015, the relatively natural landscape area increased by 1115.34 ha or 20.42 percent. This was influenced by the development of areas of forests, the area of which increased by 5.16 percent as well as the increase of meadows and natural grassland areas, which increased even by 82.31 percent. In 2015, the largest part of the relatively natural landscape consisted of forests – 51.12 percent and water – 24.39 percent, the smallest part consisted of wetlands (0.03 percent).
3. Anthropogenized environmental area during the period between the years 2010 and 2015 increased by 47.33 hectares (2.80 percent). The reason – the tree and shrub plantations increase of 82.03 percent.

4. During the period between the years 2010 and 2015 the Kaunas city anthropogenic landscape decreased by 1,189.41 hectares, or 12.23 percent. This was affected by the decrease of built-up areas by 1,233.36 hectares or by 14.10 percent. It was found that the reduction of anthropogenic landscape was influenced by the decline of built-up areas caused by the development of individual and tied green plantations and recreation areas. Built up areas cover the largest part of the Kaunas city anthropogenic landscape – 88.09 percent.
5. In 2015, the Kaunas city naturalness index was 34.81 /10.78/54.41, which corresponds to the European urban planning guidance.
6. The main problems of the city of Kaunas are as follows: asymmetric configuration; unevenly developed area; insufficiently balanced structure of housing and recreation areas; physical and urban environment peculiarities of the city parts communications going through the center of the city; lack of functional quality of the central part and its adjacencies.
7. The analysis of the planning documents showed that the implementation of the solutions of the general plan of Kaunas city, built-up areas would increase, the aesthetic appearance of the recreational environment would improve, the visual status of living environment would become of a higher quality.

### References

1. Aplinkos apsaugos politikos centras. (2013). 2014 – 2020 m. ES struktūrinės paramos veiksnių programos strateginio pasekmių aplinkai vertinimo ataskaita (Report on EU structural support for the action program of the strategic environmental impact assessment for the years 2014 – 2020). Vilnius, 187 p. (in Lithuanian).
2. Balevičiūtė, A., & Veteikis, D. (2012). Renatūralizacijos pokyčiai Lietuvos kraštovaizdyje 1995 – 2010 metais (The Changes of Renaturalisation in Landscape of Lithuania during the period between 1995 and 2010). *Geografija*. T. 48. Nr. 2. pp. 132-144. (in Lithuanian).
3. Brinkytė, E., & Gražulevičiūtė - Vileniškė, I. (2013). Urbanizuoto ir kaimiškojo kraštovaizdžių sąveikos raiška ir panaudojimas formuojant miestų želdynus (Urbanized and rural landscapes interaction resolution and use when forming urban green areas). *Miestų želdynų formavimas* 1 (10), pp. 30-40. (in Lithuanian).
4. Bučas, J. (2010). Miesto drieka kaime: socialinis ir aplinkosauginis aspektai (City development in rural areas: social and environmental aspects). IV Lietuvos urbanistinis forumas. Urbanistinė drieka: miesto ir kaimo sandūra. Mokslo straipsnių rinkinys. pp. 5-11. (in Lithuanian).
5. Cirtautas, M. (2014). Changing form of the Baltic cities: resurrection of the suburbs. *Our Common Future in Urban Morphology*. FEUP, Porto. Vol. 1, 79 p.
6. European Landscape Convention, Florence. (2000). 9 p.
7. Gražulevičiūtė-Vileniškė, I. (2014). Sociologiniai urbanizuotos aplinkos tyrimai: patirtis ir kryptys (Sociological studies of the urban environment: experience and directions). *Tiltai*, 2014 (3). pp. 35-52. (in Lithuanian).
8. Kauno miesto įvaizdžio strategija (Kaunas city image strategy). (2011). Kaunas, 140 p. (in Lithuanian).
9. Kauno miesto savivaldybės teritorijos Bendrasis planas (General Plan of Kaunas Municipality area). (2013). Aiškinamasis raštas. 5 tomas. Sprendiniai. Kaunas, 2013. 125 p. (in Lithuanian).
10. Kisieliene, G. (2012). Gamtinių išteklių, kraštovaizdžio ir bioįvairovės apsauga (Protection of natural resources, landscape and biodiversity). *Jaunųjų mokslininkų darbai*. Šiaulių universiteto leidykla. 2012, Nr. 5 (38) pp. 130-135. (in Lithuanian).
11. Lietuvos Respublikos kraštovaizdžio erdvinės struktūros įvairovės ir jos tipų identifikavimo studija. Kraštovarkos supratimo ir jo erdvinės struktūros pažinimo nuostatos. I dalis (2005). (The Ministry of Environment of the Republic of Lithuania. Part I. The study of the identification of landscape spatial structure diversity and its types in the Republic of Lithuania. Provisions of the landscape understanding and its spatial structure knowledge). Vilnius, 124 p. (in Lithuanian).
12. Lietuvos Respublikos aplinkos ministro įsakymas 'Dėl Nacionalinio kraštovaizdžio tvarkymo plano parengimo' (2012 05 28, Nr. 446) (Decree of the Lithuanian Minister of the Environment On the national landscape management plan preparation). Iš Valstybės žinios: 2012, Nr. 60-3028. (in Lithuanian).
13. Lietuvos Respublikos aplinkos ministro pakeitimo įsakymas 'Dėl atskirųjų rekreacinės paskirties želdynų plotų normų ir priklausomųjų želdynų normų (plotų) nustatymo tvarkos aprašo patvirtinimo' (Amending Order of the Minister of Environment of the Republic of Lithuania 'On the Approval of the Procedure for the determination of the separate recreational green space norms and standards of tied green spaces (areas)'). (2007 12 21, Nr. D1-694; 2014 01 14, Nr. D1 – 36). Iš Teisės aktų registras: 2014, Nr. 2014-00298. (in Lithuanian).

14. Lietuvos Respublikos Seimo nutarimas 'Dėl Lietuvos Respublikos teritorijos bendrojo plano patvirtinimo' (Resolution of Lithuanian Seimas 'On the approval of the general plan of the territory of the Republic of Lithuania'). (2002 10 29, Nr. IX-1154). Iš Valstybės žinios: 2002, Nr. 110-4852. (in Lithuanian).
15. Loureiro, V. (2014). Favela: informality leading spontaneity into contemporary city. *Our Common Future in Urban Morphology*. FEUP, Porto. Vol. 1, 199 p.
16. Mieliauskas, P., & Palaima, A. (2012). Ekologinis tinklas Lietuvoje: kūrimo principai gamtinio karkaso pagrindu (Organic net in Lithuania: the principles of the development on the natural frame basis). *Darnaus vystymosi strategija ir praktika / Mokslo darbai*. Vilnius, pp. 58-77. (in Lithuanian).
17. Milius, J., & Ribokas, G. (2004). Žemėveikšlių apskaitos statistinės ypatybės: kaita ir dabarties problemos (Land accounting statistical characteristics: change and present problems) *Geografijos metraštis*, Nr. 37 (1-2) t. pp. 175-183. (in Lithuanian).
18. Nacionalinė darnaus vystymosi strategija. (2011). (The National Strategy for Sustainable Development). Lututė: Vilnius, 2011. 100 p. (in Lithuanian).
19. Nacionalinė žemės tarnyba prie Žemės ūkio ministerijos. Lietuvos Respublikos žemės fondas (The Land Fund of the Republic of Lithuania). Vilnius. 2010 – 2015. 144 p. (in Lithuanian).
20. Saugomų teritorijų statistika (Statistics of the Protected Areas). Retrieved January 15, 2016, from <http://www.vstt.lt/VI/index.php#/188>. (in Lithuanian).
21. Skorupskas, R. (2001). Optimalaus kraštovaizdžio sampratos problema (The problem of the optimal landscape concept). *Geografija* 37 (2), 2001, ISSN 1392-1096, pp. 58-64. (in Lithuanian).
22. Recommendation CM/Rec (2008). 3 of the Committee of Ministers to member states on the guidelines for the implementation of the European Landscape Convention, 25 p.
23. Rubavičius, V. (2013). The visibility of cultural memory: urban aspect. *Sovijus*, 1(1), pp. 60-67.
24. Wekel, J., & Koriakina, P. (2014). Changing features of the urban structure in a transitional city. *Our Common Future in Urban Morphology*. FEUP, Porto. Vol. 1, 210 p.
25. Zaleckis, K., Kaimičaitytė - Virbašienė, J., & Ramanauskas, E. (2013). Kauno miesto identiteto formantų išsaugojimo galimybės planuojant miesto vystimąsi (Kaunas city identity formants conservation opportunities in planning urban development). *VII Urbanistinis forumas. Miestas ir vanduo*. 2013. pp. 43-47. (in Lithuanian).