FUNCTIONAL ROLE OF GREEN AREA SYSTEM IN KAUNAS SPATIAL PLANNING

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Abstract
The aim of the research is to assess the system peculiarities in terms of green areas and plantations in Kaunas. Together with the analysis of Kaunas recreational system, the problems of the system of green areas functioning in the city emerged, because urbanization in the city has split up the system of green plantations into small areas and violated their functions. The available General Plans of the city have already attempted to improve the current situation. However, the real endeavors or actions taken, which could shape or structure the unified system of the territorial greenery are very insignificant. The location of territorial green plantations in Kaunas is not equivalent, the majority of them coincide with the green plantations of the local residential areas, but in the newly developed neighborhoods could be vividly witnessed the shortage of green areas. To optimize the system of green plantations of the city it is suggested, when designing new residential areas to be developed, to plan areas for greenery, introduce green connections into the system of green plantations, to create migration corridors and structure the integral system of green areas.
Key words: green areas/green plantations, green connections, green space system.

Introduction

Kaunas distinguishes itself by the abundance of trees and shrubs, pleasant greenery, which adds to the cosines and charm of the landscape. Kaunas has a great number of green plantations, but those adapted to the needs of the residents and nicely arranged is considered to exist very few. The areas of greenery in the city fulfill very important functions, namely architectural, social, economical, compensatory, technical protective role for an inhabitant of the city. It is very important to pay attention to the formation and expansion of green plantation zones in the city, because due to the rapid increase of urbanization, due to the growth of the number of cars and motoring, the attempts have been made to make profit from the tiniest land parcels and therefore, in the context of the above mentioned factors more often that problem is forgotten and left out. Besides that, it is obvious that when developing new residential areas there is practice to pay insignificant attention to the formation of green areas.

The Law on Green Areas issued on January 1, 2008 m (Lietuvos..., 2007), legitimized the major goals concerning the protection and management of green areas, the tasks and ways for their enforcement. The main objectives of the law are to ensure the protection of green areas and take care of their usage, safeguard them from the devastation or total loss, to uphold the biological diversity; to ensure the stability of the landscape and quality of the environment, possibility to perform ecological, economical and social functions for vegetation at present and in future; to regulate the terms and conditions in the field of protection, usage, and development of green areas approved and agreed by with the municipality and other institutions, organizations, legal and natural person, especially the owners of private land parcels.

When viewed optimistically, the maintenance and protection of greens plantations (trees, flower gardens, shrubs, lawns and other areas of greenery) should have to improve gradually and the measures taken against pests, diseases, activities should have to be changed for better. However, the casual attitude is still present there and it has not diminished currently in terms of environmental protection, unreasonable usage of natural resources, relevancy for recommendations concerning damage caused and etc.

The aim of the research is to assess the peculiarities of green areas in Kaunas city.

The main objectives of the research:

1. To analyze the documents of territorial planning and legal framework protection of plantations for Kaunas city.
2. Identify an existing distribution of green space and optimal opportunities of development.

Methodology of the research and materials

One of the most significant documents determining the order of planning green areas in Kaunas is the General Plan of Kaunas Municipality for 2013-2023 (Kauno…, 2014). The objective of the plan is to generate the vision of the city, to assess and continue the process of the planning of the city and improve the environment of the city. One of the future points concerning the vision is the city with

the optimally developed environmental system of green plantations such as parks, forests, green connections and everything that is essential for the perfection of the state of the environment and conditions for recreation and relaxation. Besides, the General Plan points out that public places in the city have to be open to green areas and water reservoirs, the city has to make efforts to clean and tidy up idle and messy territories in the city. Moreover, the General Plan for 2003 – 2013 (Kauno…, 2003) prescribed the urban vision of the city; so far it is relevant even today. The newly approved General Plan for 2013 – 2023 which is valid for all the areas of land under the jurisdiction of Kaunas municipality (Kauno…, 2014) prescribed the necessity for continuing the determined urban vision described in the General Plan for 2003 – 2013 even though slightly amended.
The objective of the study is directed towards the system of Kaunas city green areas.
With reference to the documents on Kaunas spatial planning and on the scientific works, there was identified and analyzed the current and future system of green areas. The comparative analysis was carried out and by applying the method of generalization the visions and conclusions were formulated.
The main functions regarding the green areas and plantations in the city are the following: urban-ecological, technical protective and architectural social. It is possible to have ecologically, esthetically, functionally, economically reliable environment by properly and intentionally applying the specific characteristics of green vegetation. Therefore, the network of green areas and plantations has to be incorporated into the unified and integral system of the city.

Distribution of green areas in Kaunas city

Nature frame performs a significant place when determining the system of green area formation, the tasks of the sustainable development of the city. It comprises a significant part of the spatial structure of the city, ensuring the ecological balance of the landscape, rational use of natural resources, preservation of natural and cultural heritage and harmonious development of the city. Kaunas nature framework was provided not only in the former General Plan (for 2003 – 2013), but also in the newly approved General Plan (for 2013 – 2023) of the city. The background of the nature frame comprises the objects and protected areas, registered in the registers at the corresponding institutions. The Law on the Protected Territories (Lietuvos..., 2001) defines the term of a nature frame as the integral network of natural ecological compensation, connecting the territories protected by natural ties as well as territories and habitation relevant for the environmental protection, assuring the migration of animals and plants, as well as maintaining the ecological balance of the landscape. Thus, it is possible to state that the main objective of the nature framework is to integrate the territories bearing the highest ecological significance into the integral territorial network and protect them.
The functions of the ecological compensation in the city more or less are performed by all the green areas. The green area sections of indefinite extent (forests) cope with the task best of all; they are interconnected by green connections and possess huge biological diversity. The largest forests allocated under the jurisdiction of Kaunas municipality are Kleboniškio, Pažaislio, Panemunės forests, which are significant for their considerably large biological diversity and they contribute to the ecological state and conditions of the city. However, the possibilities of ecological compensation of those huge forest sections are not fully made use of, due to their territorial fragmentation, the absence of green connections leading to the other areas of green plantations.
The nature frame of the city and the system of green areas is not completely judicially legitimized and protected. The issues of the ratio of green plantation systems with the city nature frame have not been solved yet.
The inventory of Kaunas green areas was made in 1999. Then Kaunas green areas comprised 64.75 % of the total area of the city (10175.662 ha). Today not all the green areas have the approved boundaries. Forests occupy 2998.27 ha; parks and squares make 731.91 ha. All the green areas of Kaunas are divided into three groups having their own land use. They are the following:

- Forestry land (all groups of forests);
- Agricultural land (territories for amateur, specialized gardening);
- The other land use (territories for separate green plantations, territories for general land use, recreational territories).

The General Plan for 2003-2013 (Kauno..., 2003) indicated the categories of the systems of green areas with individual determined land parcels having the approved boundaries and included into any of the category of green areas. They are recreational forests i.e. forest parks, green areas of general use (disconnected), green plantations such as parks, squares, green connections. Unfortunately, during the current period the status only for four (4) forest parks was approved by special documents and detailed

plans issued by the municipality (but seven more forest parks will be approved). By issuing special documents and detailed plans the municipality validated the status of twenty (20) parks (25 will be approved), the status of eight squares (63 will be approved) but not a single green connection (21 will be approved) got the status.

With reference to the norms and standards of individual green areas (Atskirųjų.., 2007), the recreational plantations are standardized, as well as classified according to their position, significance for the city. Recreational green areas and plantations include city parks (Table1.), squares, and green connections, open green areas located close to the enterprises, institutions and undertakings.

Table 1

City parks in Kaunas

No	Park title	Area ha
1	Oak park (Žaliakalnis)	78.4
2	Petrašiūnų (Petrašiūnai)	56.48
3	Lakštingalų (Palemonas)	45.0
4	The Nemunas Island (Naujamiestis)	25.0
5	Santakos (Senamiestis)	13.54
6	Armališkių (Vaišvydava)	7.37
7	Aukštosios Fredos (Freda)	3.00
8	Aukštųjų Šančių Oak park (A. Šančiai)	39.82
9	Brastos g. park (Vilijampolė)	32.1
10	Draugystės (Dainava)	15.82
11	Kalniečių (Eiguliai)	21.2
12	Naugardiškių (Kazliškiai)	2.6
13	Nepriklausomybės (Rokai)	125..
14	The Neris riverfront(Vilijampolė)	26,0
15	Veršvos (Smėliai and Linkuva)	108.8
16	Vieviržio (Palemonas)	9.21
17	Žemųjų Šančių (Ž. Šančiai)	15.05
18	Old city graveyard(Naujamiestis)	8.37
19	IX fort (Panerys)	22.0
20	Marvos mansion(Marvelė)	6.14
21	Sargėnų mansion (Sargėnai)	3.43
22	VI fort (Amaliai)	13.3
24	Sargėnų water ponds (Sargėnai)	15.0
25	Vaišvydavos (Vaišvydava)	54.60

In terms of the significance, the recreational green areas are divided into central, regional, territorial. Kaunas city central green areas include large areas of land, used for recreation such as Ąžuolynas (Oak park), Santakos Park, the Nemunas Island Park, Petrašiūnų Park, Lakštingalų Park. In accordance with the standards of the individual green areas (Individual .., 2007), the mentioned above green areas could be moved away from the residential territories not longer than 1-3 km away. To the green areas of regional significance green plantations are attached which are located not more than 500-1000 m from the residential neighborhoods (Dainavos Park, Kalniečių Park, the Neris Riverfront Park and etc.) Besides that, it was determined that a certain part of the territory of the city did not have regional green areas. The demand for recreational areas in Kaunas city is not equivalent. According to the quotation of Mr. M. Pilkauskas, private investors, who are engaged in the development of new residential neighborhoods, are obliged to allocate 20 percent to green areas and plantations from the territory to be developed. However, it is not enough to have just a formal notice on the point. The investors, many a time, in order to construct as much as possible living space, leave out the undeveloped spaces, forming narrow passages between the buildings, or form green areas in other unsuitable locations (Fig.1.). The spaces are unavailable to be used for recreational green areas. The governmental officials responsible for the approval of the plans and projects of the developed territories of the city have to be designated to take into consideration (Inytė..., 2013) the violations.

Fig.1. Green areas at the residential buildings (Eitkūnų str. 1,3) (Google..., 2014)

When analyzing the General Plan of Kaunas, it was determined that some parts of the spaces of the city did not have their own regional green areas. Those territories were rather far from the larger zones of green areas to be used for recreation. The disadvantages concerning the regional recreational green areas are in the neighborhoods of Aleksotas, Freda, Birutė, Romainiai, Milikonys, Sargėnai. The distribution of recreational green areas allocated for general use, the size of the territories, do not exactly correspond to the urban structure of the city or, in other words, the shortage of green areas is mostly registered in the most densely populated neighborhoods; but they are in abundance in the rarely inhabited suburban neighborhoods. The neighborhoods with multistoried residential buildings most of all lack well preserved recreational green areas in those territories.

A certain group of recreational green areas, belonging to lower category, in terms of their significance, are called territorial green areas. They are located close to the residential spaces. In terms of the standards and norms applied in designing of the territorial green areas, there are spaces situated within 300-400 m from the residential territory (Atskirųjų..., 2007). The distribution of such green areas in Kaunas is not irregular. The network of these green areas is very well developed in the residential areas of multistoried buildings (Dainava, Eiguliai, Kalniečiai). In case, the distance to the recreational green areas increases, their attendance is greatly reduced, but, if the distance is more than 1km, residents visit them mostly during the weekends (Grahn et al., 2003). Thus, the most significant fact for the recreational territories to be attended is rather easy and quick accessibility to those territories.

When assessing the distribution of territorial green areas, the majority of them coincide with the regional green areas. The greatest shortage of the territorial green areas is determined currently in the newly developed territories allocated for the city expansion (Romainiai, Linkuva, Aleksotas, Kazliškiai, Amaliai, Vaišvydava); in the traditional homestead territories, in the suburbs (Panerys, Veršvai, Sargėnai and etc.). Milikonys neighborhood with multistoried buildings has the shortage of the territorial green areas. Therefore, the main conceptual task necessary for the formation of the territorial recreational green areas was mentioned in the General Plan for 2013-2023(Kauno..., 2014). It had to ensure the standard accessibility from the most far away residential area to recreational green areas (regional and especially territorial recreational green areas).

New communications and urbanization divide the extent areas of the forests of the city into small parcels, which lose their protective and recreational functions (Pažaislio, Kleboniškio, Lampėdžių forests parks, Romainių forests). The impact of the urbanized insertions has larger area than the developed area.

The optimization of the territorial system of Kaunas green areas has to proceed in two directions:

- the nature frame is formed from green areas, by forming the migration corridors;
- the system of green areas is expanded by matching them with the urban expansion of the city, by planting green areas in the newly designed residential areas.

Formation of green areas by green connections in Kaunas

Green connections are very valuable for the formation of recreational territories and for the systems of green areas. Based on the previously prepared documents (Kauno..., 1983; Kauno..., 2003), it was decided to join the most significant zones of recreation into the general recreational system of the city by these connections. The designed linear connections had to serve the routes for pedestrians and cyclists (in winter time for skiers), linear recreational green areas with the observation sites and recreational zones. However, at that time the system was not created. To the functional linear connections only separate routes of the bicycle paths could be allocated, but so far they are only the components of the system but do not comprise the total system.

In the previous General Plans of the city (Kauno..., 1983; Kauno..., 2003) there were presented the proposals to organize the system of green areas by connecting them by green connections but that idea was not implemented. The green areas were not connected into the nature frame. Majority of many small individual green areas did not play the functions of the ecological compensation, which serve the territorial system of larger green areas connected by green connections. A large part of the territories intended for green connections were restituted to their owners, privatized and developed.

The green connections in the nature frame serve many functions. They fulfill all the functions of green areas as the static component of the environment and therefore they are very significant part of the system of the urbanized territories of green areas. However, the most important function is to make it possible for the flows of the citizens between the places of residence, work and recreational sites to move and have adequate environment. Traditionally the greatest attention in city planning is paid to the motor transportation and according to its demand the network of the streets is planned, comprising the urban frame. The sidewalks are left for pedestrian traffic and cyclists. But cycling or walking very closely along the intensive traffic of the streets is considered to be not a hygienic and attractive experience. Therefore, the promotion to cycling or walking when there no specially built paths for pedestrians and cyclists are considered to be only moral declaration. Several segments of the bicycle paths available do not fill the shortage list of such paths in the general system of the city. If the streets allocated for the car traffic routes comprise the urban frame then the nature frame of the city or the system of the green areas should have to create the conditions for the expansion of the system of pedestrian paths and bicycle routes. The axis of the recreational natural territories has to comprise green connections, which are more or less of the natural type, in the shape of the band, parts of the system of green areas of the towns, connecting in between the territories of the city having recreational function as well as connecting residential districts. In all the previous plans of Kaunas there was stated that the major pedestrian and bicycle paths having the function of the general city have to be directed towards:

- the riverfronts of the Nemunas and Neris;
- the embankments of Kaunas Lagoon;
- along the historic roads of the south and northeastern fortifications;
- to connect the city centre with the residential areas and then with the suburban forests.

These provisions are relevant even nowadays. It is important to preserve green connections between the central green areas of the city, streets, by changing them into the alleys, by constructing transit pedestrian paths along the neighborhoods of residential areas and paths to nowhere or untidy green areas.

It is possible to distinguish separate bicycle paths as the functioning linear connections. In the General Plan for 2003-2013 there were planned 59 km of the green corridors, the area of which had to exceed 142 ha. At present, Kaunas has more than 47 km of bicycle routes (Kauno..., 2010). But they were constructed fragmentary; they did not form the integral system. From the point of green area formation, the paths constructed in the green environment comprise very significant connections. These are the paths laid in the inner spaces of the neighborhoods as well as the paths along the streets, which are separated from the carriageway by green zones. Those paths in green environment as well as further away from the carriageway create the environment of the higher comfort zone for the citizens and guests of the city when walking or cycling. The paths mostly do not have the required 20m wide lanes for green connections to be formed; therefore, they get under the territories of residential areas, territories of engineering infrastructure. They are very significant for the supplement of green connections and for changing the territories as such where due to the historic type of development there are no possibilities to develop green connections. The most densely is the network in Žaliakalnis; the similar system is also developed along the main streets in Dainava, Kalniečiai,

Eiguliai residential areas. The green paths could be assessed as one of the most valuable element forming the territorial recreational environment. Therefore, the territories, where there are many of the above mentioned paths, it is possible to assess as the territories possessing higher quality for the residential environment.

Although the system of green areas has a significant social value (Jakovlevas-Mateckis 2005; Bučas, 2007; Conway et al., 2000), for ensuring the health of the citizens of the city it is not expressed by financial indices; it is not depicted when preparing the budget for the city as well as applying it. Table 2 indicates that it is required 17.58 ml Lt for the general demand for the system of green areas to function. The greatest investments (83%) from the total sum to be allocated for the maintenance of green plantations.

Table 2

Indicative investment demand for green area system to be formed (annually) (Kauno..., 2003)

Recreational green areas	Area ha	Annual demand for funds ml Lt			
		General demand	For maintenance of forests	For maintenance of green plantations	For formation of infrastructure
Forest parks	1,339	4,.1	0.05	4.46	0.4
Parks	665	7.57	0.014	7.2	0.36
Squares, street flower gardens	78	2.96	—	2.92	0.05
Green connections	142	2.14	—	—	—
Total:	2,224	17.58	0.064	14.58	0.81

When analyzing the city budget of the last decade (Fig. 2.), the municipality, even during the best periods for the budget, were able to allocate about 2 % of the budgetary resources for the protection of the environment and the total sum received did not satisfy the general demand for green areas to be formed.

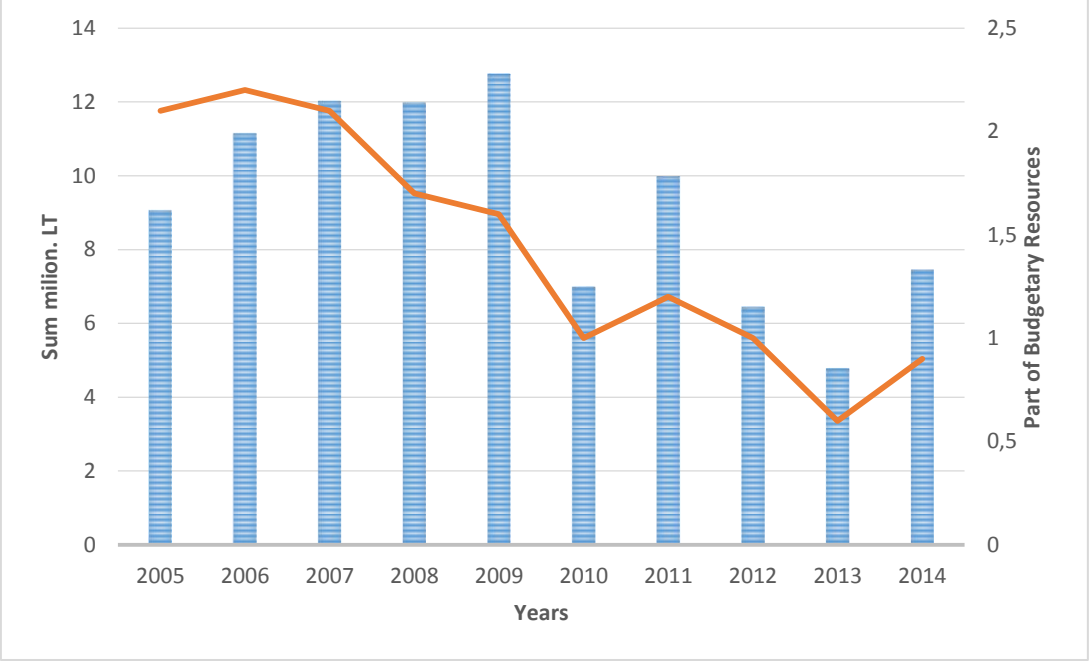

Fig. 2. City budget appropriations for environmental protection for 2005 – 2014 (Patvirtinti…,2014)

When assessing the economic value of green areas, only the direct expenses for the construction of green areas and maintenance, direct income received for the timber grown in the green areas and for the other bio-production are calculated. After such estimation, green areas are seemingly considered to cause the losses, but in reality it is necessary to evaluate, how the green plantations tend to increase the

value of the parcels located adjacent to green areas. The increase in the prices exceeds the costs for the maintenance of the parcels. The economic optimization of the usage of green areas has to start from determining the financial aspect of their social value.

The optimization of the system of green areas means combining recreational territories by green connections and that experience could be adapted in a number of cities and towns of Lithuania. For the modern society, when more and more people are interested in ecology, the creation of the unified system could not only improve the visual and esthetic state of the city, but also could create positive conditions for the citizens to migrate by green connections. At the same time, green connections supplement significantly the ecological stability of Kaunas.

Conclusions and proposals

1. The nature frame of the city and the system of green areas are not entirely judicially legitimized and preserved. The issues concerning the relations of the green area system and the nature frame of the city have not been solved yet. During the period of the General Plan for 2003-2013 implementation, the municipality issued documents and provided detailed plans and approved the status of only four forest parks (57 % from the planned ones), twenty parks (80 % from the planned ones), eight squares (13 % from the planned ones) and not a single green connection (will be approved 21). The legal steps to assure the targets and goals on the protection and maintenance of green areas are proceeded step by step in Kaunas.
2. The distribution of the territorial green areas in Kaunas is not equal. The network of green areas is developed in the multistoried areas best of all (Dainava, Eiguliai, Kalniečiai). When assessing the distribution of the territorial green areas, the majority of them are matched with the regional green areas. The greatest shortage of the territorial green areas has been currently determined in the newly developed territories when expanding the city.
3. The optimization of the territorial system of Kaunas should have to be continued in two directions, i.e. submission of green connections into the system of green plantations and areas by developing migration corridors and forming the entire integral system of green areas and the system of green plantations by expanding them in the neighborhoods of newly designed territories.

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