 DOI:10.22616/RRD.29.2023.030

CHANGE IN THE AREA OF LITHUANIAN TREES AND SHRUBS GREENERY IN 2002–2022

***Giedrė Ivavičiūtė**
Vytautas Magnus University, Lithuania
Kaunas Forestry and Environmental Engineering University of Applied Sciences, Lithuania
Klaipėda State University of Applied Sciences, Lithuania
*Corresponding author's e-mail: ivavice@gmail.com

Abstract
The topic of this article is relevant because in Lithuania the assessment of the area occupied by plantations and green spaces has shown that the area standards do not meet the requirements and recommendations of the World Health Organisation. Green spaces are regulated differently in different countries of the European Union. Lithuania has also developed a legal framework for the protection, management and establishment of new plantations and green spaces. However, this legal framework is im-proving and new laws are being added to it. Comparative, analytical, as well as statistical, and logical analysis methods were used for the investigation. The data of the Land Fund of the Republic of Lithuania for 2002–2022 were used for comparative investigation. The aim of this article is to perform an analysis of the change in the trees and shrubs greenery area of Lithuania in 2002–2022. In Lithuania, for example, trees and shrubs occupied 84,687.48 ha in 2002. In 2022, the plantation area amounted to 208,609.48 ha. From 2002 to 2022 the area of tree and shrub plantations in Lithuania increased by 123,922.00 ha or 146.33%. The analysis shows that in the period between the years 2002 and 2022 the biggest increase in the area of shrubs and plantations took place in Utena County (32,715.83 ha or 395.27%), but the smallest increase in Tauragė County (2,642.93 ha or 37.69%) and Marijampolė County (4,581.39 ha or 72.25%).The development of plantation areas has been positively influenced by the creation of an appropriate legislative framework and the implementation of plantation programmes in counties and munic-ipalities.
Key words: the trees and shrubs greenery, plantations, area change, development of greenery.

Introduction

The publication of the National Land Service under the Ministry of Agriculture of the Republic of Lithua-nia, Land Fund of the Republic of Lithuania (Nacion-aline…, 2022), contains a definition of tree and shrub plantations, i.e., separate plantations (parks, squares, green links) and areas of plantations (trees and shrubs) that are not classified as forests. Individual trees and shrubs, groups of trees and shrubs, rows of trees and shrubs are included in plantation areas when they form a contour of at least 0.1 ha.

Public and green spaces are open areas where the land is partially or completely covered with grass, trees, water bodies, shrubs or other vegetation. The typology of public and green spaces is defined according to different criteria such as size, amenity or distance from residential areas. Within the United Nations 2030 Agenda, public and green spaces play a key role in promoting urban sustainability and the well-being of citizens, i.e. the connection between people and nature, and the multiple benefits for human health and the environment (Vidal, Barros, & Maia, 2019).

Understanding the relationship between population size and the quality and quantity of green spaces is vital for the sustainability, health and resilience of areas. Quality green spaces improve the quality of life in cities by making them more attractive to residents, employees, tourists, investors and firms (Russo & Cirella, 2018).

Authors Xia, Yabuki & Fukuda (2021) believe that greenery has long played an important role in the quality of landscapes and is closely linked to people's physical and mental health. In addition, the level of street greening is an important indicator of environmental quality. Green spaces, including parks, street trees, community gardens and green roofs, provide numerous ecosystem services at the local level and constitute a potential adaptation strategy to offset the increasing impact of human activity on the urban environment. There is thus an urgent need to assess whether green environments can help mitigate the impacts of climate change on human health, and increase the amount of public green space.

Green spaces make up so-called 'green corridors' or 'green spots' and have cultural, educational and so-cial significance, including recreational and spa func-tions. They are not only a complement to architecture, but can play a primary role in the structure of cities (Jaszczak & Kristianova, 2019).

Urban green spaces (UGS) play a vital role in design and influence the development of compact cities, which has caused scientific controversy over how much green space humans need and to what extent modern approaches address this issue

(Mehta, 2022).

The World Health Organization (2012) recommends a minimum of 9 m^2 of green space per person, with an ideal green space value of 50 m^2 per capita. These statistical values correlate with a number of greening standards, including: core health indicators to monitor progress and measure success, the link between sustainable cities and improved health, food markets and urban infrastructure for social, recreation and livelihoods, increasing the value of health indicators and the validity of data presentation through cross-cutting issues (e.g. equity, governance and climate change), expanding indicator values (e.g. governance indicators, access to services).

Increasing emphasis on urban greening is a recent trend in urban planning and development. This emphasis is evident in the long-term strategic and sustainable development plans of a number of the world's cities, which almost always include promoting urban greening to achieve high quality of life and built environment. Therefore, a high-quality built environment achieved through the functional benefits of urban greenery has become an important urban development goal for creating healthy and livable cities (Tan, Wang, & Sia, 2013).

The development of greenery depends not only on investment and technology, but largely on the attitude and participation of urban residents (Chaudhry, Bagra, & Singh, 2011).

Authors Gatrell & R. R. Jensen (2002) believe that there is an opportunity for communities to develop environmental policies that allow them to remain not only attractive but competitive as well.

The object of article is trees and shrubs greenery of the Republic of Lithuania.

The aim is to perform an analysis of the change in the trees and shrubs greenery area of Lithuania in 2002–2022.

Tasks to be resolved:

1. To analyze the current situation of trees and shrubs greenery in Lithuania.
2. To perform the analysis of the change in the area of Lithuanian trees and shrubs greenery in 2002–2022.
3. To examine the change of trees and shrubs greenery in the counties of the country.

Materials and Methods

Copious methods have been used to prepare the re-search of this article: theoretical and practical.

To achieve the aim, a comparative method was used, which determined the change of tree and shrubs greenery areas in Lithuania and its ten counties in 2002–2022. The received change results are presented in hectares and percentages. The data of the Land Fund of the Republic of Lithuania (Nacionaline…, 2002–2022) for 2002–2022 were used for comparative investigation.

The method of analytical and logical analysis was used to determine the reasons for the increase in the area of tree and shrubs greenery in Lithuania and its ten counties (Table 1).

The article presents the prospects for the development of tree and shrub green areas in Lithuania.

The research also describes the principles of protection, management, and restoration of greenery (Lietuvos Respublikos aplinkos, 2002).

To complement the study, graphical method was used.

Results and Discussion

Existing situation of tree and shrub plantations.

As stated in this article, tree and shrub plantations are classified as a separate green space, i.e. a park, garden, square or other green area of a city or town located on a plot of land that, depending on the use for which it is intended, is classified as separate green space.

Plots of land set aside for individual green areas are created and managed for recreational, scientific, educational, cultural, cognitive, recreational, aesthetic and other public needs. In order to create new individual public green areas or transform existing individual public green areas, it is necessary to prepare a landscaping project (Lietuvos Respublikos želdynų įstatymas, 2007).

The history of Lithuanian green spaces goes back in time. As a set of green spaces, green areas have multifunctional purposes: ecological, protective, recreational, cognitive, aesthetic, architectural, historical, cultural and psychological.

In 2022, tree and shrub plantations in the Republic of Lithuania covered 208,609.48 ha, accounting for 3.20% of the country's area.

Today's landscape is not homogeneous. It is cultivated differently in different parts of the territory, with different social and economic functions, structure, form, expression, cultural and social significance.

There are ten counties in Lithuania where green spaces are unevenly distributed.

An analysis of the area of tree and shrub plantations in Lithuanian counties shows that the largest number of trees and shrubs is found in Utena (40,992.63 ha or 5.70%) and Vilnius (44,706.11 ha or 4.59%) counties, while the smallest number of trees and shrubs is found in the counties of Telšiai (9,518.94 ha or 2.19%) and Tauragė (9,655.40 ha or 2.19%) (Table 1).

Table 1

Trees and shrubs greenery area in hectares and percent in counties of Lithuania in 2022

Counties of Lithuania	Trees and shrubs greenery area	
	ha	%
Alytus	20,106.26	3.71
Kaunas	20,764.69	2.57
Klaipeda	10,793.50	2.07
Marijampole	10,922.81	2.45
Panevezys	20,236.42	2.57
Siauliai	20,912.28	2.45
Taurage	9,655.40	2.19
Telsiai	9,518.94	2.19
Utena	40,992.63	5.70
Vilnius	44,706.11	4.59

Source: author's calculations based on Nacionaline…, 2002–2022.

As plantations serve to conserve biodiversity and the gene pool of the dendroflora, it is necessary to ensure the protection, maintenance and management of plantations, as well as their design and the breeding of new ones.

Changes in the area of tree and shrub plantations in Lithuania.

This paper examines the change in the area of these plantations over 20 years. In Lithuania, for example, the area under trees and shrubs in 2002 was 84,687.48 ha.

In 2002, the Order of the Minister of Environment of the Republic of Lithuania 'On Approval of the Strate-gy for Protection, Management and Restoration of Green Areas' was adopted, which entered into force in 2003 (Lietuvos Respublikos aplinkos, 2002).

This legal document established principles for the protection, management and restoration of green spaces, which are:

1. To provide a legal basis for the protection, resto-ration, management and use of green spaces.
2. To promote a coherent system of green spaces in cities, towns and rural landscapes, forming a natural framework on a national, district, city (or parts thereof) scale. Legislation stipulates that green spaces shall be connected to each other as well as to large green spaces and forests by means of green links.
3. To maintain and properly manage existing green spaces in good condition as they grow, giving priority to maintaining and renewing existing green spaces rather than creating new ones. Of particular importance is the preservation of the integrity of historic green spaces and the integrity of ensembles or complexes of buildings within or adjacent to them, and the harmonisation of their functions with each other.
4. The state, exercising the functions of state regu-lation of all green spaces in the country, developing green space infrastructure, protecting them from natural disasters, mass diseases and pests, recognising all forms of ownership of green spaces, creates legal, financial and other prerequisites for green space conservation, rational management of green spaces, meeting social needs of society and protecting the environment. Policies for the protection, management and restoration of green spaces should ensure that owners, managers and users of green spaces are responsible for the condition of green spaces and their sustainable restoration.
5. Policies should take into account the views of all stakeholder groups in society.

In 2007, the Law on Green Areas of the Republic of Lithuania (Lietuvos Respublikos želdynų įstatymas, 2007) was adopted. The aim of this Law is to estab-lish a legal framework for the protection, management, creation of green areas and planting of greenery in the territory of the Republic of Lithuania on nonforest land, to ensure the stability of the natural and cultural landscape and the right of the population to environmental conditions that improve the quality of life.

The adoption of this law and the implementation of the strategy stimulated the development of planta-tions in Lithuania. As can be seen in Figure 1, the ana-lysed area has started to increase since 2008, and in 2022 the plantation area amounted to 208,609.48 ha.

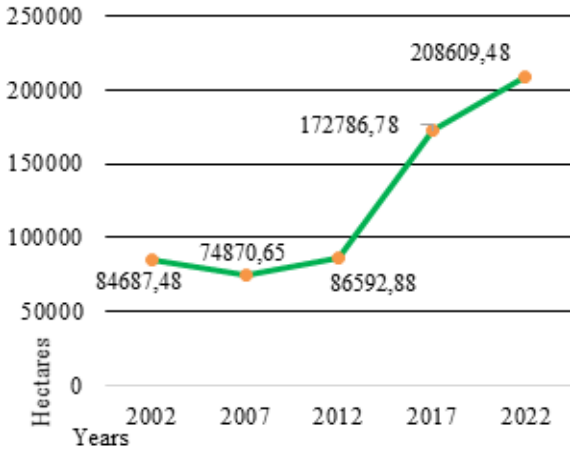


Figure 1. Trees and shrubs greenery area change in hectares in the Republic of Lithuania in 2002–2022 (Nacionaline…, 2002–2022).

From 2002 to 2022 the area of tree and shrub planta-tions in Lithuania increased by 123,922.00 ha or 146.33%. The development of plantation areas has

been positively influenced by the creation of an appropriate legislative framework and the implementation of plantation programmes in counties and their municipalities.

Changes in the area of tree and shrub plantations in the counties.

Tree and shrub plantations are an important part of the landscape. Its planning and management have always been and continues to be an important landscape activity, the nature of which depends on the needs and capacities of society, as well as on levels of planning and management practices.

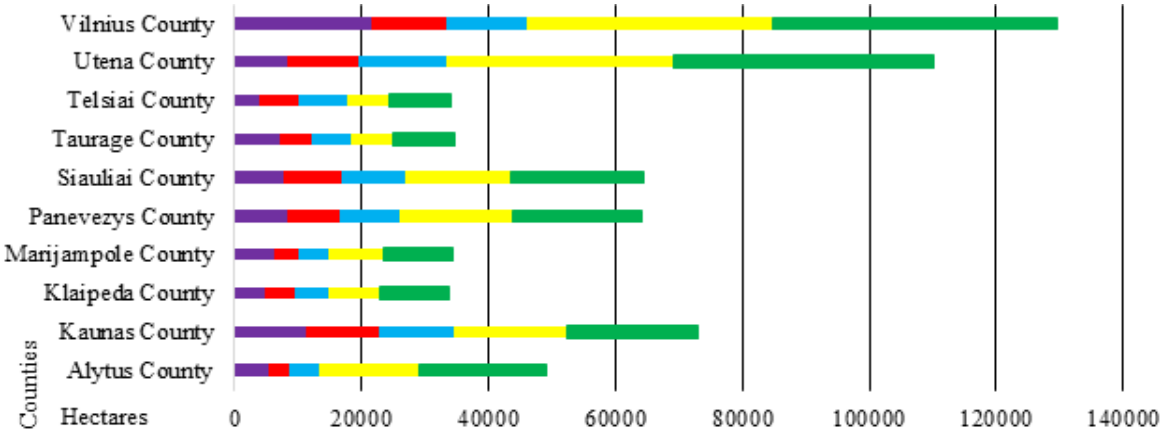
Figure 2 shows that the area of tree and shrub planta-tions in all counties of the Republic of Lithuania has increased from 2002 to 2022.

This means that all counties in the country and their municipalities have expanded their planted areas over the 20-year period.

However, the increase in the area under trees and shrubs was uneven across the counties of Lithuania (Table 2).

The analysis shows that in the period between the years 2002 and 2022 the biggest increase in the area of shrubs and plantations took place in Utena County (32,715.83 ha or 395.27%), but the smallest increase in Tauragė County (2,642.93 ha or 37.69%) and Marijampolė County (4,581.39 ha or 72.25%).

Plantations create green spaces and provide ecological stability.



	Alytus County	Kaunas County	Klaipeda County	Marijampole County	Panevezys County	Siauliai County	Taurage County	Telsiai County	Utena County	Vilnius County
2002	5297,03	11283,59	4758,14	6341,42	8431,97	7826,64	7012,91	3760,99	8276,8	21697,99
2007	3435,84	11417,76	4791,76	3719,59	8021,24	8890,99	5266,26	6336,94	11220,97	11769,3
2012	4713,09	11890,77	5263,56	4601,29	9606,72	10270,98	6066,77	7684,89	13832,18	12662,63
2017	15603,65	17715,95	8182,67	8862,58	17904,62	16652,3	6581,54	6682,86	35799,35	38801,26
2022	20106,26	20764,69	10793,5	10922,81	20236,42	20912,28	9655,84	9518,94	40992,63	44706,11

Figure 2. Trees and shrubs greenery area change in hectares in counties of Lithuania in 2002–2022 (Nacionaline…, 2002–2022).

Scientific research shows that planting greenery not only creates an aesthetic environment, but also improves air composition, provides ionised air, positively affects the microclimate, reduces solar radiation, air pollution, noise pollution and protects areas from erosion.

Also, physical and psychological benefits have been linked to green spaces (Lee & Maheswaran, 2011).

Green spaces and elements provide many functions, services and benefits which are needed for the sustainable development of urban, rural or recreational areas (Jansson, 2014).

Prospects for the development of tree and shrub planting areas in Lithuania.

On 4 June 2020, the Seimas of the Republic of Lithuania adopted a resolution 'On Approval of the Master Plan for the Spatial Development of the State Territory of the Republic of Lithuania and the Functional Priorities for the Use of the Territory of the Republic of Lithuania' (Lietuvos Respublikos Seimo nutarimas, 2020), which provides that in the future the natural framework should cover at least 65% of the country. At present, the proportion of natural frame territories in individual municipalities varies; in Joniškis, Pakruojis and Pasvalys municipalities the natural frame covers 35–40%, and in Varėna and Zarasai municipalities up to 75–80% of the total area of these municipalities. In most of the municipalities of the districts, the area of the natural frame covers 55–65% of their area.

Table 2

Trees and shrubs greenery area change in hectares and percent in counties of Lithuania in 2002–2022

Counties of Lithuania	Trees and shrubs greenery area	
	ha	%
Alytus	+ 14,809.23	+ 279.58
Kaunas	+ 9,481.10	+ 84.03
Klaipeda	+ 6,035.36	+ 126.84
Marijampole	+ 4,581.39	+ 72,25
Panevezys	+ 11,804.45	+ 140.00
Siauliai	+ 13,085.64	+ 167.19
Taurage	+ 2,642.93	+ 37.69
Telsiai	+ 5,757.95	+ 153.10
Utena	+ 32,715.83	+ 395.27
Vilnius	+ 23,008.12	+ 106.04

Source: author's calculations based on Nacionaline…, 2002–2022.

In urbanised areas, the aim will be to improve habitat quality, which requires conditions for expressing biodiversity, living and migratory habitats, and increasing the connectivity of the remaining islandtype natural elements by creating green links – corridors.

The geo-ecological potential of natural framework areas located in intensively populated agro-territories is damaged or severely damaged, and the restoration of its naturalness is planned to compensate for the negative impact of diffuse pollution on soil and aquatic ecosystems or even to contribute effectively to the improvement of these environmental components. Planned planting of protective plantations on water bodies, creation of protective strips on fields, increasing the area of protective forests and stimulating the processes of spontaneous renaturalization of agrarian territories will increase the potential of the natural framework and thus improve the overall ecological status of agrarian territories.

On May 1, 2023, amendments to the Law on Green Areas of the Republic of Lithuania (Lietuvos Respu-blikos želdynų įstatymas, 2007) will come into force that will bring green areas closer to the population, with the norm being calculated at a closer distance from residential buildings – within a radius of up to 1 km. This is a distance that can be walked in no more than 15 minutes. Parks and squares should be created at the rate of at least 12–25 m^2 per inhabitant within this maximum distance, depending on whether it is a city, town or resort.

The standards for green areas in courtyards have also been increased, especially in areas with a natural framework. Where there is not enough space to create green areas, this can be compensated by vertical greening of buildings – up to 5% of the required greening area. A standard of 10% green space has been introduced in the central areas of large cities, which has not been the case in Lithuania so far.

The amendments to the law oblige municipalities to restore street greenery within one year if it had to be removed due to construction work or if it posed a risk to the environment or traffic safety. This is expected to help restore the green balance in urbanised areas.

The implementation of green spaces requires the mobilisation of both national and local government structures, the active involvement of civil society organisations and communities, and the open, constructive and coordinated implementation measures. The spatial planning process also needs to be optimised, creating the necessary conditions for the formation and further development of an ecological compensation system.

Conclusions

1. In 2022, tree and shrub plantations in the Republic of Lithuania covered 208,609.48 ha, accounting for 3.20% of the country's area. An analysis of the area of tree and shrub plantations in Lithuanian counties shows that the largest number of trees and shrubs is found in Utena (5.70%) and Vilnius (4.59%) counties, while the smallest number of trees and shrubs is found in the counties of Telšiai and Tauragė (2.19%).
2. From 2002 to 2022 the area of tree and shrub plantations in Lithuania increased by 123,922.00 ha or 146.33%. The development of plantation areas has been positively influenced by the creation of an ap-propriate legislative framework and the implemen-tation of plantation programmes in counties and municipalities.
3. The analysis shows that in the period between the years 2002 and 2022 the biggest increase in the area of shrubs and plantations took place in Utena county (395.27%), but the smallest increase in Tauragė county (37.69%). In the implementation of trees and shrubs greenery, the spatial planning process needs to be optimised, creating the necessary conditions for the formation and further development of an ecological compensation system.

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