

# THE DEVELOPMENT OF GREEN AREAS IN THE COMMUNE OF ŁOMIANKI AND THE PROTECTION OF VALUABLE NATURAL AREAS

**Edyta Roślon-Szeryńska**

*Department of Landscape Architecture, Faculty of Civil and Environmental Engineering, Warsaw University of Life Sciences, 02 787 Warsaw, Poland*

<https://doi.org/10.11118/978-80-7509-831-3-0348>

## Abstract

Łomianki belongs to the urban-rural communes of Warsaw suburbs in Poland. There are a number of forms of protection in the commune, including Natura 2000 areas (31% of the area) and the Kampinos National Park (15%). The importance of nature as the green infrastructure of urbanized space is increasing due to the progressive climate change. The green infrastructure of the commune provides a number of ecosystem services. These areas are threatened by urbanization pressure.

The subject of this study is to develop guidelines for improving the functioning of green areas in the commune of Łomianki. For this purpose, small-scale, field and social studies were carried out, including extensive analyzes of legal acts and local documents determining the development of the commune. A survey was carried out among the inhabitants of the commune, which contributed to learning about their opinions and needs in the field of greenery. The proposed solutions are to become the basis for the sustainable management of green areas by the local government unit and improve the quality of life of the inhabitants of the Łomianki commune.

**Key words:** anthropoppression to nature protection areas, management and development of green areas, ecosystem services, green infrastructure

## Introduction

Łomianki is an urban-rural commune located in the Mazovia Province, in the West Warsaw County. The area of the commune of Łomianki is about 39 km<sup>2</sup>, the number of inhabitants in 2021 is 27 957 people and each year it increases by 1-2% (GUS, 2021). The number of people per km<sup>2</sup> increased to 716. In 2019 it was 701.<sup>3</sup> The commune covers the city of Łomianki with 14 estates and 9 villages.

The spatial and functional development of Łomianki is significantly influenced by its location. Łomianki belongs to the Warsaw Metropolitan Area, located 15 km from the center of the capital. The whole area of the commune is situated in the buffer zone of the Kampinos National Park and in the Vistula valley with its oxbow lake and 4 lakes. The Warsaw-Gdańsk transit route, road no. 7 (E-77), which is one of the important entrances to the capital, runs through Łomianki (SUiKZP, 2015).

There is a process of suburbanization in the commune, which may have a negative impact on naturally valuable areas, including forms of nature protection such as the forest complex - Kampinoski National Park (558ha) and the Vistula valley, with dominant willow and poplar riparian forests - constituting the Natura 2000 area (686ha) (Matuszkiewicz M., Kowalska A., 2009).

The commune with an area of 3880 ha has only 33 ha of landscaped green areas, including 10.79 ha of parks, lawns and squares in public space, 17 ha of greenery along roads, 5.2 ha of cemeteries and 1 ha of communal forests. It constitutes only 0.85% of the total area of the commune and is a serious problem in implementing the idea of its sustainable spatial and functional development, and in activities aimed at adaptation to climate change. The share of public parks, squares and recreational green areas in the commune is only 0.3%. The forms of nature protection and the Kampinos National Park cover 23.3% of the commune's area, which significantly improves the balance of natural areas.

The vast majority of green areas in the area in question are home gardens, within which species of ornamental trees and shrubs grow in various arrangements and density. Coniferous trees and shrubs are planted most willingly. Large trees dominate the oldest estates and villages of the commune - in Dąbrowa, Buraków and Łomianki Majowe. There is a lack of trees in the areas intended for development and in the newly emerging residential estates of single-family houses.

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<sup>3</sup> source: <https://www.lomianki.pl/pl/samorzadz/zarzady-osiedli-i-rady/zarzady-osiedli>

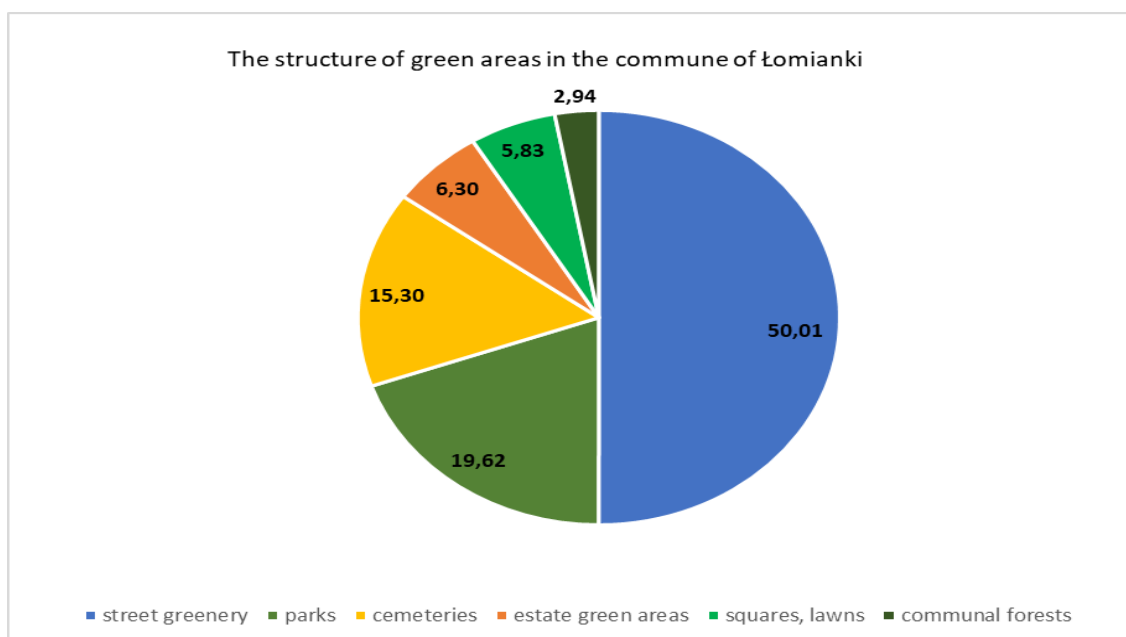


Fig. 1: The structure of green areas in the commune of Łomianki (own elaboration based on data from the Central Statistical Office of Poland)

The spatial policy of the Łomianki commune assumes intensive development of former agricultural lands and pastures in the Vistula valley. The presence of forest-water complexes covered by the form of nature protection and the dominance of single-family houses with gardens in the commune contribute to the commune's low involvement in the acquisition of new public green areas.

The aim of this article is to present the problems related to having a negligible amount of public green areas, especially wooded areas, which results in an increase in human pressure on areas covered by the form of nature protection. The result of the research is the development of a program for sustainable development of the commune, including guidelines for the standards of management of tree cover in the commune. One of the basic conditions for the sustainable development of a modern city is the presence of a developed and efficiently functioning system of green infrastructure (Borowski J. et. al., 2018).

### Material and methods

The study is based on field research carried out in 2021, where data on green areas and trees in the estates of the Łomianki commune were collected. The condition of green areas was assessed using a valuation scale, where 1- means bad, 2- average, and 3- good conservation of the greenery.

Factors such as plant condition, species composition, and the presence of invasive plants were taken into account. Spatial analyzes of green areas were also carried out on the basis of indirect data. Strategic documents of the commune and acts of local law were used to prepare the document.

The data compiled by the Central Statistical Office was used to compare the state of preservation of greenery in the commune of Łomianki and the way of managing trees over a period of 15 years (2005-2020). Spatial data, including a map of tree crown coverage, were used to assess the potential for afforestation in the urban and rural areas of the commune.

### Results

Currently, there is 3.86 m<sup>2</sup> of public green space per inhabitant of the commune, which is not conducive to building relationships and ties that shape the civil society. In the years 2005-2020, a slight increase in this indicator can be seen due to the construction of the Fabryczny park. From the value of 1.74 in 2015, this indicator increased to 4.08 in 2018, to decrease in subsequent years (4.0- in 2019; 3.93 in 2020 and 3.86 in 2021) due to the lack of new green areas with a constant increase in the number of inhabitants.

As part of the management of natural resources, the commune authority records tree losses and new plantings. In the period from 2015 to 2019, the balance of tree losses and plantings is slightly positive (the average is 1.12), so 12% more trees are planted than removed. In 2018, an exceptionally high number of plantings (830) and tree removal / cavities (642) were recorded. The comparison shows that the compensation of environmental losses is too low, close to the 1: 1 ratio, which means that one large tree removed from space is replaced with just one small and young specimen.

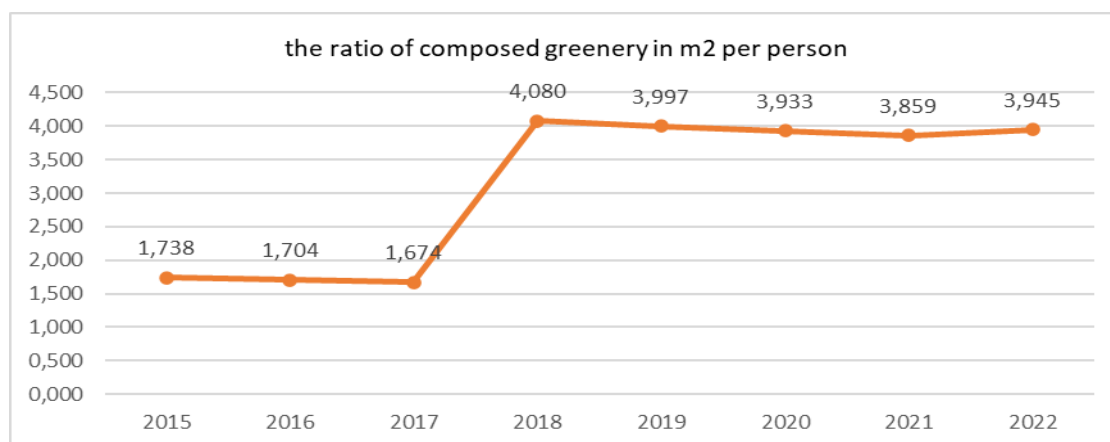


Fig. 2: Indicator of the green areas in m2 per one inhabitant of the Łomianki commune (own study based on GUS data).

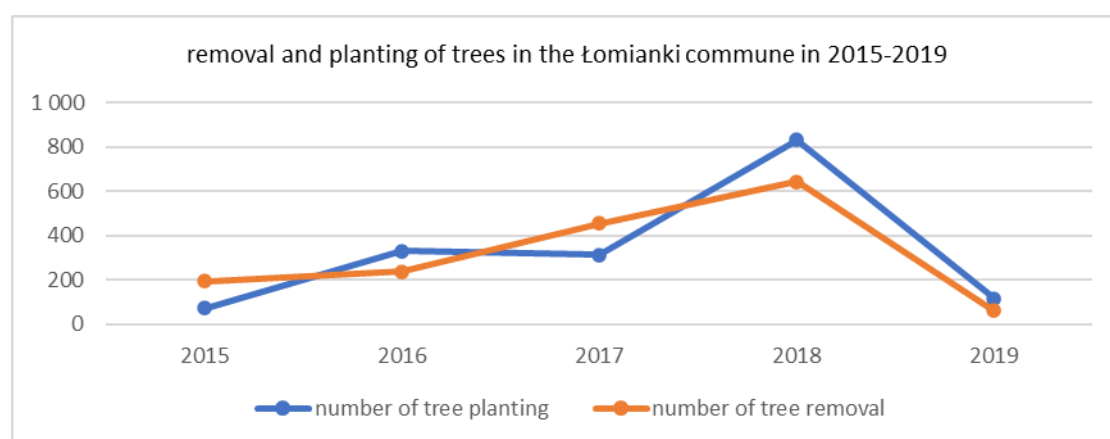


Fig. 3: Removal and planting of trees in the Łomianki commune in 2015-2019 (own elaboration based on GUS data)

Most of the land belongs to private owners (approx. 70%). Only about 4% of the land is owned by the commune. This limits the limited possibilities of land development and afforestation, and forces the commune to purchase land for investments aimed at improving the quality of life of the commune's inhabitants and improving the spatial order. Although the provisions of the Study of the Conditions and Directions of Spatial Development establish a relatively large share of the biologically active PBC area in most villages and settlements (> 50%), it should be clearly emphasized that this indicator does not allow to estimate ecosystem services. Trees provide the most ecosystem services in urbanized space. The study of the biologically active surface ratio is becoming insufficient today in the era of municipalities' adaptation to climate change.

On the basis of the map of tree crowns from 2012, the percentage share of tree cover in Mazowieckie communes was compared. Łomianki, with an average tree area of 15%, has a similar share of trees as Wołomin (14.90%), Kobylka (16.50%), Halinów (16.10%), Chynów (14%), Tarczyn (14%) and Mszczonów (16.50%) and Warsaw (14.10%). The neighboring communes have a higher tree density factor.

The total tree crown coverage of individual housing estates and villages of Łomianki was analyzed, as well as the percentage of urbanized space after deducting the legally protected areas, such as Kampinoski National Park and Łęgi nad Wisłańskie, which are protected by nature reserve and Natura 2000. The most developed urbanized areas are in the central zone of the commune. Łomianki Równoległa has a tree coverage lower than 0.01% of the area.

The minimum share of trees is visible in the areas of Łomianek Stare (2.93%), Łomianek Trylogia (3.06%) and Łomianek Powstańców (5.95%). Low coverage with tree crowns - less than 10% of the area - has Dziekanów Leśny (5.18%), Dziekanów Nowy (5.28%), Łomianki Chopina (7.71%), Łomianki Dolne (7.11%), Sadowa (8, 17%) and Łomianki Górne (8.81%), Dziekanów Bajkowy (9.16%) and Łomianki Centralne (9.75%). Dąbrowa Zachodnia (51.19%) and Dąbrowa Leśna (36.68%) should be

considered green. Łomianki Majowe has a level of 20.51% of land cover with trees. About 15% of the trees cover Dąbrowa Rajska, Kępa Kiełpińska and Dziekanów Polski.



Fig. 4: Covering with tree crowns in the commune (prepared by A. Lewińska, J. Jastrzębska based on mapakoron.com)

Figure 5 presents the ranking of administrative units of the Łomianki commune, from the least to the most wooded, with the separate areas under legal protection (ie KPN Forests and Reserves within the Vistula riparian forests and Natura 2000 Area).

In Dziekanów Leśny (71.05%) and Sadowa (68.57%), a large share of the tree cover is due to the presence of KPN forests within the boundaries of the villages. With the exception of these areas under legal protection, the percentage of tree cover drops drastically to 5.18 and 8.17% of the total area of the village council area, respectively. It should be noted that many trees are located in the private space of home gardens. For this reason, the spatial structure of the trees cannot be ensured. Especially in zones intended for intensive development (Łomianki Chopina and Łomianki Dolne), a further decrease in the share of trees in these spaces should be expected. The difference between the urban and rural part of the commune is presented below. The urbanized part of the city is twice as wooded as the village councils. The share of trees, excluding areas under protection, in the city of Łomianki is 25%, and in the rural area - only 10%. This is a serious problem, as the rural part is dominated by private spaces, on which the spatial policy of the commune has a limited influence.



Basing the natural potential of the commune almost exclusively on areas covered by the form of nature protection poses a significant threat to the environment. Increased anthropopressure and intensification of development in the buffer zone of these naturally valuable areas negatively affect the condition of plants, biodiversity and disturbs the functioning of these ecosystems. Invasive species appear in these areas, intensive use increases the risk of tree collapses and windbreaks, hence decisions are made to remove trees growing near trails and tourist infrastructure.

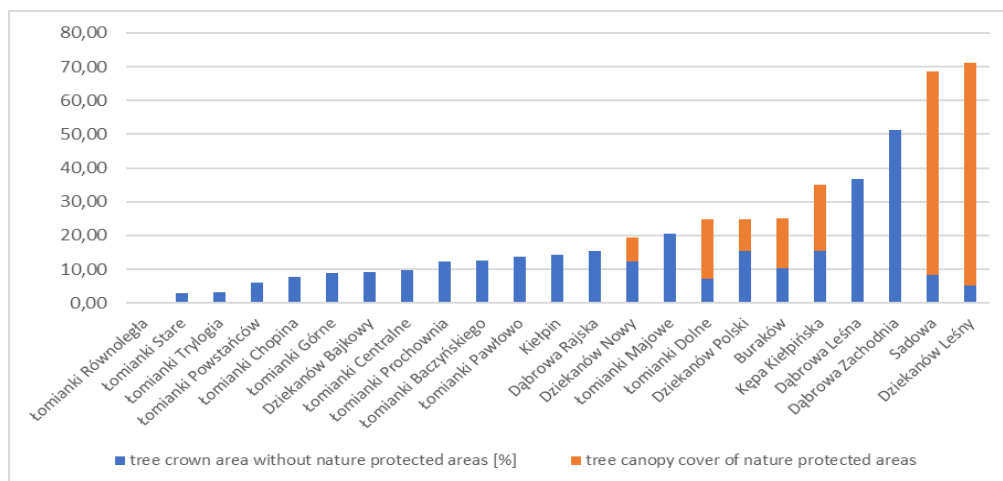


Fig. 5: Covering with tree crowns in the Łomianki commune (own study based on the map of tree crowns)

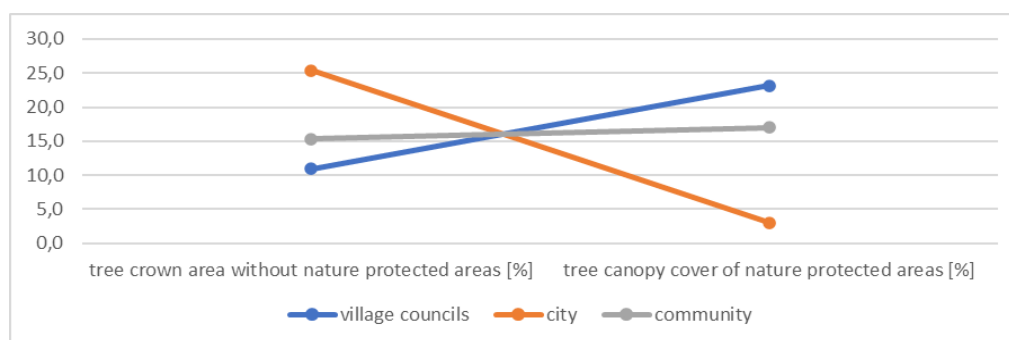


Fig. 6: Comparison of tree crown coverage in individual structures of the Łomianki commune, in village councils and in the city (own work based on the map of tree crowns)

## Discussion and conclusion

The forms of nature protection, the meadows of the Natura 2000 area in the Vistula Valley and the Kampinos National Park cover 23.3% of the commune's area, which significantly improves the balance of natural areas. However, when considering the presence of trees as the most important components of green infrastructure, the commune compares average with other local government units in Mazovia. The tree crown coverage of the Łomianki commune is only 15.3%. Interestingly, the city of Łomianki is greener, with 25.4% of the area covered by trees, while in village councils the tree crown coverage is only 10.9% of the urbanized area. The situation of trees in the intensively developing Łomianki Dolne and Łomianki Chopina is bad and will worsen, because most of the trees in these administrative units grow on private plots, on the management of which the commune has a limited influence.

Rational management of natural resources, using the potential of trees to adapt to climate change is an important task of local government units today. The basis for sustainable tree management will be:

- developing standards and good practices for skilful design and shaping of trees in accordance with their requirements, the nature of the place, specificity and function, using the potential of greenery in adaptation to climate change;
- the use of tools and techniques to improve the monitoring and assessment of trees, allowing for the analysis of changes, their management or regression, which will contribute to increasing the knowledge about threats and harmful factors;
- conducting and developing the principles of proper care and protection of trees, reducing the risk of damaging trees;

- activation of the society to activities for the benefit of trees. Raising awareness of the role of trees and the low scale of risk associated with their presence. Preparation and development of a support system for residents (substantive and financial). Education of children and adolescents, incl. by allowing unhindered contact with nature;
- building a substantive and financial support system for administrators of trees and natural spaces. Raising professional qualifications, assistance in obtaining funds for pro-ecological activities;
- creating clear laws and regulations at the local level, developing procedures and presenting good practices;
- promoting and disseminating the system of insurance against civil liability for trees and against accidents / damage caused by trees;
- developing and searching for effective ways to minimize the risk.

Long-term management of trees covers the stage from tree planning, through shaping, maintenance, then risk-based assessment and, as a result, protection

The implementation of the plan should be monitored and verified. It is worth noting that despite the existence of risk from trees, it is important to remember about their protection, which is a legal obligation of every citizen.

For the commune of Łomianki, an important priority is both the sustainable development of green areas using their potential in shaping spatial order, biodiversity, improving the quality of air, water and soil, as well as the safety of residents and their property. The goal of the commune is to consciously use the ecosystem services provided by trees while taking care of the health, life and property of its inhabitants.

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## Souhrn

Łomianki patří k městským a venkovským obcím na předměstí Varšavy v Polsku. V obci se nachází řada forem ochrany, včetně území Natura 2000 (31 % území) a Kampinoského národního parku (15 %). Význam přírody jako zelené infrastruktury urbanizovaného prostoru roste v důsledku postupující změny klimatu. Zelená infrastruktura obce poskytuje řadu ekosystémových služeb. Tyto plochy jsou ohroženy urbanizačním tlakem.

Předmětem této studie je vypracování pokynů pro zlepšení fungování zelených ploch v obci Łomianki. Za tímto účelem byly provedeny maloplošné, terénní a sociální studie, včetně rozsáhlých analýz právních aktů a místních dokumentů určujících rozvoj obce. Byl proveden průzkum mezi obyvateli obce, který přispěl k poznání jejich názorů a potřeb v oblasti zeleně. Navržená řešení se mají stát základem pro udržitelnou správu zeleně ze strany samosprávného celku a zlepšit kvalitu života obyvatel obce Łomianki.

## Contact

Edyta Rosłon-Szeryńska

E-mail: [edyta\\_roslon\\_szerynska@sggw.edu.pl](mailto:edyta_roslon_szerynska@sggw.edu.pl)

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