

Maintenance of urban green areas by the municipal and housing management company in Sandomierz Ltd. – An analysis based on GUS data from 2019–2023

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Abstract

Facing urbanization challenges, climate change, and growing ecological awareness, proper management of green areas has become a priority for local authorities. In cities like Sandomierz, rich in tourist attractions appeal, green spaces additionally enhance the attractiveness of public areas.

Ongoing demographic growth and intensified urbanization are making it increasingly difficult to introduce new green spaces in Polish cities. Currently, greater importance is placed on acquiring land for residential and commercial development.

In Poland, the maintenance of urban green areas is often the responsibility of local government units or specialized municipal service companies. In the case of Sandomierz, these tasks are carried out by the Municipal and Housing Management Company in Sandomierz Ltd. An analysis of changes in the extent of urban green areas in recent years allows for an assessment of the effectiveness of maintenance and development efforts and highlights current challenges in this field.

Introduction

Urban greenery constitutes an essential component of urban infrastructure, influencing the quality of life of residents, the state of the environment, and the aesthetics of public spaces. In the face of urbanization challenges, climate change, and growing ecological awareness, the proper management of green areas has become a priority for local authorities. In cities such as Sandomierz, rich in tourist attractions, green spaces additionally enhance the attractiveness of public areas.

Due to ongoing demographic growth and an intensified urbanization process, the introduction of new green areas in Polish cities is becoming increasingly difficult. Currently, more emphasis is placed on acquiring land for residential and commercial development. As a result, greenery has been relegated to a secondary role, as the primary objective of most Polish cities is to pursue social and economic development. Green space management systems vary between urban centers. Authorities in some cities have begun to place greater importance on creating green zones within urban spaces, recognizing their impact on residents' sense of comfort. In certain cases particularly in locations with tourism potential - urban greenery also plays a decisive role in shaping the local budget [Czechowska, Ruba, 2022, p. 107].

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Literature Review

The analysis of subject literature indicates that local governments, non-governmental organizations, and urban residents are increasingly taking initiatives aimed at environmental care and the expansion of green areas. In recent years, public awareness [Przybytniowski, 2007, pp. 111-118] regarding environmental protection has significantly deepened. A growing number of people recognize the need for biologically active spaces in cities, as well as the benefits of innovative and modern solutions in this area. Various initiatives are emerging to improve environmental quality and increase the number of green spaces in urban settings. Examples include tree-planting programs and the establishment of community and urban gardens.

Moreover, many cities are developing educational programs on environmental protection and the benefits of urban greenery. Residents are learning how to care for plants, separate waste, and reduce energy consumption in their homes. As a result, in addition to direct environmental benefits, there is also a growing public awareness of the need to care for the space around us [Kozycz, 2023, p. 59].

Anielska notes that there are numerous classifications of urban green areas in the literature, including those by Czarnecki, Giedych, Szumański, and Niemirski. Czarnecki proposes a division into five categories of green space: accessible, designated for special purposes, accompanying, as well as agricultural and forest areas. He focuses particularly on accessible green spaces, which correspond to Giedych's definition of undeveloped areas covered with vegetation that serve recreational and leisure functions [Anielska, 2019, p. 74].

According to Hulicka, the modern world is increasingly facing a deficit of urban greenery. Contemporary urban spatial policy often overlooks the creation of new green areas, while plots that could be transformed into parks are frequently taken over by developers. Further threats include

ongoing urbanization, population growth, and urban sprawl—the uncontrolled expansion of urban areas into surrounding regions. The result is a significant reduction in green spaces both in city centers and on the outskirts [Hulicka, 2015, p. 74].

In cities, biologically active surfaces—simply put, green areas—are essential elements of the urban environment. Unfortunately, they are increasingly being sacrificed for the sake of new infrastructure and construction. These areas are often the easiest to remove to make room for new investments. City centers offer no relief; with the increasing frequency of heavy rainfall and record-high flood incidents, we are now experiencing the consequences of past urban planning practices. There is a shortage of parks, squares, and green spaces that could absorb excess water. This has led to the rising popularity of the "sponge city" concept - an urban model capable of capturing and reusing rainwater. It is increasingly clear that urban development plans, strategic documents, and green space management policies must be approached with far greater care and foresight [Bryś-Szczygiel, 2021, p. 8].

The concept of green infrastructure can be applied at various scales and in different locations. Cities, as complex systems, are where natural, economic, and social spheres intersect. Green areas, forming a more or less coherent ecological network, perform a range of functions essential to the proper functioning of urban environments, and above all, they directly influence residents' quality of life [Korwel-Lejkowska, Topa, 2017, p. 65].

When discussing urban greenery, one cannot ignore the concept of the "green city" developed by Ebenezer Howard. In his book *Garden Cities of Tomorrow*, he laid out the principles of the green city model, which advocates for a dispersed urban layout and a high percentage of green areas. It is not only crucial to increase the extent of green spaces in cities but also to ensure they are properly planned and accessible to all residents [Howard, 1902].

As noted by Haase and Wolff, the demand for green areas is largely driven by the density of urban development. The higher the density, the more people depend on green spaces and the more essential their multifunctional role becomes [Haase, Wolff, 2019, p. www. frontiersin.org: update: 12.03.2025].

Materials and research methodology

Due to the growing importance of urban greenery for residents' quality of life, environmental protection, and the aesthetics of public spaces, the aim of this thesis is to analyze the condition of green space maintenance in Sandomierz between 2019 and 2023. Particular emphasis is placed on evaluating the activities undertaken by the Municipal and Housing Management Company in the care and management of greenery. The study aims to assess the effectiveness of these activities, identify potential issues, and formulate conclusions and recommendations for improving the management of urban green areas in the future.

The study seeks to answer the following research questions:

- How did the total area of green spaces in Sandomierz change from 2019 to 2023?
- What measures were taken by the Municipal and Housing Management Company regarding the maintenance of green areas?
- Was the number of newly planted trees and shrubs sufficient in relation to the recorded losses in vegetation?

The research material used in this study includes statistical data from the Central Statistical Office of Poland (GUS) concerning urban greenery in Sandomierz for the years 2019–2023, as well as internal documentation from the Municipal and Housing Management Company in Sandomierz Ltd., which is responsible for maintaining green areas in the city.

The research methodology combines a quantitative approach, critical analysis of the literature, and statistical analysis of the collected GUS data. The statistical analysis involves comparing annual values, calculating year-on-year differences, and visualizing the results using charts and graphs. The literature review was conducted using keywords such as "urban greenery," "greenery maintenance," "green areas," and "urban greenery management."

The adopted methodology provides a comprehensive perspective on both the evolving structure of green spaces in Sandomierz and the theoretical foundations of the role of urban greenery in contemporary urban environments [https://pgkim.sandomierz.pl: update: 15.03.2025].

Results

The analysis covered data on the area of urban green spaces in Sandomierz from 2019 to 2023, including three categories: parks and green squares, residential greenery, and street greenery. The results are presented in Table 1.

Table 1. Area of urban green spaces in Sandomierz, 2019–2023 (in hectares).

Year	Parks and Green squares (ha)	Residential greenery (ha)	Street greenery (ha)	Total (ha)
2019	14,1	20,81	3,0	37,91
2020	14,1	20,81	3,0	37,91
2021	14,1	20,81	3,0	37,91
2022	14,1	20,57	3,0	37,67
2023	14,1	20,57	3,0	37,67

Source: Author's own work based on GUS data (2025).

Based on the data analysis, the area of all categories of green spaces remained constant from 2019 to 2021. However, starting in 2022, there was a small decrease in the area of residential greenery—from 20.81 ha to 20.57 ha. Consequently, the total area of green spaces decreased from 37.91 ha to 37.67 ha. The area of parks, green squares, and street greenery remained unchanged throughout the analyzed period.

Data regarding changes in plantings and losses of urban greenery, as well as the number of parks in Sandomierz from 2019 to 2023, were also analyzed. This included five

categories: tree plantings, shrub plantings, tree losses, shrub losses, and parks. The results are summarized in Table 2.

Table 2. Changes in plantings and losses of urban greenery and the number of parks in Sandomierz (2019–2023).

Year	Tree plantings (units)	Shrub plantings (units)	Tree losses (units)	Shrub losses (m ²)	Parks (sites)
2019	102	1292	319	150	3
2020	0	250	50	0	3
2021	41	602	30	12	3
2022	14	14	83	0	3
2023	20	802	26	0	3

Source: Author's own work based on GUS data (2025).

Table 3 Data presentation

	Tree plantings (units)	Shrub plantings (units)	Tree losses (units)	Shrub losses (m ²)
Min	0	14	26	0
Max	102	1292	319	150
Mean	35	592	102	32
Standard Deviation	40,05	496,3	123,61	65,95
Range	102	1278	293	150
Coefficient of Variation	1,13	0,84	1,22	2,04
Skewness	1,54	0,41	2,06	2,20
Kurtosis	2,45	-0,43	4,32	4,87

Source: Author's own work based on GUS data (2025).

The data analysis for urban greenery plantings and losses shows significant differences between the years. 2019 had the highest level of plantings, with 102 trees and 1,292 shrubs planted, but it also saw the highest losses: 319 trees removed and 150 m² of shrubs. In 2020, no new trees were planted, and shrub plantings dropped to 250 units, while tree losses were limited to 50 units and there were no shrub losses. 2021 saw a slight recovery, with 41 trees and 602 shrubs planted, and tree losses falling to just 30 units and shrub losses at only 12 m². In 2022, both plantings and losses decreased: only 14 trees and 14 shrubs were planted, while tree losses increased to 83 units. By 2023, the situation improved, with 20 trees and as many as 802 shrubs planted, while tree losses were limited to 26 units, which may indicate an improvement in the health of existing tree stands.

In conclusion, urban greenery maintenance in Sandomierz was conducted in a stable and balanced manner from 2019 to 2023. While some changes in planting were noticeable, the total area of green spaces and the number of parks

remained practically unchanged. The actions taken by the Municipal and Housing Management Company in Sandomierz Ltd. have contributed to preserving the city's green character, although the data suggests a need to increase the number of new plantings in the future.

Discussion

The results indicate that the Municipal and Housing Management Company in Sandomierz is taking systematic actions aimed at the development of green areas. This trend is consistent with broader patterns observed both in Poland and globally. The impact of greenery on human health is highlighted in a publication by the World Health Organization entirely dedicated to urban green spaces [https://iris.who.in: update: 17.03.2025].

However, as Hartig rightly notes, examining how access to green spaces affects health is complex, as many effects overlap and often interact synergistically. Different models explain the positive health outcomes for residents of green cities in various ways - such as improved air quality, increased physical activity, and reduced stress levels [Hartig, Mitchell, de Vries, Frumkin, 2014, p. 35]. Lachowycz and Jones emphasize relaxation through contact with nature and social interactions [Lachowycz, Jones, 2013, p. 118], while Villanueva highlights the role of greenery in mitigating the negative effects of urban heat and improving respiratory health [Villanueva, et al, 2015, p. 57]. Kuo also suggests improved immunity, pointing out that greenery influences health through multiple mechanisms, which often work in combination and provide both direct and indirect benefits [Kuo, 2015, p. 6].

International literature also emphasizes the role of urban greenery in promoting public health, suggesting that the development of green spaces in Sandomierz has not only an aesthetic value but also social and health-related significance.

At the same time, Tomasz Jeleński argues that the management of urban greenery in Polish municipalities remains unsatisfactory. This is evidenced by the increasing civic and NGO activity demanding more effective engagement from local governments in protecting and enhancing green areas. A higher level of education and public awareness brings about growing expectations for improved quality of life - largely associated with the desire for a healthy and clean environment, which significantly contributes to urban well-being [Jeleński, 2018, p. 27].

As Agata Warchalska-Troll and Paweł Pistelok point out, city authorities are often forced to prioritize certain functions of urban space. This task is complicated by the need to meet strict criteria of grant programs and funding schemes, which are usually focused on achieving measurable results within a limited timeframe. Such requirements often do not align with the slower pace and complex nature of ecological and social processes. Moreover, there is growing pressure to follow current “trends” in urban greenery development. If these trends are adopted uncritically, they may - in extreme cases - prove counterproductive to fostering public understanding and support for sustainable, pro-ecological solutions [Warchalska-Troll, Pistelok, 2023, p. 5].

Sandomierz, like many European cities, recognizes the wide-ranging benefits of developing green infrastructure.

Summary and conclusions

Based on the analysis of data from the Central Statistical Office (GUS) for the years 2019–2023, the total area of green spaces in Sandomierz has remained relatively stable, despite minor fluctuations in the amount of residential greenery. The year 2019 was particularly significant for the city, as it saw the largest investments in new plantings.

In the following years, varying levels of maintenance activity were observed, with efforts increasingly focused on minimizing the loss of urban tree cover. It should be emphasized that urban green space management policies should continue to prioritize the systematic renewal of plant resources and the reduction of vegetation losses. Continuous care for greenery should remain a key priority, as it contributes to enhancing the city's tourism appeal and improving

the overall quality of life for residents. Future investments in green space development should also take into account the diverse needs of different social groups.

The stable number of public parks demonstrates a consistent commitment to maintaining recreational spaces for residents.

Despite these positive trends, the Municipal and Housing Management Company in Sandomierz still faces several key challenges. Efforts should be made to expand the area of urban green spaces - especially in residential districts - to mitigate the effects of urbanization and meet the growing expectations of the local community. It is also essential to increase the planting of tree species that are resilient to changing climate conditions, which will support the long-term sustainability of the city's ecosystem.

Another important challenge is ensuring high-quality care for existing greenery, which requires effective planning and investment in modern maintenance technologies.

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