BOOK OF PROCEEDINGS

INTERNATIONAL CONFERENCE
13th - 14th October 2023

ISSUES OF HOUSING, PLANNING, AND RESILIENT DEVELOPMENT OF THE TERRITORY
Towards Euro-Mediterranean Perspectives

Issues of Housing, Planning, and Resilient Development of the Territory Towards Euro-Mediterranean Perspectives

Conference Theme and Rationale

Albania, along with other Western Balkan countries, has undergone significant economic, social, and political changes in recent years. As a result, housing, planning, and the resilient management of territorial development have emerged as critical issues. This is because these regions face significant challenges in providing affordable housing, addressing the impact of urbanization on the environment, fostering evidence-based decision-making on the territory, and bringing forth the commitments towards climate neutrality.

The organizers use the term "multi-modality" to define complex situations (in matters of territorial planning, management, architecture, housing, public space, technology, etc.) that have historically encompassed Western Balkans and Mediterranean cities in a logic of coexistence and value co-creation. A combination of knowledge and heritage that throughout time and history have given life to civilization in this region of Europe. The active involvement of Albania in the existing network of the Mediterranean Basin and the EU, through a joint action plan with UN / UNECE, and the Albanian and regional authorities, including reputable scientific bodies such as the Academy of Sciences of Albania, makes this conference even more intriguing to explore fascinating areas of research. The conclusions, to be considered as a stage for open innovation, will include recommendations for further scientific and applied research, projects, and events.

The geographical focus of the conference covers three dimensions: i) Albania; ii) the Western Balkans; iii) Euro-Mediterranean countries. POLIS University aims to focus on the above-mentioned research areas that are of common interest to both Western Balkans and Mediterranean cities, including, but not limited to: housing policies, urban history and architecture typology, innovation and digitalization in urbanism, energy efficiency, resilience and environmental sustainability, governance and smart technologies for city management, education and gender aspects in urban planning research.

In this regard the main aim of this international conference is to bring together scholars, policymakers, and practitioners to examine the pressing issues of housing, planning, and land development in these regions, in a context of transition fatigue, climate challenges and post-pandemic realities.

Issues of Housing, Planning, and Resilient Development of the Territory Towards Euro-Mediterranean Perspectives

Conference Aim

The main aim of this international conference is to bring together researchers, policy makers and practitioners to examine the urgent issues of housing, planning and land development in these regions, in a context of transition, climate challenges and post-pandemic realities.

Objective

-Consolidation of the cooperation network between Albanian and non-Albanian researchers, lecturers, managers, with the aim of participating in joint research projects at the regional and international level;
-Support of local authorities with contemporary data, on the state of housing issues, planning and sustainable urban and environmental management, as well as representatives of public and private institutions operating in this field.

The conference is organized by POLIS University (U_POLIS) in cooperation with the Academy of Science of Albania, and supported by other local and international partners.
 In the framework of resilience, the main conference theme is devoted to Issues of Housing, Planning, and Resilient Development of the Territory from a Euro-Mediterranean Perspective, including Albania, Western Balkans and the Mediterranean Basin. This event aims to bring together academics, policymakers, researchers, experts, practitioners, and stakeholders from diverse backgrounds to discuss and address critical challenges related to housing, urban planning, and the development of resilient territories.

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HOUSING

MANAGEMENT, TECHNOLOGY,SUSTAINABILITY

PLANNING & ARCHITECTURE

A GIS-based analysis of the urban green space accessibility
Case Study: Administrative Area No.6, Tirana, Albania

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Abstract

Urban green spaces such as parks, recreational areas as well as urban forest represent a fundamental component of urban ecosystems. In terms of urban planning, it is important to focus on the urban green spaces open to the public, especially analyzing the availability and accessibility of all urban residents to these areas. Managing and ensuring access to these green areas within urban landscapes poses distinct challenges. Geographic Information Systems (GIS) have become an indispensable tool for researchers aiming to analyze urban green space accessibility.

Albania currently lacks specific nationwide standards for green space per capita, and such standards vary between countries, shaped by urban planning policies, population density, and environmental considerations. This study situated in Administrative Area No. 6, Tirana, Albania, comprehensively assesses the general accessibility and deficiencies in urban green spaces. It also explores the interaction between green space density and population density within the area.

Using GIS, this study aims to seek the relationship between green space accessibility, and deficiency of urban green spaces into the given area. The number and location of the green spaces within the area are correlated with the population density in order to analyze the accessibility to green areas based on walking distance between the access points of the green spaces and the residential areas. It also seeks to guide local decision-makers in identifying areas requiring additional green space development in new residential zones and older urban areas.

Results highlight the distribution of green spaces, emphasizing disparities in accessibility and deficiency within the area.

Keywords: Accessibility, GIS, Network Analysis, Urban Green Space, Tirana.

Introduction

Urban green spaces are integral components of modern urban ecosystems, offering respite from the bustling city life and providing essential environmental benefits (Ignatieva et al., 2020). However, ensuring the effective management and accessibility of these green oases within urban landscapes presents unique challenges (Langemeyer, 2015). To address these challenges, the integration of green space data into a Geographic Information System (GIS) becomes crucial enabling real-time observation of spatial data and facilitating informed decision-making. GIS has emerged as an indispensable tool in the arsenal of researchers dedicated to analyzing the accessibility and walkability of urban green spaces (Guerrero et al., 2016).

We examine various type of green spaces including urban forests, residential green areas, public parks and recreational areas to comprehensively assess their accessibility and deficiency in accessibility within our zone (Figure 1). This research also considers the density of these green spaces and population density within the area offering a nuanced understanding of their relationship. Currently, Albania does not have specific nationwide standards or guidelines for green space rates per capita. The development and implementation of such standards can vary from one country to another and often depend on factors like urban planning policies, population density, and environmental considerations. By harnessing GIS capabilities, researchers can collect and analyze data that illuminate the complex relationship between urban green spaces, their accessibility and the well-being of urban dwellers.

This study situated in the context of Administrative Area No. 6, in Tirana, Albania, endeavours to shed light on two fundamental aspects of urban green spaces: accessibility and deficiencies in green spaces. Specifically, it offers a comprehensive assessment of green space accessibility, considering the distance required for residents to reach the nearest green space. Furthermore, the study identifies residential areas that stand in need of improved access to green spaces or an increase in green area coverage. Kombinati, is a suburban neighbourhood located approximately 6 kilometres southwest of Tirana's city centre, falls within Administrative Unit No. 6. The unit covers an area of 5.5 square kilometres and home to a population of 77,620 inhabitants.

The paper also aims to guide local decision-makers in identifying areas that require additional green space development, both in new residential zones and within older urban areas. While the analysis provides valuable insights into accessibility disparities in urban green spaces, it is essential to acknowledge certain limitations. These limitations may arise from methodological constraints, data processing errors, or the use of road network data obtained from open sources, which may contain inherent inaccuracies. Furthermore, the study is limited from delving into a more nuanced analysis of demographic factors such as age, socio-economic status, or ethnicity, despite the potential influence of these variables on green space accessibility.

The study consists of three main parts after the introduction, the literature review, methodology used, results and the conculsion.

Literature review

The problem of how to ensure the accessibility of green areas is a significant issue for urban planners and leaders (Ergen, 2021). Every segment of society should have access to green areas. European countries often set standards and guidelines for the provision of green spaces per capita to enhance urban quality of life and environmental sustainability. These standards vary across nations but generally aim to ensure that residents have sufficient access to green areas. For instance, countries like Sweden and Finland typically strive for a minimum of 10 square meters of green space per person, emphasizing the importance of nature in urban planning. In contrast, densely

populated countries like the Netherlands and Belgium aim for higher green space ratios, often exceeding 20 square meters per capita. These standards serve as benchmarks for urban planners and policymakers, fostering greener, healthier, and more livable cities across Europe (Yukhnovskyi & Zibtseva, 2019).

Langemeymer (2015) takes a broader perspective on urban ecosystem services, emphasizing the multifaced value of green spaces in cities. While not exclusively focused on accessibility, this work contributes to the understanding of the holistic benefitis of urban green areas. It offers a comprehensive urban green spaces beyond accessibility and highlights the various roles green spaces play in the cities.

Ignatieva (2020) explore the global phenomenon of lawns in urban green spaces and their potential for sustainable solutions. This study contributes to the broader discussion of urban green space accessibility by considering alternative approaches. It encourages innovative thinking about urban green spaces and sustainability and it promotes the consideration of alternative solutions to improve accessbility. But it does not directly address traditional accessibility concerns.

Sotoudehnia & Comber (2011) study emphasizes the importance of urban green spaces (UGS) as vital areas for relaxation and stress relief in urban environments. It found that people tend to travel longer distances to access green spaces than what network analysis suggests. This study observed that individuals preferred traveling towards central city green spaces over those in the northern direction.

Moreover, Yan & Wang (2021) used ArcGIS platform and a combination of traffic and population distribution data, this research analyzed the spatial accessibility of parks and green spaces in Weifang prefecture-level city. They employed the cuckoo search algorithm to optimize park green space site selection. The study highlighted disparities in accessibility across different streets, assisting in the allocation and optimization of green spaces in the city.

So (2016), in his paper explores the relationship between urban green spaces and the well-being of urban residents. It notes that access to public green spaces is not evenly distributed, with the White population having no higher accessibility than others. Interestingly, the Hispanic population has the highest accessibility but also experiences higher park pressure.

Furthermore, Kemec & Salar (2023) in their study conducted in Erbil city employed GIS and network analysis to evaluate the accessibility of different types of green spaces. It found that a significant percentage of the population had access to community, district, and neighborhood parks within various travel times, indicating relatively good accessibility. However, mini parks were less accessible to the population.

Poslončec-Petrić et al. (2020) in their study discussed the development of Geographic Information Systems (GIS) for managing green areas, emphasizing their role in sustainable development. It highlights the challenges associated with creating and maintaining a green cadastre system and its significance in effective green area management.

On the other hand, Vîlcea & Şoşea (2020) this study using GIS, analyzes the accessibility of Craiova residents to urban green spaces. It correlates the location of parks with population density to evaluate accessibility by both walking and driving distance. The findings reveal uneven distribution and access to green areas in the city.

Khahro et al. (2023) in his study focusing on Hyderabad, Pakistan, assessed the spatial accessibility of urban parks in different areas of the city. The research aims to contribute to Sustainable Development Goals (SDGs) by improving citizens' well-being and promoting sustainable urban development.

In summary, these papers collectively emphasize the importance of urban green spaces for the

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well-being of urban residents and the need for equitable distribution and accessibility of these spaces. They also showcase the valuable role of GIS and optimization techniques in assessing and improving green space accessibility. These insights can inform urban planning and policy decisions aimed at creating healthier and more sustainable cities.

Methodology

The research presented in this paper aimed to investigate accessibility and availability of green spaces in Administrative Area No.6, using Geographic Information Systems (GIS), with a primary focus on the Network Analyst module. The methodology involved several key steps to comprehensively analyse the urban green space landscape. First and foremost, data collection played a crucial role. To obtain the necessary information we utilized the European Corine Land Cover Dataset (Urban Atlas), which provided the land cover vector data. Street network data was obtained from Open Street Map, while additional spatial information was taken from the General Local Plan of Tirana. Also, some missing data were digitized using the last orthophoto from the national geoportal. All these data sources together conducted our database (Figure 2). This data formed the foundation for the subsequent analyses.

Spatial analysis was then processed using QGIS 3.32 and particularly QNEAT (Network Analyst Tool) plugin. This step allowed us to process and manipulate the collected data effectively, paving the way for in-depth examination.

Green space analysis was a central aspect of the research. To achieve this, a series of indicators were used. The primary indicator focused on calculating the total area of green spaces within the administrative area, their size and vegetation (Table 1). Additionally, the study examined green spaces within walking distance buffers, an essential factor for urban accessibility.

Data acquisition and database creation (vectors, orthophoto)	Data processing	Data analysis and interpretation
- Green spaces (Urban Atlas, orthophoto) - Street Network (Open Street Map) - Demographic data	- Digitize the missed green spaces - Creating access points of green spaces through Network Analyst. - Creating service area polygons for park use (Network Analyst) - Integration of layers	- Classification of green areas into categories - Identify the areas with low access to green spaces and high population density. - Determine the accessibility of population to green spaces.

Table 1: Research steps

A critical element of the research involved correlating the location and extent of existing green areas with the population distribution within the area. This analysis aimed to identify areas where residents might face challenges in accessing green spaces due to either limited proximity or an outright lack of such areas.

Accessibility in this paper, refers to physical accessibility, particularly with regards to walking between access points in parks and residential areas. To assess this, several factors were taken into account.

The study considered the proximity of green spaces to densely populated residential areas, using

buffer zones set at distances of 150, 300, 450 and 600 meters from park access points. The presence of green areas in residential neighbourhoods (residential green areas) is also considered. The street network was evaluated to understand its role in facilitating access to green spaces. In our analysis, we categorized the administrative area into zones characterized by high, low or medium population density with data sourced from the administrator of the unit.

Additionally, as a tool for our analysis, we used QNEAT3- Iso-Areas as Polygons tool, enabling the creation of polygons that represent the areas with uniform walking distances to access green spaces, facilitating a more detailed exploration of accessibility. Furthermore, the density of green spaces was assessed using information extracted from the orthophoto data, providing valuable insights into the spatial distribution of green areas within the administrative area.

Type	Number	Vegetation
Natural Areas	3	High
Green Residential Area	17	High-medium
Small public parks and recreational activities	4	Low
TOTAL	24	

Table 2. Classification of green areas in terms of size, and vegetation cover

This multifaced methodology ensured a thorough and insightful analysis of green space accessibility and availability in Administrative Area No.6. It employs a comprehensive approach that combined spatial analysis, GIS tools, and a range of indicators to assess the availability and accessibility of green spaces in Administrative Area No.6 (Kombinat).

Results

The unit covers an area of 547.6 hectares and approximately 77,620 inhabitants in 2022.

There are a total of 24 green areas identified, distributed throughout the administrative unit as follows:

•   The areas occupied by urban forests are primarily located in the peripheral areas near the administrative boundary, particularly in the southeast (SE) and southwest (SW);

•   the public parks and recreational areas are concentrated in two specific regions, notably in the west (W) and east (E), while the green residential areas are distributed almost throughout the entire unit, with a higher concentration in the SE and SW, where more private houses with gardens are present.

The total area of the green spaces considered for the analysis is 33.4 hectares, with 20 hectares covered by urban forest vegetation. In contrast, the built-up area occupied by residential land use
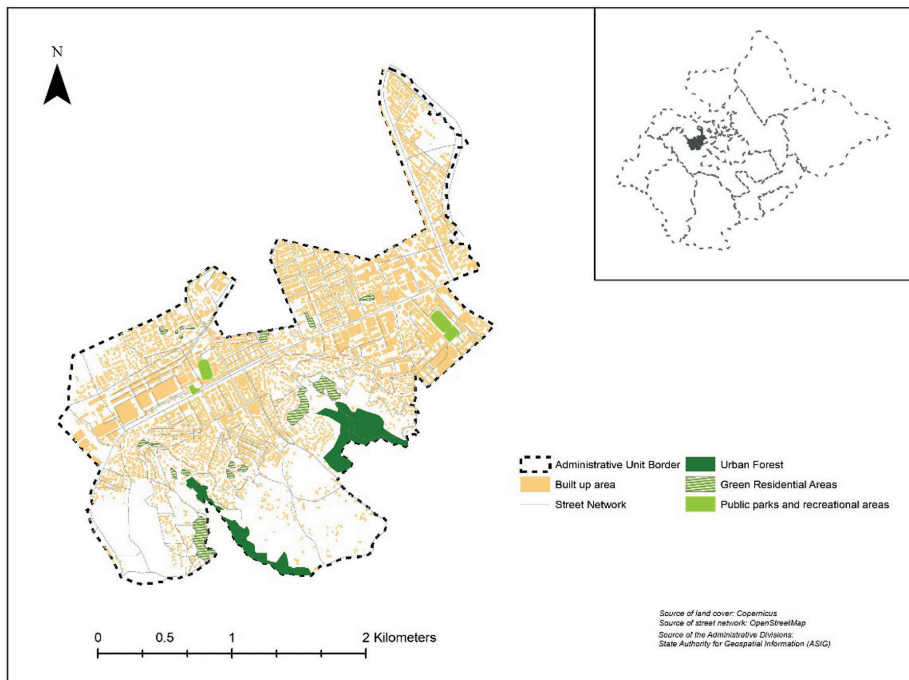
Figure 1: The distribution of the green areas within the administrative area

covers 110.2 hectares. Out of the four urban green areas categorized as public parks and recreational zones, totaling 3.49 hectares, one of them covers 1.4 hectares and has the lowest vegetation.

As illustrated in Figure 2, several green areas that could not be classified as parks, referred to as "residential green areas", were identified from satellite images and digitized. The total area of these green spaces is 9.94 hectares. These areas consist mainly of gardens located around collective housing or private gardens attached to single dwelling housing. The total area classified and mapped as green spaces is 33.4 hectares, which is approximately 6% of the total area occupied by residential land use.

The results underscores significant disparities in green space accessibility among residents (Figure 2). In the northern and north-western sectors of the area, residents experience notably limited access to green spaces. This disparity results in an unequal distribution of urban green spaces, leaving a substantial portion of the population with restricted access to these essential amenities.

Conversely, residents in the southern portions of Administrative Area No. 6 enjoy closer proximity to urban forests, indicating a more favorable accessibility situation in these regions. The analysis also reveals a complex and somewhat chaotic pattern of green space distribution, presenting a pressing issue for urban planning and development. The disparities in accessibility are particularly pronounced, emphasizing the need for a more balanced distribution of green spaces across the area.
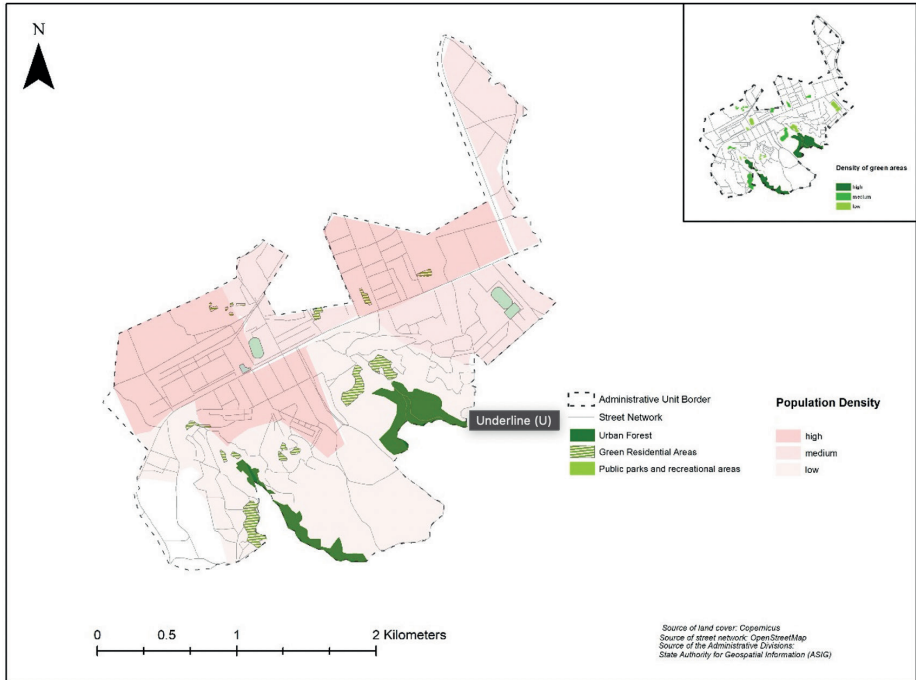
Figure 2: The distribution of the green areas and population density within the area

Furthermore, as evident in the figure below (Figure 3), the study's analysis provides a clear representation of green spaces accessibility in terms of distance buffers 150,300, 450 and 600 m and identifies areas within residential zones lacking public green spaces.

It is evident that additional green spaces are needed, particularly in the northern and north-western regions, to address the accessibility deficiencies and enhance the overall well-being of residents.

Upon analyzing the data, it is evident that an area measuring 273.5 hectares lacks green spaces, and half of it resulting in poor pedestrian access to the available green spaces. The largest deficient areas are located in the northwest (NW), northeast (NE), and southwest (SW), with NE and NW being densely populated areas with a lack of green spaces. Additionally, in the southern part of the unit, where residential housing predominates, nearly half of the population faces reduced access to public green areas.

While many single dwelling residences have private gardens attached to the house, the study's aim is to identify areas with low availability of public green spaces. In the northern part, especially in the NE, there has been significant urban expansion in the last decade, with newly built surfaces predominantly used for residential purposes.

Regarding demographic density, we can't provide correct numbers since our information was based on from an interview with the unit administrator, particularly about the neighbourhoods in
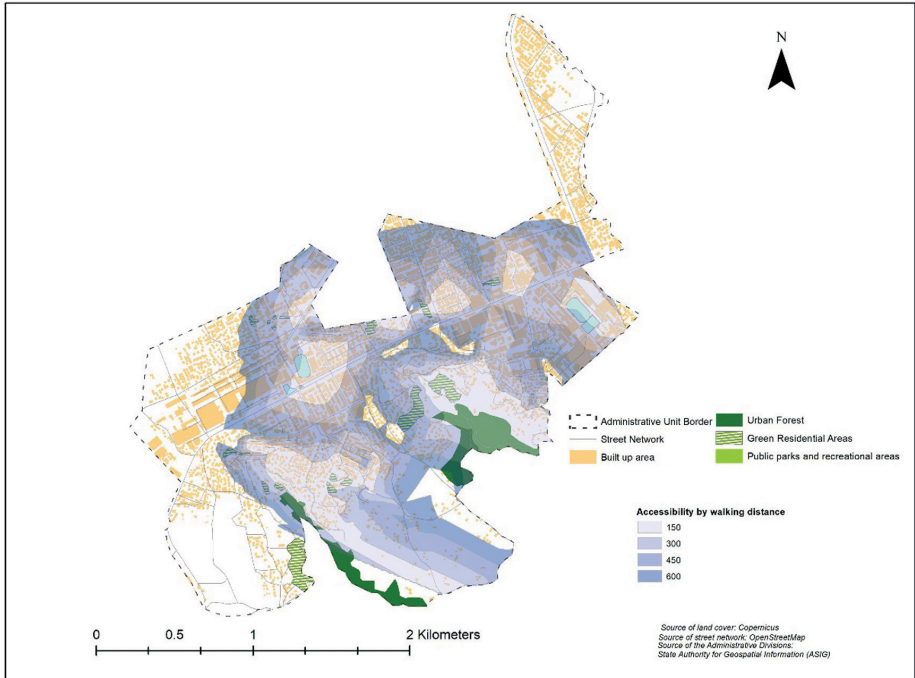
Figure 3. Pedestrian accessibility by walking distance

Kombinat and their perspective on the accessibility to green spaces.

Conclusions

This study uses GIS tools to analyze the accessibility of existing public green spaces in Kombinat. The findings indicate disparities in population access to public parks and the presence of areas lacking in green spaces. In the context of urban expansion, which has impacted both Tirana Municipality and Kombinat over the last decade, local decision-makers face conflicting demands in implementing urban development plans. The need to promote compact cities with high population densities to limit urban sprawl, along with the existing urban structure, presents challenges in increasing green urban areas and enhancing ecosystem services.

The present research highlights several areas in the unit that require planning for the establishment of green spaces, recreational areas, and improved pedestrian access for the population. Achieving this acquires close collaboration between urban planners, local authorities, and the community. While this study identifies areas where expanding green spaces is advisable, it does not identify exact locations for effective park establishment. Further analysis is required, coordinated with urban management plans issued by authorities and the expressed needs of the population. Socio-demographic aspects should also be considered in this endeavour.

The study's results may be affected by methodological limitations or errors in the data. The methodology relies on the analysis of the road network, obtained from open sources, which may con-

tain their own errors, and employs the QGIS component for calculations. To mitigate the potential impact of errors originating from a single data source, we utilized multiple data sources. We completed green surface data from the Urban Atlas with digitizing additional green areas from orthophotos. The accessibility of urban green areas involves additional aspects beyond those covered in this study, which could affect the results. A critical factor is the classification of green spaces into different categories. In the absence of formal green area classifications, the categorization or exclusion of green areas based on specific criteria remains a decision with a high degree of subjectivity.

By examining accessibility based on means of transportation, authorities may consider expanding public transport routes. Presently, many new residential areas rely solely on personal cars for park access. Introducing new public transport options may reduce traffic congestion, parking issues around large community parks, and air pollution.

In conclusion, the results of this study serve as a starting point for future research concerning Kombinat's need to expand green spaces. They provide an initial identification of areas with challenges related to the availability of green spaces and limited access to small green areas.

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