

UNPACKING CC:

Policies Versus Landscape Protection in Peri-Urban Areas

EDYTA SKIBA

Lodz University of Technology
edyta.skiba@dokt.p.lodz.pl

MAŁGORZATA HANZL

Lodz University of Technology
malgorzata.hanzl@p.lodz.pl

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ABSTRACT

Sustainable growth policies are increasingly integrating Circular City (CC) strategies, emphasising resource and land flows as limited resources. EU cities aim to harmonise the coexistence of urban life and nature. This research examines the impact of CC strategies on ecosystem stability and cultural landscapes in the case studies of the historical villages of Mieszki and Wiskitno incorporated into the city limits of Łódź, Poland. The results show how the CC approach benefits cultural landscapes by stimulating the preservation of traditional periurban zone elements. At the same time, it offers new research and design methodologies that combine the protection of natural and cultural values as essential policies of degrowth. The critical aspect is the shift of focus from perceiving informal green space as merely as land reserves to recognizing them as the key asset of peri-urban areas.

1. INTRODUCTION

Strategies for sustainable growth are increasingly embracing the principles of Circular City (CC) frameworks, which track metabolic stocks and flow and the value of resources within their structure (Lucertini & Musco, 2020; Venkata Mohan et al., 2020; Feiferytė-Skirienė & Stasiškienė, 2021; Calisto et al., 2023). This approach is in line with Sustainable Development Goal Number 12 (SDG12) and has become an essential topic in the post-growth debates. This issue has been widely explored by scholars (Hobson & Lynch, 2016; Predenille et al., 2018; Bauwens, 2021; Williams, 2021; Calisto et al., 2023) who are looking for new ways to implement CC in cities. This trend is strongly linked to the idea of regarding the land as a scarce resource.

EU cities play a crucial role as frontrunners in implementation of CC strategies (Petit-Boix & Leipold, 2018; Prendeville et al., 2018; Fratini et al., 2019; Kębłowski et al., 2020). Despite the novelty of the topic and the differences in the spatial planning ((Shmeleva et al., 2016), they are struggling to implement the transition, often following the success stories (Predenille et al., 2018; Galvão, 2018; Dabrowski et al. 2019; Williams, 2021; Calisto et al., 2023).

1.1. THE CIRCULAR CITY VISION

Nowadays, the documents published in different EU member countries related to the topic of Responsive Cities topic are based on the definition of Circular Economy (CE), which is unfortunately is inconsistent (Kirchherr et al., 2017). The strategies focus on planning cities where the built environment and nature coexist harmoniously (Łódź Ecopact, Amsterdam Circular Strategy 2020-2025). In addition, the approaches to envisioning CC and its social, economic and environmental aspects differ (Calisto et al., 2023). The parallel study in which we analyse the spatial policies of Łódź city (Skiba and Hanzl, 2025) reveals that the implementation of CC vision requires a balance between the Reformist Circular Society (RCS) and Transformational Circular Society (TCS) approaches (Calisto et al., 2023). In other words achieving the vision relies on technological breakthroughs and societal policies that benefit both humanity and natural ecosystems. In addition, it would require a reconfiguration of the current socio-political system, shifting away from productivity-focused and anthropocentric worldviews (Calisto et al., 2023). Despite that, a significant part of the natural landscape stays unprotected from unhampered development. The thesis to be proved is that most of Łódź natural, suburban landscape referring to remote past is being unsustainably transformed.

1.2. CASE STUDY - TRADITIONAL PERI-URBAN LANDSCAPES OF ŁÓDŹ

We aim to understand how the CC Is understood affects the approach to the cultural landscape and foster the preservation of the features that of the remote past (Antrop, 2005; Santoro, 2024). In this regard, the UNESCO World Heritage Convention (1992) states that the cultural landscape should be protected similarly to the built heritage. The UNESCO Florence Declaration on the Links between Biological and Cultural Diversity (2014) states that “the European landscape is predominantly a biocultural multifunctional landscape” (Santoro, 2024)



Figure 1:
**Imaginary contemporary
polish peri-urban landscape,
illustration by the author**

As pointed out by Koter (1970, 1979), high concentrations of traditional landscape elements occur in the peri-urban zone (Santoro, 2024); peri-urban landscapes preserve urban layouts that have been a constant element of urban structure for centuries (Koter, 1970, 1979). They tend to be occupied Informal Green Spaces (IGS), which are crucial for the city's Green-Blue Infrastructure, being the reservoirs of biodiversity (Machon, 2021) that support the stability of Formal Green Spaces (FGS) (Krzyk, et al, 2013). In Łódź, IGS cover a much larger proportion of urban space than FGS. Although they are highly valued by residents, city authorities tend to regard them as empty areas – reserves for further development (Biernacka et al., 2023; Kronenberg et al., 2023).

In the past, during the pre-industrial period, Łódź was surrounded by numerous small settlements (Koter, 1979; Cwikła and Nowak, 2023), the traces of which are preserved in the local topography, parcellation, and landscape features. Today, most of these areas are covered by IGS, as shown by Biernacka et al. (2023).

It should be acknowledged that the original spatial organisation in city planning gave priority to proximity as a factor limiting the flow of materials (Koter, 1970). The morphological structure of self-sufficiency of handmade waving settlements is still visible in the plots and street layouts. The study of contemporary patterns of transformation could shed light on their role in the CC vision. If CE and CC are used to propose a sustainable economy (Boeri et al., 2019), it is crucial to investigate how these strategies impact traditional landscapes and Green Infrastructure (GI), as they can lead to environmental degradation (Kebłowski et al., 2020; Calisto et al., 2023) or contribute to the development of circular future practices.

1.3. THE PERI-URBAN METABOLISM

In urban planning the linear approach is revealed by treating land and elements of landscape as resources to be used and turned into profitable investments. However, from the metabolic perspective, the resources including water, land turn into the waste such as wastewater, polluted air and contaminated soil. This degenerative, economical approach would finally destroy the landscapes on which it depends (Lyle, 1985).

Peri-urban zone, which accommodates physical manifestations of periods of slow movement or even standstill in the outward extension of the built-up area of the standard zone (Louis, 1936) tends to have higher amounts of green and vegetative area (Whitehand and Morton, 2003, 2004; Whitehand, 2003, 2005) that remains unchanged (Whitehand, 1967). Due to their peripheral location vast amounts of empty land, attract land-uses with low accessibility requirements to the commercial core, and are seeking large sites (Louis, 1936). Yet, no matter how we would characterise the peri-urban landscape, it will always be a part of global limited resource - land (Deteix et al., 2023).

2. METHODOLOGY

We divided the research into two parts. Firstly, desktop research provided an insight into the historical development of the two selected settlements – Mileszki and Wiskitno (chapter 3.1). Next, the study of historical aerial pictures of the settlements, allowed the observation of the gradual disappearance of the natural elements of the landscape and its cultural features (chapter 3.2). The results formed the basis for an in-depth analysis of city greenery morphology within the selected time frames. For this purpose, we mapped the IGS and FGS using the modified classification proposed by Biernacka et al. (2023). We omitted the absent features, and divided the classification for rural features (fields, meadows, orchards) to achieve the finer grain of the peri-urban description. This allowed us to measure the amount of landscape sacrificed for the built-up area development.

Table 1 shows the division of the classification, while Table 2 provides the rationale for selected time frames of spatial growth.

Category	FGS / IGS	Description
Park	FGS	Well-managed green spaces with park architecture and recreational equipment
Forest	FGS	Less maintained green spaces, a place for recreation and rest
Allotment gardens	FGS	Clusters of small plots of land used by individuals for non commercial cultivation of plants or other recreational purposes
Cemetery	FGS	Fenced green spaces, burial sites
Botanical gardens	FGS	Place for the presentation of various plants; heavily maintained, fenced
Street greenery	FGS	Green spaces (trees, shrubs, grass) along streets
Neighbourhood green space	IGS	Green spaces accompanying multi-family residential buildings, with small architecture, recreational equipment, quite well maintained, sometimes fenced
Private gardens	IGS	Usually small green spaces with small architecture, developed, fenced, located on private properties
Private allotment gardens	IGS	Usually plots of a size appropriate to host the housing unit, uninvested in that purpose used by the owner for non-commercial cultivation of plants or other recreational purposes
Green space near public institutions	IGS	Green spaces around public offices, museums, hospitals, and other public institutions
Green space near Kindergartens /schools	IGS	Green spaces around kindergartens, primary, secondary and higher schools, fenced; including school sport facilities
Green space related to economic activity	IGS	Green spaces in land used by companies
Green space near Religious institutions	IGS	Green spaces around churches and other objects used by religious communities
Green space along railway tracks	IGS	Unmanaged green spaces along railway tracks
Fields / Fields SA	IGS	Vast open spaces, used for agricultural purposes, but sometimes – especially in urban and suburban areas – neglected and overgrown / the suffix SA state for set aside areas for natural overgrow, which allows to track individual land owners attitude towards owned land
Meadows / meadows SA	IGS	
Orchards / orchards SA	IGS	
Green space near airpor	IGS	Green spaces in the area used by the airport
Brownfields	IGS	Unmanaged green spaces or neglected houses and farms
Waterside green space	IGS	Green spaces along the rivers, the managed part serves as a recreational space

Table 1:
The classification of the IGS and IGS adopted from Biernacka et al. (2023); the grey colour represents elements that cannot be traced within the Mileszki and Wiskitno regions; the violet colour represents the authors remarks

Table 2:
The rationale for selected time frames of spatial growth (authors own)

No of time frame	Year	Justification
1	1989	The structure of the former villages is very close to its historical borders and land-use; it is also the first year after the incorporation of the villages into the Łódź city administrative boarders in 1988
2	2017	The first years after 1989 can be treated as period of stagnation – not many investments were made; in the city history the transition to capitalism brought stagnation due to gradual disappearance of textile industry – the main industrial branch keeping the city economy robust for more than 100 years; In 2017 the first stronger influences of urban-sprawl can be observed; it is also a moment when the intersection of two main highways around Łódź is being build, which opens up the peri-urban structure for business; it was a one year before the current study of preconditions and spatial development was proclaimed
3	2024	Is the most up-to date version of peri-urban development condition; it is also the moment when the city is preparing a new general plan for the city after the changes of spatial management legislation in 2023

To visualise changes in land management processes the measured values were displayed as diagrams (chapter 3.3). The results were set against the city environmental policy to value what future is drawn for those regions (chapter 3.4). This comparison also aims to raise awareness of how natural landscapes should be considered and planned as they are bio-diversity hotspots (Machon, 2021).

3. RESULTS - LEARNING FROM THE PAST

Historical periods of growth and stagnation leave visible traces in the city plan, building fabric typology, and land usage patterns. This approach, which enables the study of the evolution of development from early phases to contemporary processes (Coenzen, 1960; Koter, 1970), has been broadly applied worldwide, including to the pre-industrial and industrial growth of Łódź (Koter, 1970).

Almost all cities face the suburbanization processes, creating a “horizontal metropolis” (Wandl, 2017). The built-up structures growing around the central city core are defined in different ways depending on the cultural background of the researcher (Wandl, 2017). They all seem to refer to the morphological concept of city fringe-belt (Whitehand, 1967; Oliveira, 2012; Kropf 2017). It could serve as an umbrella definition, referencing to other peri-urban structures in cities in European Union and beyond.

The current research aims to identify the traditional landscape elements essential to ecosystems, with special attention to the overlap between environmental and cultural perspectives. The proposed case studies examine the contemporary characteristics of two former villages (Mieszki and Wiskitno) that have been incorporated into the municipal boundaries of Łódź. Both hold the qualities that allow us to describe them as the fringes of Łódź, which have developed rapidly over the last decades.

3.1. MIESZKI AND WISKITNO MORPHOLOGICAL STRUCTURE

Mieszki and Wiskitno are among the oldest village settlements that grew up around Łódź. Mieszki dates back to the 13th, and Wiskitno to the 12th century. However, both were regulated based on German law in the early 14th century (Cwikła and Nowak, 2023) and incorporated into the city of Łódź boundaries in 1988. The arable land was obtained by clearing and burning up forests (Koter, 1979; Uminska-Tyton and Cybulski, 2023). This anthropocentric influence was reflected in the names of settlements' and can still be found in the city's administrative structure of the city.

The first marked fields were narrow strips of land located according to the geological shape of the terrain. They crossed the meridian, were perpendicular to the riverbanks and had irregular shape, providing similar soil conditions on each plot (Koter, 1979).

This characteristic pattern can be observed in Mieszki, where narrow strips of arable land face the spindle-shaped square that was the central public space. The runding shape of Mieszki is unique in the scale Łódzkie region (Wójcik, 2023). What is more, the still visible remnants of its landscape parcellation system reveals a connection to the three-field system.

The morphological structure of Wiskitno is more traditional with a linear form of settlement, which could also be included in the multi-road typology. In the early stages of its existence, it consisted of a few scattered farmsteads, a river mill, a glassworks in the 15th century, and a colony. Interestingly, in the mid-war period, due to the popularisation of the garden-city concept, Wiskitno became one of the many places around the city designated for this new type of settlement. However, it was never fully realized due to the economic crisis in the 1930s and the oversupply of sub-urban plots (Historical Atlas of the City of Łódź, 2022). From that time, an irregular network of diagonal roads filled with small plots formed the core of the future garden city of Wiskitno. The former river mill on the Olechówka River was transformed into a public park named after its former spatial function – Park na Młynku (River Mill Park). The mentioned processes are presented in Figures 2 and 3.



Figure 2:
The land management dynamics within Wiskitno peri-urban structure; time span 1989, 2017, 2024 (authors own)



Figure 3:
The land management dynamics within Mieszki peri-urban structure; time span 1989, 2017, 2024 (authors own)

3.2. THE DISAPPEARING IDENTITY

Proximity to nature and to the city (thanks to the main city bay pass) attracts new residents. Although prices per square meter have risen in both locations (Figure 4-5), the land prices are relatively low when

compared with the inner city. Finding a place to live within the city's peri-urban structure is profitable for both buyers and sellers of land. The proximity of railway and main motorway connections (A1 - north-south connection) attracts investors within the logistics sector. It is also a result of planned urban management to leave reserves of greenfield open for business and production (Study of Conditions and Directions, 2018; Historical Atlas of the City of Łódź, 2022).

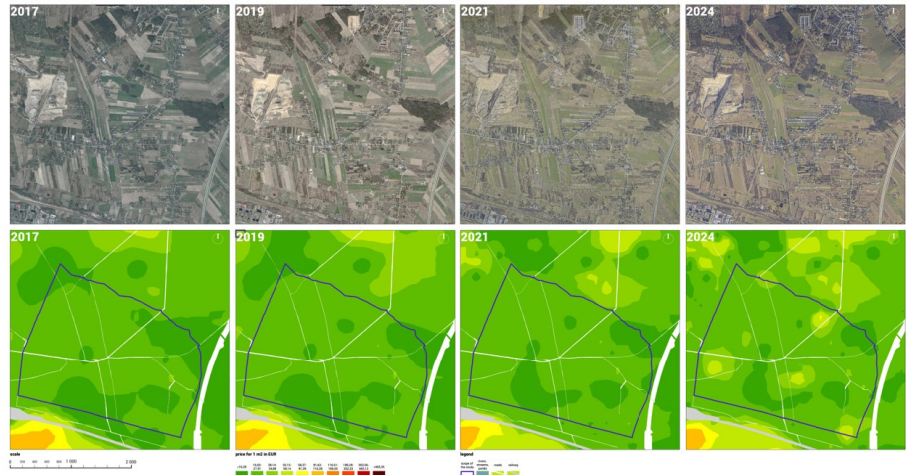


Figure 4:
The changes in land prices within Wiskitno peri-urban structure; time span from 2017-2024 (authors own, based on InterSit)

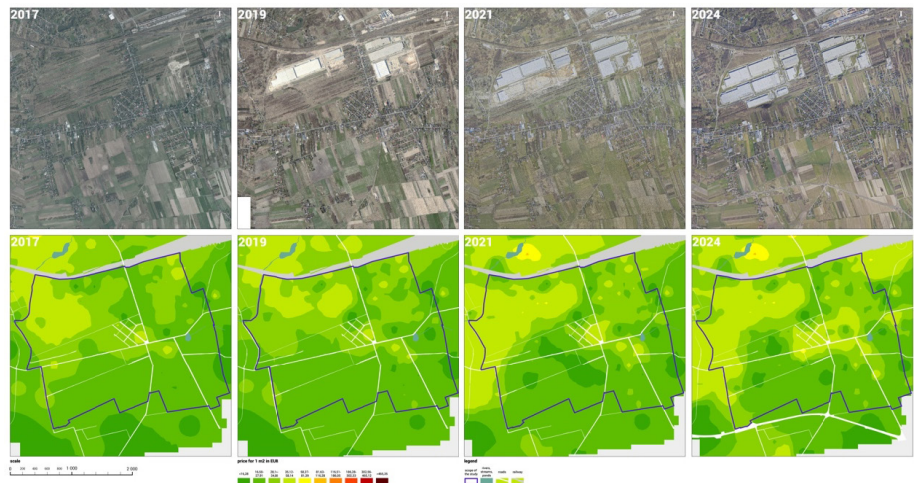


Figure 5:
The changes in land prices within Mieszki peri-urban structure; time span from 2017-2024 (authors own, based on InterSit)

Fields, meadows or orchards are left to overgrow or remain set aside. Some plots are being cultivated, yet their owners have already divided them into smaller lots for housing units and service roads, in the hope of a quick sale. These processes are shown in Figure 6-7. The economic costs of the quick rise in demand for infrastructure in the sub-urban region are obvious. Little is known about how those changes will influence the local ecosystem. Changes seem to be inevitable, yet it is important to investigate how the potential of development brought by the investors could be used to benefit the environment and cultural heritage.

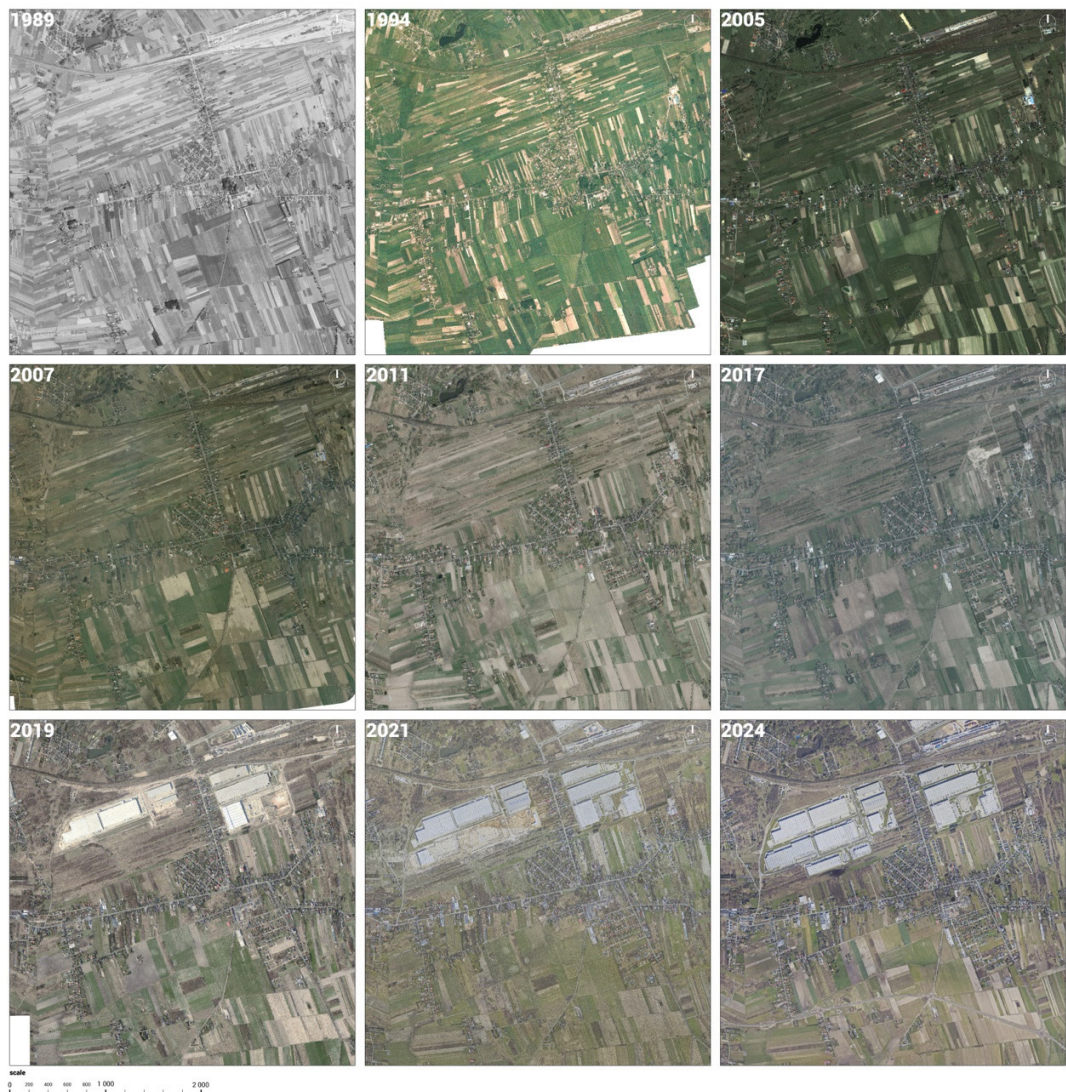


Figure 6:
The land management
dynamics and landscape
changes within Wiskitno peri-
urban structure; time span of
1989-2024 (authors own,
based on InterSit)

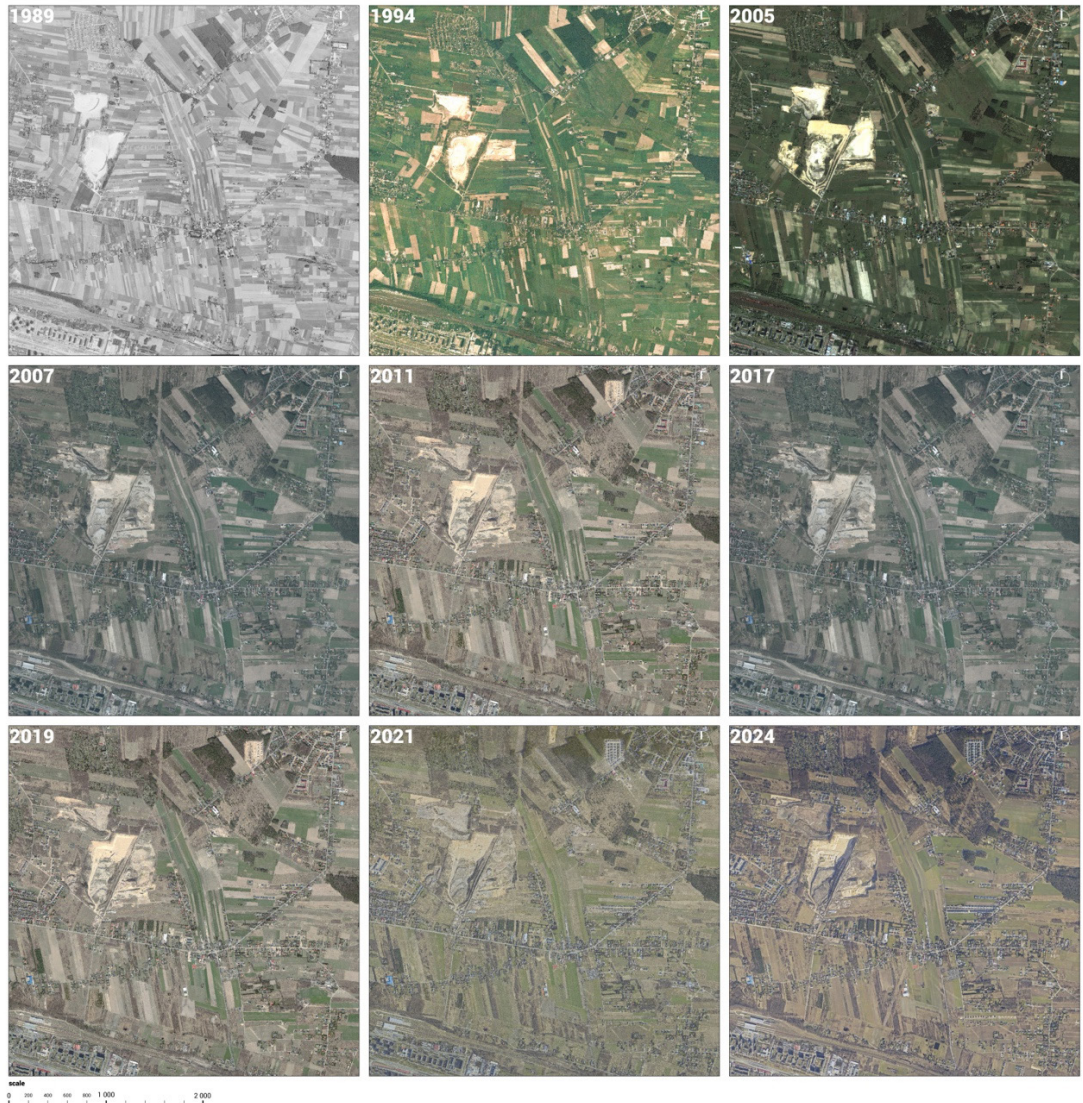
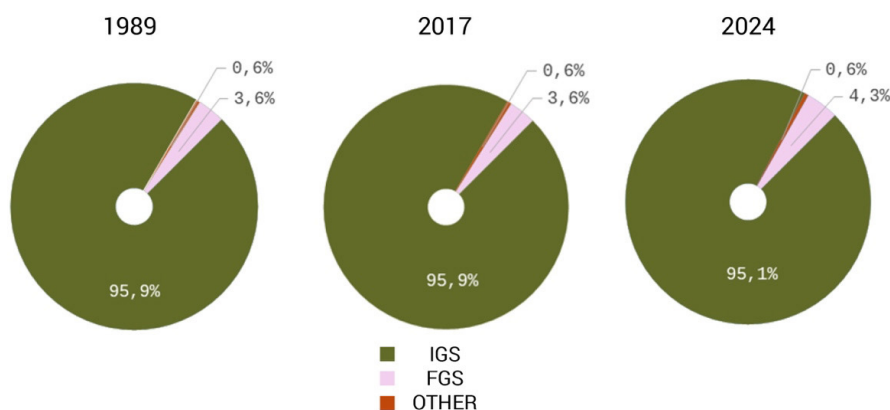


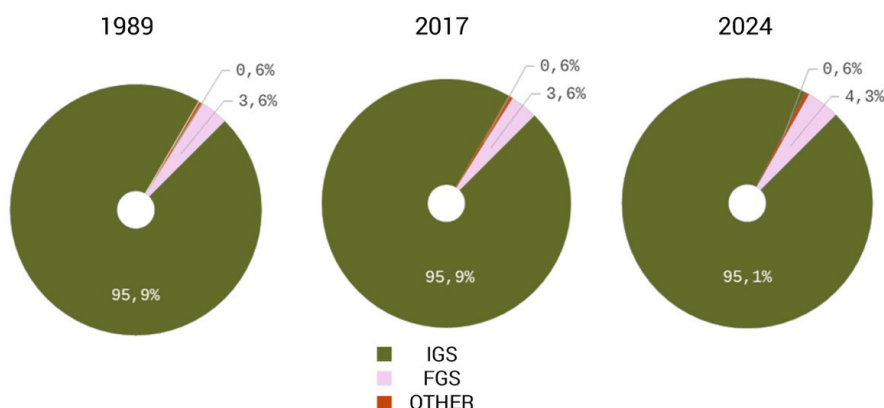
Figure 7:
The land management
dynamics and landscape
changes within Mieszki peri-
urban structure; time span of
1989-2024 (authors own,
based on InterSIT)

3.3 THE LAND MANAGEMENT DYNAMICS

Both in Mieszki and Wiskitno, the amounts of IGS coverage – despite the time span of 35 years – were significantly higher than FGS (graphs 1-2). The fluctuation between different types of land use could be observed. The three most valuable trends could be distinguished. Firstly, despite the investments into the FGS (sport-fields in Mieszki, the church in Wiskitno), the total number of FGS remains disproportionally lower than compared to IGS and other usages. Secondly, the most of the changes in land use have taken place within the IGS typology. Thirdly, the amount of other types of land use is rising in the selected time frames, mostly due to new investments in road infrastructure.



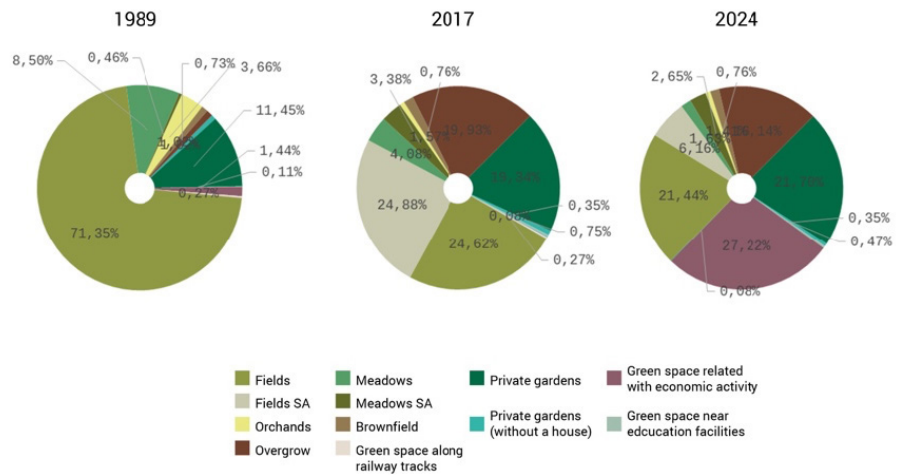
Graph 1:
IGS and FGS coverage in
Wiskitno; time span of
1989-2024 (authors own)



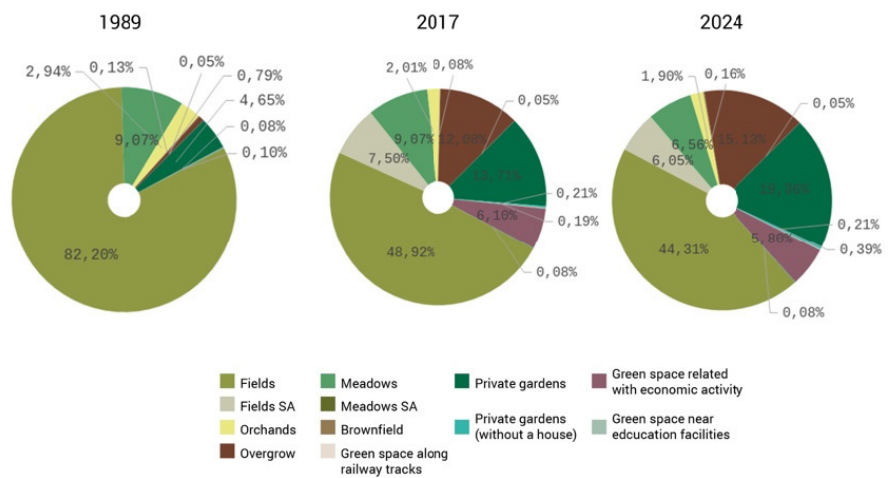
Graph 2:
IGS and FGS coverage in
Mieszki; time span of
1989-2024 (authors own)

The conducted quantitative analyses have revealed another troubling trend: the fields, meadows, and orchards are steadily disappearing. What is more, the total area of fields and meadows that have been left fallow or allowed to overgrow has been rising. This tendency not only impacts agricultural productivity within the city limits, but also threatens local biodiversity. Moreover it is followed by the significant rise within the type of greenery related to the economic activity (Table 1). It is due to the location of large-scale production and logistics centres (Wiskitno) or gravel quarry (Mieszki). The number of single family houses scattered throughout the region is also rising (Graph 3-6). This growth affects the most primary difference between the city and the village landscape, which are the complementary elements supporting distinguishing the limits between those two typologies (Dankowska, 2016). The comparison of the aerial pictures with the geodetic information revealed another observation. There is a significant number of plots, awaiting investment for suburban housing settlements. Some are still being cultivated; others remain overgrown by trees and shrubbery, to be cutted if only there is an investor willing to buy the land. Also the disappearance of hedgerows, ditches and mid-field trees could be observed in the selected time span.

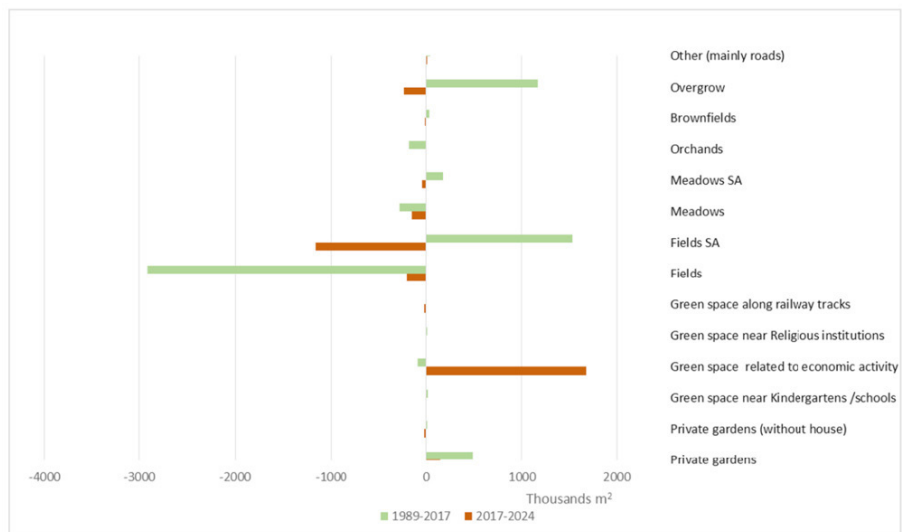
Those tendencies have a strong influence over the bio and genetic diversity of species located within the peri-urban zone. The loss of these features may profound implicate local ecosystems and water circulation in the landscape.



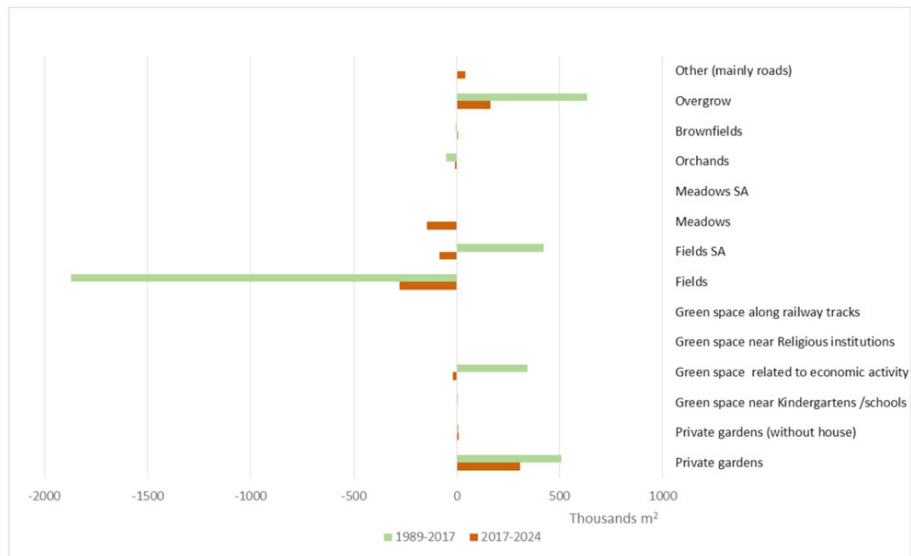
Graph 3:
IGS changes in coverage in
Wiskitno; time span of 1989-
2024 (authors own)



Graph 4:
IGS changes in coverage in
Mieszki; time span of 1989-
2024 (authors own)



Graph 5:
IGS land coverage dynamics
in Wiskitno; time span of
1989-2024 (authors own)



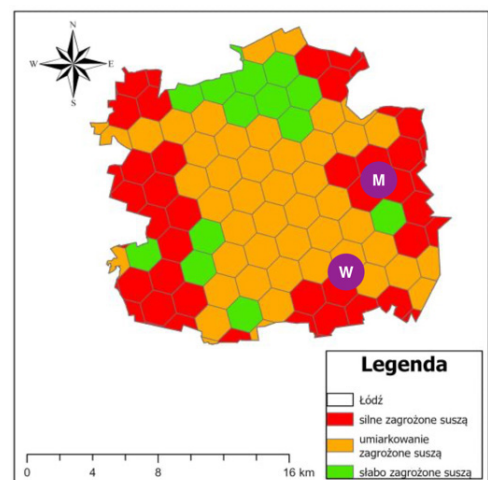
Graph 6:
IGS land coverage dynamics
in Mieszkowski; time span of
1989-2024 (authors own)

3.4 MILESZKI AND WISKITNO WITHIN THE CITY ECOSYSTEM

The obtained results should be considered together with the geographical data concerning the city location. Łódź is placed on the watershed. Its scant streams have been exploited during the industrial era in the 19th century. Currently, only a few regions within the city are not threatened by the drought (Environmental Protection Plan for Łódź for the city of Łódź). The most vulnerable areas are located within the peri-urban structure. Both case studies are endangered (Figure 8). The underground water system is being affected at least by minimising the permeable area allowing the infiltration of rainwater into the soil. It should be mentioned here that the preservation of traditional landscapes supports the mitigation of hydrogeological risk (Santoro, 2024).

What is more, the loss of plants and insects living in landscape features affects the population of typical rural avifauna. As it was already mentioned by many researchers, a complex landscape mosaic combined with linear features support the habitats for pollinators (Kells and Goulson, 2003; Goulson et al., 2015; Santoro, 2024).

Figure 8:
Drought threat level for Łódź;
red colour marks the strong
threat, orange medium and
green low; the violet dots are
marking the Wiskitno (W)
and Mieszkowski (M) regions
(authors own, based on
Environmental Protection
Program for the city of Łódź)



4. CONCLUSIONS

This research, which compares the land cover and land use maps from three points in time has confirmed the thesis. The need to track the soil management within the traditional landscapes in peri-urban structures is crucial (Santoro, 2024) also for Łódź nature and inhabitants. Furthermore, the cultural and landscape features of those zones are strengthening their identity and aesthetics. With this aim, the socio-ecological approach towards this landscape should be further explored.

CC strategies focusing on reducing, reusing, recycling and recovering are useful measures to support the defined goals further and their application offers the potential for concerted activities and synergies. Therefore a detailed examination of land use transformation patterns concerning the amount of hardened surfaces, biologically active areas and water management, within the IGS structures is needed. For the detailed studies the Sankey charts should be used to depict the sizes and direction of flows (Cuba, 2015) within the selected time span of last the 35 years. This approach will shed light on how much land has been irrevocably lost and how much remains capable of providing critical ecosystem services, especially considering the city's vulnerability to drought.

The objective of this study to develop a basis for a low-tech sustainable tool designed to assess what should be preserved, why is it important, and how businesses can be leveraged as an opportunity to support sustainable development – was proposed together with paving the path for future development of the work.

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