

Anna Bielska¹, Mikołaj Sahajdak²

LEGAL AND SPATIAL CONDITIONS FOR AGRICULTURAL LAND PROTECTION AMID THE EXPANSION OF SINGLE-FAMILY RESIDENTIAL DEVELOPMENT: A CASE STUDY FROM CENTRAL POLAND

Abstract: As a result of decades-long suburbanization, rural areas surrounding regional cities have experienced increasing pressure from residential development. The phenomenon of rapid suburbanization, commonly referred to as urban sprawl, is characterized by dispersed, often poorly coordinated development in peri-urban areas, which may contribute to the loss of agricultural land and the fragmentation of rural space. The study focuses on the development of single-family residential buildings on agricultural land and the resulting spatial relationship between residential development and agricultural land with high production potential. The analysis considers environmental, social, economic, and spatial planning conditions, as well as the legal framework, with particular attention to the Act of 7 July 2023 amending the Act on Spatial Planning and Development and certain other acts. The study also includes a review of domestic and international literature and planning instruments used in selected European countries to protect agricultural land and limit the uncontrolled expansion of residential development. The empirical part of the study examines the draft General Plan of the municipality of Cegłów, with particular emphasis on the spatial relationships among areas designated for potential residential development, the existing settlement structure, and agricultural land with high production potential. The results identify potential spatial conflicts between residential development and the protection of agricultural land and provide a basis for assessing the proposed planning solutions.

Keywords: suburbanization, spatial planning, development of rural areas

Received: 6 June 2026; accepted: 3 September 2026; 18 September 2026

© 2026 Authors. This is an open access publication, which can be used, distributed and reproduced in any medium according to the Creative Commons CC-BY 4.0 License.

¹ Warsaw University of Technology, Faculty of Geodesy and Cartography, Warsaw, Poland, ORCID ID: <http://orcid.org/0000-0001-6615-7578>, email: anna.bielska@pw.edu.pl

² Warsaw University of Technology, Faculty of Geodesy and Cartography, Warsaw, Poland, ORCID ID: <http://orcid.org/0009-0002-3680-6754>, email: mikolaj.sahajdak@onet.eu

Introduction

Over the past seventy years, internal migration processes have played a key role in shaping the condition of contemporary cities, particularly in the economic, social, cultural, and spatial dimensions. The systematic increase in the urban population, combined with its growing importance within the region, has intensified urbanization (Brzeziński, 2010).

Urban development is not a hermetic phenomenon and also exerts a proportional impact on adjacent peripheral areas, which function within a larger system and network of relationships and connections. Consequently, suburban areas, particularly those of so-called large cities, have also become subject to significant population displacement processes known as suburbanization (Harasimowicz, 2018; Szukalski, 2023). Although suburbanization processes are natural stages of urban development, their current scale and impact raise many concerns related to, among other things, the quality of emerging spaces and the impact of local conditions, particularly environmental ones (Bagiński, 2011).

The process of extensive suburbanization, or so-called "urban sprawl", is a relatively recent phenomenon, but its impact on rural spaces is significant. It refers to the aggressive occupation of land by urban units, whose growth is typically exceptionally intense and uncoordinated, often leading to irreversible devastation of the natural environment (Green, 2006).

The resulting development changes existing, usually agricultural, land use patterns, leading to land take. As the built-up area increases, soil sealing occurs, disrupting the area's natural water conditions and often leading to irreversible soil degradation (European Commission, 2006). The process of urbanizing agricultural land, therefore, causes profound changes in both the natural environment and the spatial structure of the land, and represents one of the main challenges for shaping rural areas in recent and upcoming years (Maciantowicz, 2018).

Its impact on the structure and functionality of rural areas has consequently become the subject of broad discussion, encompassing not only political and specialist circles but also public debate, stemming from growing public awareness. For this reason, protecting agricultural land is a key challenge in contemporary spatial planning. Properly conducted spatial policy can limit the scattering of development, support the concentration of new investments in already urbanized areas, and protect land with high agricultural usefulness against unjustified exclusion from production. Planning documents play a special role in this respect, as they can influence the scale and pace of transformation of agricultural areas by determining the directions of spatial development and the rules for locating new buildings.

However, the effectiveness of agricultural land protection depends on the method used to formulate planning arrangements and the criteria adopted for designating areas intended for development. Planning documents can be both a tool for protecting soil resources and a factor accelerating their urbanization. For this reason, it is important to conduct a systematic assessment of planning solutions regarding their impact on the

preservation of agricultural land and on the implementation of the principles of sustainable development.

While the impact of suburbanization on agricultural land has been extensively documented, less attention has been paid to whether the solutions proposed in new planning documents effectively limit development on high-quality agricultural land and align with principles of rational spatial structuring-particularly in rural municipalities located beyond the immediate outskirts of metropolitan areas.

This study addresses this issue by analyzing the relationship between areas designated for potential single-family housing development and the existing settlement structure and agricultural land quality, using the municipality of Cegłów in Central Poland as a case study. Cegłów was selected as a representative case study for rural areas in Central Poland; due to their specific location, these areas face the challenge of balancing development pressure with the protection of agricultural resources, while being characterized by a settlement pattern of farmsteads and single-family housing strung along existing roads. The study aims to answer the following research questions:

What spatial planning principles and agricultural land protection practices used in selected EU countries can serve as a benchmark for evaluating systemic solutions implemented in Poland, including the draft general plan for the municipality of Cegłów?

What is the spatial relationship between areas designated for residential development and the existing settlement structure?

To what extent do these areas encompass agricultural land with high production potential?

What spatial conflicts between residential development and agricultural land protection are revealed by the draft general plan for the municipality of Cegłów? The aim of the study was to assess the spatial relationships within the draft general plan for the Municipality of Cegłów among the built-up area infill zone in rural areas, the existing settlement structure, and agricultural land with varying productive potential. The study included an analysis of domestic and international literature, enabling the development of a comprehensive overview of international law and practices across other EU countries. The specific objective was to assess the compliance of the proposed planning solutions with the principles of rational spatial management and the protection of agricultural land and soils with high production potential.

Materials and methods

The research was conducted using an interdisciplinary approach, combining spatial analysis, analysis of planning and legal documents, and literature studies. The research methodology presented in the diagram (Fig. 1) was divided into three complementary stages, leading from theory through spatial analysis to the synthesis of conclusions. Stage I, Research Problem Analysis, focused on the theoretical understanding of the suburbanization process and analysis of legal regulations, with particular emphasis on the 2023 spatial planning reform. The key part of the work is Stage II, Case Study, in which the draft General Plan of the Cegłów Commune was analyzed using geographic

information system (GIS) tools (Fig. 2). The methods used, such as overlay analysis and development continuity analysis, allowed for a precise assessment of the scale of agricultural land occupation and the compactness of the planned settlement structure. The entire research process concludes with Stage III, Synthesis of Results, in which the results of the spatial analysis were compared with planning instruments, enabling the formulation of specific recommendations for soil protection and the sustainable development of the commune. The stages of the research procedure, objectives, source materials and research methods used are presented in Table 1.

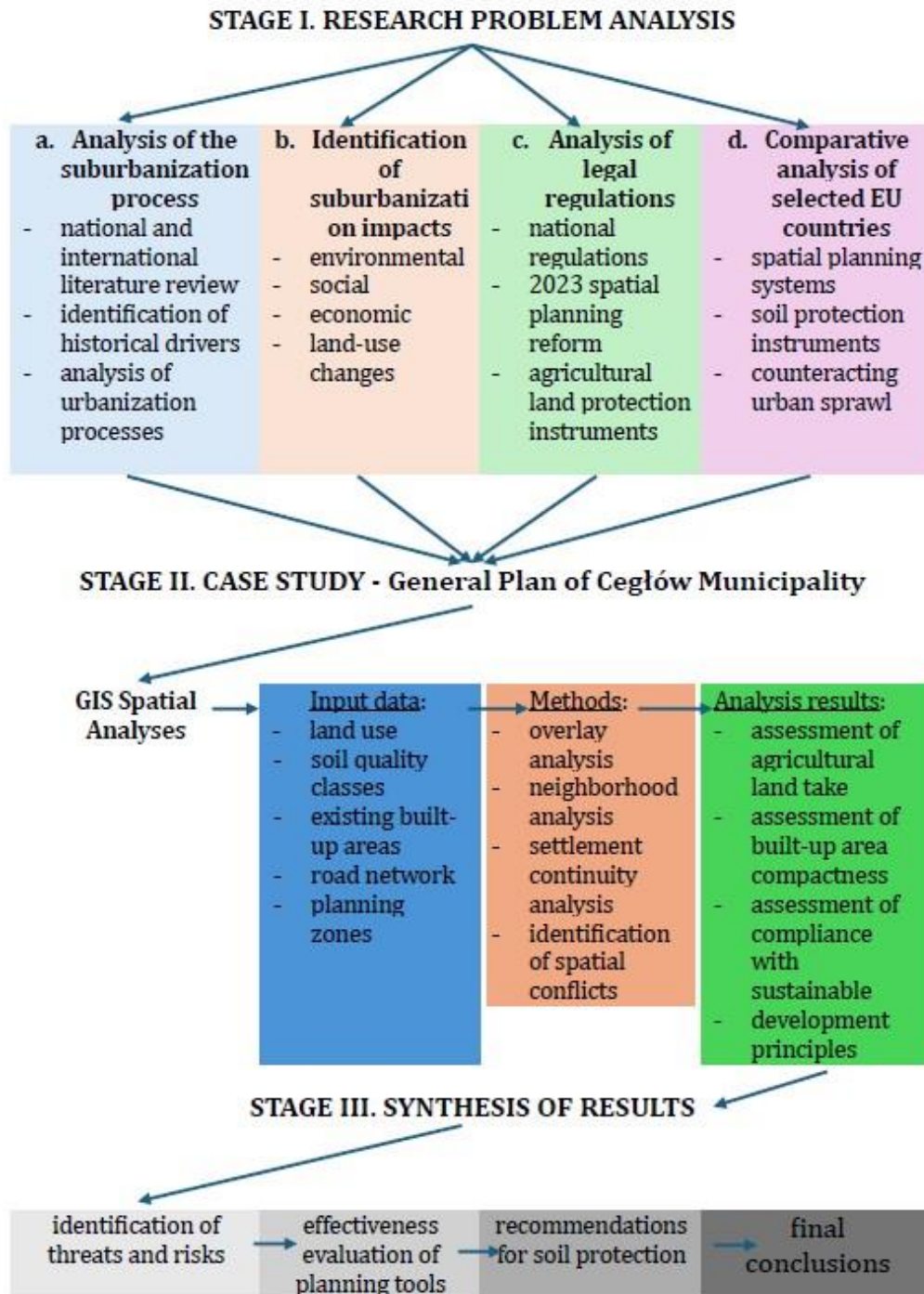


Fig. 1. Research methodology diagram

Source: own study



Fig. 2. Spatial scope of the analysis area

Source: own study based on databases of the State Register of Borders

Table 1. Stages of the research procedure, objectives, source materials and research methods used

RESEARCH STAGE	OBJECTIVE	SOURCE MATERIALS	METHODS
STAGE IA. Analysis of the suburbanization process	Identification of suburbanization drivers and mechanisms	National and international literature	Literature review and analysis
STAGE IB. Identification of suburbanization impacts	Determination of the impact on agricultural land and the environment	Statistical data, planning studies, maps	Comparative and descriptive analysis
STAGE IC. Analysis of legal regulations	Evaluation of land protection instruments	Legal acts, strategic documents	Formal-legal analysis
STAGE ID. Comparative analysis of selected EU countries	Identification of best practices	Literature and planning documents of selected EU countries	Comparative analysis
STAGE II. CASE STUDY: CEGŁÓW GENERAL PLAN	Evaluation of proposed spatial development directions	Draft of the General Plan, spatial data	Planning document analysis
GIS spatial analyses	Assessment of spatial conflicts and soil protection	Cadastral data, pedological (soil) data, land use, road network	Overlay analysis, proximity analysis, settlement continuity analysis
SYNTHESIS OF RESULTS	Development of recommendations	Research results	Synthesis and inference

Source: own study

Reference datasets from the national geodetic and cartographic resource were used to conduct the spatial analyses. The primary empirical material consisted of vector data for the entire Cegłów commune:

- the Draft General Plan of the Cegłów commune, published in the Public Information Bulletin on July 11, 2025, which is compared with the current state of development and soil conditions in selected areas of the commune,
- a digital soil-agricultural map (scale 1:25,000), enabling the identification of soil agricultural suitability complexes, and
- the Topographic Objects Database (BDOT10k, GUGiK), serving as a source of information on land cover and infrastructure networks.

Furthermore, for selected cadastral precincts, detailed analyses utilized data from the land and building register – including land-use layers and soil classification contours indicating soil quality – obtained from the District Office in Mińsk Mazowiecki in 2024; these data feature the accuracy characteristic of cadastral maps at a 1:5,000 scale.

ArcGIS (Esri) GIS software was used to perform the spatial analyses. Integrating the acquired multi-source geodetic and topographic data into a single spatial coordinate system (PL-1992) enabled quantitative and qualitative analyses.

A key methodological step involved applying thematic layer overlay techniques (overlay analysis) and spatial operations based on map algebra (including the Intersect and Erase tools). An operation involving the overlay of vector geometry layers – comprising the land and building register, the digital soil-agricultural map, the Topographic Objects Database (BDOT10k), and the Draft General Plan of the Cegłów commune – enabled the precise identification of relationships between:

- qualitative aspects: agricultural land types and soil quality classes versus the land-use designations proposed in the new planning document (identifying potential zones of spatial conflict and impacts on the continuity of agricultural structures);
- quantitative aspects: a precise area-based balance (in hectares and percentage share) of specific soil agricultural suitability classes and classification units designated for new residential development or included in built-up area infill zone (obszary uzupełnienia zabudowy – OUZ).

The analysis was complemented by aggregating results and cartographically visualizing the identified spatial relationships. The study results enabled the formulation of conclusions and recommendations regarding the principles for designating development areas and their impact on the spatial structure, at both the local (Cegłów Commune) and national levels.

Results

Analysis of the suburbanization process. Today, cities and suburban areas form an integrated system of spatial, social, and economic connections. These relationships have been shaped over decades, and their current form is the result of long-term urbanization processes, one of which is suburbanization.

In Western Europe and North America, contemporary suburbanization developed after World War II, while Central and Eastern European countries within the Eastern Bloc's sphere of influence, including Poland, were affected by this process much later (Petrov, 2020; EEA, 2006). In the second half of the 20th century, traditional suburbanization began to give way to urban sprawl, which resulted not only from population growth but also from housing preferences, increased social mobility, investment decisions, and the quality of spatial policy (Green, 2006). This process was particularly pronounced in countries with high population density and economic activity but also affected smaller towns and rural areas located along major transport routes (EEA, 2006). In Europe, since the mid-20th century, built-up areas have grown significantly faster than the population. According to research from the MOLAND project, over 90% of new housing developments since 1950 were low-density. During the same period, urban areas grew by an average of 78%, while the population grew by only 33%. Between 1990 and 2000, approximately 8,000 km² of Europe's land area was sealed (EEA, 2006).

In Poland, urbanization processes after World War II were closely linked to industrialization and rural-urban migration. Between 1946 and 1950, the urban population increased by approximately 1.8 million, while over 1 million emigrated from rural areas (Litterer, 1955). This trend continued in subsequent decades, leading to the systematic depopulation of rural areas (Śleszyński et al., 2018). At the same time, suburban zones were developing, particularly along major transportation routes, providing good connections to urban centers (Czarnecki, 2019).

The 1990s were a turning point for suburbanization in Poland. The political and economic transformation created new conditions for the development of suburban settlements, driven not only by lower land prices but also by social and qualitative factors related to the search for better living conditions outside the city (Czarnecki, 2019). Transportation accessibility and proximity to natural areas became particularly important, fostering the dynamic development of towns located around the largest cities, including Warsaw (Gałka et al., 2018). An additional factor intensifying this process was the emergence of private investors exploiting gaps in the spatial planning system (Cendrowska, 1998).

Between 1995 and 2012, suburbanization in Poland progressed at varying rates. In cities such as Gdańsk, Poznań, Wrocław, Łódź, and Katowice, suburban development occurred at the expense of the populations of the agglomerations' central areas. A different situation was observed in Warsaw and Kraków, which, despite the outflow of population to the suburbs, continued to grow thanks to strong economic and educational functions that attracted migrants from other regions of the country (Gałka et al., 2018).

Identification of suburbanization impacts. Suburbanization is one of the main processes shaping the suburban areas of regional cities, causing significant spatial, social, economic, and environmental consequences. In the long term, it can lead to a decline in residents' quality of life and a deterioration of the environment, including soil quality (Hasse et al., 2003; Degórska, 2007).

Soil sealing is a particularly significant problem, causing irreversible loss of natural functions and disruption of local water cycles, including the infiltration and filtration of pollutants (Maciantowicz, 2018). Therefore, reducing soil sealing is a priority of the European Union's environmental policy (European Commission, 2006). The suburbanization process also leads to socio-demographic changes, including the influx of new residents and the increasing social diversity of suburban areas (Stelmaszewska, 2020). The emergence of gated communities impedes the integration of newcomers into local communities, fostering social segregation and conflicts over land use (Stelmaszewska, 2020). At the same time, despite the perceived problems associated with the dispersion of development and the limitations of agricultural functions, landowners are often interested in selling their land for development, driven by both economic benefits and the ongoing economic urbanization of rural areas (Ziobrowski, 2019). Suburbanization also has significant financial implications for municipalities. Scattered development generates high costs for the construction and maintenance of technical infrastructure and the provision of public services, which often outweigh the additional revenues generated from taxes and subsidies (Smutek, 2012; Smutek, 2016). Low population density reduces the economic efficiency of these investments, and growing anthropogenic pressure increases environmental protection expenditures (Pařil et al., 2022). Consequently, suburbanization can impose significant burdens on municipal budgets and hinder the implementation of sustainable development principles, including the effective protection of soil and water resources (Smutek, 2016).

Analysis of legal regulations. Despite the European Union's significant role in shaping environmental policy, for many years, soil protection was not covered by a comprehensive, horizontal legal framework at the EU level; instead, soil-related issues were regulated under various policies—specifically environmental, agricultural, and regional policies (Kelemen, 2010; Paleari, 2017). A key milestone in the development of EU policy in this area was the 2006 adoption of the Thematic Strategy for Soil Protection, which identified—among other issues—soil degradation, erosion, the decline of organic matter, soil sealing, and land take as significant threats to soil resources. The Strategy also included a proposal for a Soil Framework Directive. However, that draft was never adopted and was formally withdrawn by the European Commission in 2014 (European Commission, 2006; Paleari, 2017).

The adoption of the Directive on Soil Monitoring and Resilience (European Parliament and Council, 2025) marks a significant shift in this regard. The Directive establishes a framework for monitoring and assessing soil health across the European Union and outlines measures to improve soil conditions, maintain good soil health, and prevent or mitigate soil degradation. Its adoption represents a crucial step toward developing a common EU policy framework for soil and underscores the importance of monitoring soil resources for their protection and sustainable use. From the perspective of spatial planning, particular importance is attached to addressing the processes that lead to soil degradation, including soil sealing and land take.

The growing concern over land consumption was further reflected in the Roadmap to a Resource Efficient Europe, which introduced the objective of achieving “No Net Land

Take by 2050” (European Commission, 2011). Land take, understood as the conversion of agricultural, forest, and natural land into artificial surfaces, has become one of the key indicators of unsustainable spatial development, particularly in areas affected by urban sprawl and suburbanization (EEA Glossary, 1999).

In Poland, the protection of agricultural land is closely linked to the spatial planning system. Numerous studies identify the Spatial Planning and Development Act of 2003 as one of the factors contributing to spatial disorder and the uncontrolled expansion of development into rural areas (Jędraszko, 2007; Gwiazdowicz, 2010; Ziobrowski, 2009). The extensive use of planning permissions issued in the absence of local spatial plans facilitated dispersed development and accelerated the conversion of agricultural land to non-agricultural uses (Koliński, 2024).

A major reform was introduced in 2023 through amendments to the spatial planning system. The reform replaced municipal studies with legally binding General Plans and introduced built-up area infill zone (OUZ) designed to promote compact settlement patterns and limit urban sprawl. By restricting new development primarily to designated areas, the reform aims to reduce land take, soil sealing, and the loss of agricultural land (Serafin & Nadolny, 2023).

Agricultural land protection in Poland is also regulated by the Act on the Protection of Agricultural and Forest Land, which provides special protection for high-quality agricultural soils and generally requires administrative approval for their conversion to non-agricultural uses (Journal of Laws of 2024, item 82). However, amendments adopted in 2009 weakened several protection mechanisms, including regulations concerning agricultural land located within urban boundaries and financial charges associated with land conversion. As a result, concerns have been raised regarding the effectiveness of the existing system in preventing the loss of valuable agricultural land, particularly in areas under strong urbanization pressure (Kwartnik-Pruc et al., 2011).

Overall, both European and Polish policies increasingly recognize land take and soil sealing as major challenges to sustainable development. Nevertheless, the long-term effectiveness of recently introduced planning instruments in limiting the conversion of agricultural land remains to be verified in practice (Drozda & Pięta, 2025).

Comparative analysis of selected European approaches to agricultural land protection. European countries apply different planning systems and legal instruments to limit agricultural land conversion, soil sealing, and urban sprawl. Despite institutional differences, the most effective solutions share a common objective: directing urban development toward already urbanized areas while protecting agricultural and natural land resources (Newman & Thornley, 1996).

The United Kingdom relies on a planning-led approach in which development proposals are assessed individually against strategic planning objectives. The National Planning Policy Framework (NPPF) promotes the redevelopment of brownfield sites and limits development on agricultural and undeveloped land, while requiring local authorities to balance housing demand with sustainable land management (McGuinness et al., 2018).

Germany has developed one of the most advanced systems for limiting land consumption. National policies explicitly support the reuse of brownfield sites and the regeneration of former industrial areas as alternatives to greenfield development (Ginzky & Ruppel, 2022). These measures form part of broader sustainability policies aimed at reducing daily land take and achieving the European objective of No Net Land Take by 2050 (Umweltbundesamt, 2025). At the local level, municipal land-use plans and development plans coordinate urban growth with infrastructure availability, helping to reduce dispersed settlement patterns and unnecessary conversion of agricultural land (Böhm, 2008).

Denmark is widely recognized for integrating urban development with long-term agricultural and environmental protection. The Copenhagen Finger Plan directs urban expansion along public transport corridors while preserving green wedges and agricultural land between development zones. This approach has successfully limited urban sprawl, maintained landscape continuity, and protected open rural areas from uncontrolled development (Vejre et al., 2007; Sørensen & Torfing, 2019).

France has adopted some of the most ambitious land protection policies in Europe. The Climate and Resilience Act introduced legally binding targets consistent with the No Net Land Take objective and requires a substantial reduction in land consumption by 2030 and 2050 (Build Europe, 2022; Sourisseau, 2024). Progress is monitored through the national land artificialisation observatory (OAS). In addition, France uses dedicated agricultural protection instruments, including Protected Agricultural Zones (ZAP) and Perimeters for the Protection and Enhancement of Agricultural and Natural Areas (PAEN), which safeguard agricultural land exposed to urbanization pressure and restrict non-agricultural development (Simon Rojo et al., 2015).

The analysed examples demonstrate that effective agricultural land protection requires a combination of strategic spatial planning, strong legal restrictions on land conversion, continuous monitoring of land take, and prioritization of brownfield redevelopment over greenfield expansion. Among the reviewed countries, Germany, Denmark, and France have implemented particularly comprehensive approaches linking agricultural land protection with broader climate and sustainability objectives (Böhm, 2008; Sørensen & Torfing, 2019; Sourisseau, 2024).

Case study: Ceglów general plan. The Ceglów commune was selected as the study area – an urban-rural commune located in Mińsk County, in the central-eastern region of the Masovian Voivodeship. State forests and small-scale family farms cover a significant portion of its area. Most of the commune also lies within the boundaries of the Masovian Protected Area (Bielska et al., 2013).

This area was chosen due to the high level of rural development fragmentation, which, due to its location near Warsaw and low production profitability, is being displaced by residential and summer development. As a result, much agricultural land is being permanently excluded from production and subsequently covered by development (Czarnecka et al., 2012).

The general analysis covers the entire municipality (with a total area of 9574 ha), while the detailed analysis encompasses the following precincts: Posiadały, Piaseczno, Skupie,

Huta Kuflewska, Wola Stanisławowska, Kiczki Pierwsze, and Kiczki Drugie. Together, they cover an area of 2564 ha.

Soils in the Cegłów commune are characterized by average agricultural suitability. Over 38% of the total area is forested. Land with the lowest production potential, on the other hand, has a remarkably small share in the land use structure. The highest-quality soils cover almost 8% of the commune's area. They are clearly concentrated in the northern part of the area, while in the south, they appear only in trace amounts.

A comparison of soil quality structures across the entire study area and the areas designated for infill development reveals a disturbing trend. Although most of the land planned for future urbanization is of average agricultural suitability, its share in the planned development zone is significantly higher than in the overall area.

Simultaneously, the share of poor soils in the development zones has decreased sharply, indicating that better-quality soils are being allocated for urban and rural development. This trend is confirmed by the fact that in built-up area infill zone (OUZ) designated, the share of the highest-quality soils exceeds 20%. While the structure of individual soils designated for development depends on the current building layout, such a rapid increase in the share of protected soils in planned OUZ zones raises serious concerns. This calls into question the designation of new OUZ zones and their future functionality.

An analysis of the structure of land designated for new OUZ zones in selected areas confirms the above conclusions. As expected, the largest portion of this land comprises medium-quality agricultural land with agricultural suitability. Meadows and forests, on the other hand, have the smallest, even negligible, share in the areas of planned OUZ zones.

The quantitative analysis for the specific study area is presented in Table 2 and Table 3.

Table 2. Share of land type within the detailed study area, considering agricultural land quality

Type of land	Area [ha]	Percentage Share [%]
Classified agricultural land	2205,2874	86,0
III	28,6687	1,3
IIIb	136,7278	6,2
IV	231,5552	10,5
IVa	242,5816	11,0
IVb	319,7667	14,5
V	957,0947	43,4
VI	288,8926	13,1
Total	2205,2874	100,0
Unclassified land	359,1578	14,0
OUZ	93,6458	3,7
Detailed area of research	4223,8444	100,0

Source: own study

Table 3. Share of agricultural land soil quality classes in the built-up area infill zone (OUZ) for the detailed study area

Agricultural land quality class	Area [ha]	Percentage Share [%]
III	0,7492	0,8
IIIb	12,0803	12,9
IV	6,2743	6,7
IVa	33,5252	35,8
IVb	11,9867	12,8
V	22,9432	24,5
VI	6,0870	6,5
OUZ	93,6458	100

Source: own study

The map (Fig. 3) shows the spatial distribution of the built-up area infill zone (OUZ) relative to soil quality classes within the detailed study area.

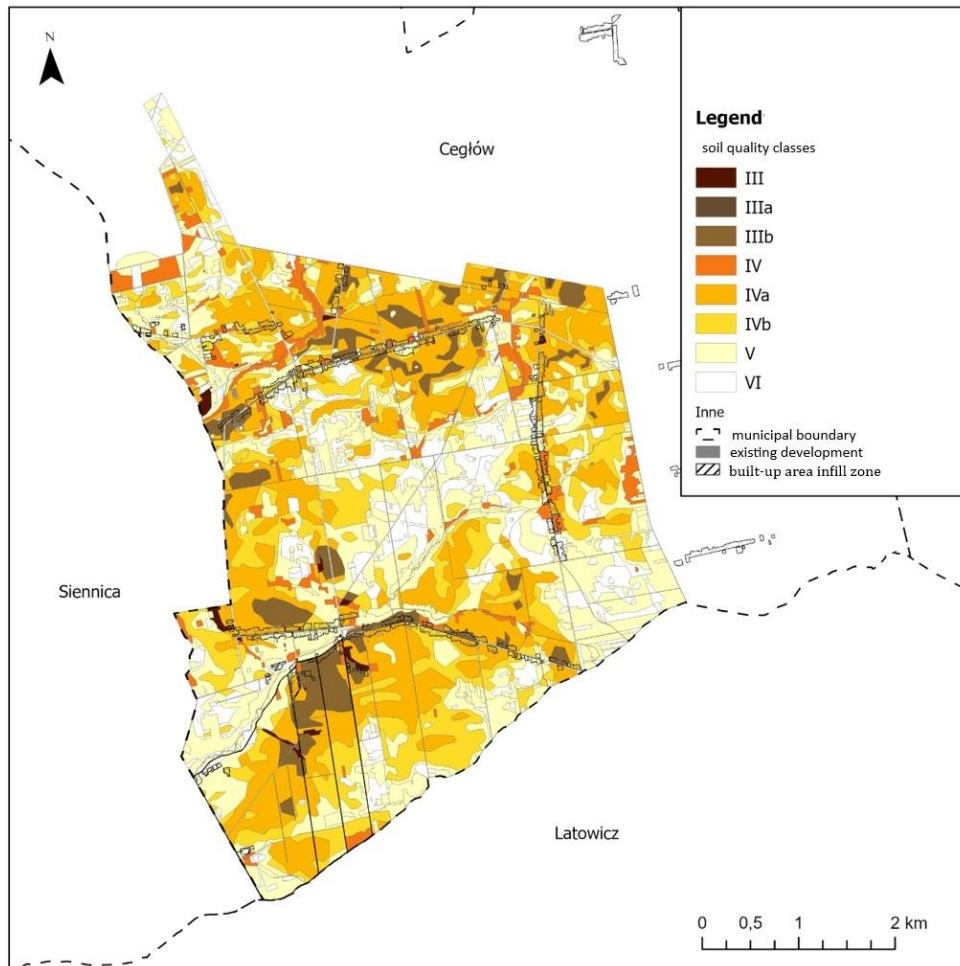


Fig. 3. The distribution of soil-quality classes within the municipality and the built-up area infill zones (OUZ)

Source: own study

The settlement structure of the Cegłów commune is characterized by scattered farm buildings, concentrated along main communication routes and forming so-called street villages. Despite the relatively dense road network, the large number of roads results in significant OUZ zones dispersion throughout the commune.

In the context of the draft General Plan, the method of designating OUZ zones is particularly important. Although according to the assumptions, they were designated adjacent to existing development, their spatial distribution raises questions about the future direction and scale of development.

The first identified problem is the presence of isolated OUZ zones, located at a significant distance from the main development routes (Fig. 4). These areas are typically located in areas with single, highly dispersed residential or farm buildings. This phenomenon is particularly noticeable in the southern part of the commune, characterized by a large number of small settlement units. This approach may promote further development dispersion, contradicting one of the primary goals of designating OUZ zones: limiting urban sprawl and supporting the development of compact settlement structures.

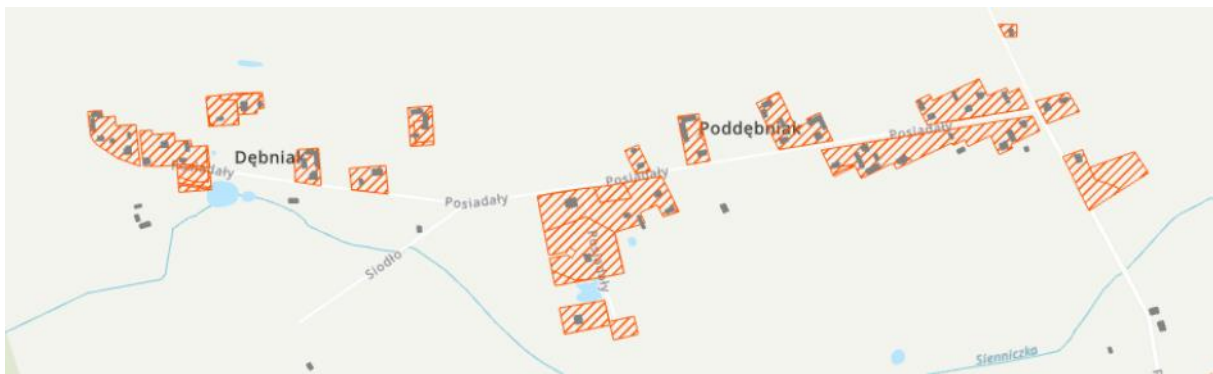


Fig. 4. Examples of "enclaves" of supplementary development areas
Source: own study based on the draft General Plan

The second problem is the excessively close connection of some OUZ zones with the existing development line (Fig. 5). In many cases, OUZ zones were designated almost exclusively within already developed areas, leaving limited options for locating new development. The changes introduced to the spatial planning system—specifically linking the ability to issue decisions on development conditions (WZ decisions) to OUZ zones—may restrict the availability of land designated for new development and, in some municipalities, lead to a mismatch between available development space and future needs. However, assessing the scale of this phenomenon requires taking into account transitional provisions and statutory exceptions, as well as actual demographic and investment trends.



Fig. 5. Examples of compact supplementary development areas
Source: own study based on the draft General Plan

Additional concerns are raised by the designation of some OUZ zones on high-quality agricultural land (protected from decommissioning). This is particularly important in municipalities with a dominant agricultural function, as it may contribute to the gradual reduction of protected land areas and intensify conflicts between agricultural and residential functions. This problem may be further exacerbated by locating new investments in the immediate vicinity of existing farm buildings.

Furthermore, some of the OUZ zones were designated within existing road rights-of-way or directly along road infrastructure. This approach can lead to discrepancies between the formal and actual available land area designated for development and can also cause difficulties in interpreting their intended use and development potential.

The structure of the farm buildings in the Ceglów commune is characterized by a compact, linear arrangement along main traffic routes, known as "street development." Although roads are relatively dense in most cases, their number results in a significant dispersion of development within the commune.

This is significant in light of the draft General Plan of the commune's development areas. Although, as intended, they were designated within existing development, their extent and layout raise certain doubts regarding the directions and pace of urbanization.

Discussion

The analysis of spatial planning policies implemented in selected European countries reveals a common policy direction aimed at reducing land take, soil sealing, and urban sprawl. Most European Union Member States pursue measures consistent with the "No Net Land Take by 2050" objective, which seeks to achieve a neutral balance between land consumption and land restoration by 2050. This objective has become an important reference point for national spatial planning policies and soil protection strategies.

At the same time, the experiences of countries such as Denmark, France, and Germany demonstrate that achieving ambitious land take reduction targets remains challenging despite favorable economic conditions. According to Eurostat data, these

countries rank among the European Union's leaders in terms of gross domestic product per capita (Eurostat, 2025). This suggests that the effectiveness of spatial planning policies depends not only on economic performance but also on the quality of planning instruments and on their effective implementation.

The literature emphasizes that the effectiveness of spatial planning should not be assessed solely by the degree to which quantitative targets are achieved. Equally important are the reduction of development uncertainty and the ability to guide land-use change in accordance with long-term strategic objectives (Li et al., 2022). Conversely, the persistent failure to meet established targets may undermine confidence in public policy, weaken stakeholder engagement, and necessitate continuous revisions of strategic documents, thereby generating additional organizational and financial costs (Stupak, 2021).

For this reason, spatial planning objectives should be ambitious while remaining aligned with actual socio-economic conditions and anticipated development trends. A notable example is the Copenhagen Metropolitan Development Plan (Finger Plan), whose effectiveness stems from both its long-term planning horizon and the consistent implementation of its principles by local authorities.

Particular attention should also be paid to the German spatial planning model, which is based on long-term forecasting and the integration of future investments into existing spatial structures. In contrast, the Polish planning system is more reactive in nature and tends to focus on immediate development needs. As a consequence, long-term considerations, including agricultural land protection and the prevention of spatial fragmentation, often receive less attention. This results in lower stability of planning documents and a greater need for their frequent revision.

The countries examined in this study also differ in the degree of decentralization of planning powers. It is not possible to identify a universally optimal governance model, as the effectiveness of planning systems depends on each country's legal, historical, and socio-economic context. More centralized systems facilitate the implementation of coherent spatial policies and the protection of the public interest, whereas greater decentralization promotes flexibility, innovation, and the consideration of local needs (Flejterski & Ziolo, 2008).

The German experience suggests that a highly decentralized planning system can effectively support the protection of agricultural land and soils even under strong development pressure. In Poland, however, the assessment of decentralization remains contested. According to Ziobrowski (2009), the decentralization of spatial planning reduced the effectiveness of the Spatial Planning and Development Act as an instrument for ensuring coordinated and sustainable spatial development.

The analysis of planning approaches in Denmark and the United Kingdom indicates that effective agricultural land protection requires spatial policies that extend beyond the boundaries of individual municipalities. Both the Finger Plan and the Green Belt Policy are based on long-term planning frameworks that cover entire metropolitan regions and their functional hinterlands.

In Poland, spatial planning remains largely a municipal responsibility, while regional planning documents generally have a strategic character and exert only limited influence on local planning decisions. This also applies to functional urban areas, for which recommendations and policy directions are typically formulated without establishing legally binding spatial regulations (Resolution No. 22/18 of the Mazowieckie Regional Assembly of 19 December 2018).

The example of the Warsaw Functional Urban Area demonstrates that, despite recognizing the threats posed by suburbanization and development pressure on agricultural land, strategic planning documents often remain relatively general. Consequently, their influence on actual land-use processes and agricultural land protection is limited (Resolution No. 22/18 of the Mazowieckie Regional Assembly of 19 December 2018).

An analysis of approaches adopted in selected European countries revealed several recurring principles for containing urban sprawl and protecting agricultural land. Key principles include: concentrating new development within the existing settlement structure; limiting the expansion of built-up areas into previously undeveloped land; protecting highly productive agricultural land; and prioritizing the use of existing infrastructure and already developed sites.

These identified principles served as benchmarks for evaluating the spatial strategies proposed in the draft General Plan for the Municipality of Cegłów. The analysis specifically examined the relationship between areas designated for development (OUZ zones) and the existing settlement structure, their proximity to highly productive agricultural land, and the presence of areas where development could lead to further spatial fragmentation. This approach enabled the comparative analysis to serve not only as a means of characterizing practices in other countries but also as a foundation for evaluating the planning solutions proposed for the municipality in question.

The analysis of the General Plan of the Cegłów Municipality supports this conclusion. The delineation of OUZ zones indicates the limited effectiveness of supra-local planning instruments in shaping municipal spatial policies. In many cases, these areas form dispersed and irregular spatial structures that contradict the principles of compact urban development and agricultural land protection. Of particular importance is the share of agricultural land with high production potential located within OUZ zones. However, their inclusion in OUZ zones does not automatically imply designation for non-agricultural purposes, formal exclusion from agricultural production, or actual development or soil sealing. Instead, it signals a potential conflict between the scope for future urban development and the need to protect valuable agricultural land. The extent to which these areas are actually transformed will depend on future planning and investment decisions, as well as the actual demand for new development land.

Conclusions

Considering the issues discussed above, several priority actions are necessary to improve soil protection. The first and arguably most important measure would be the more effective enforcement of existing regulations protecting soils of high environmental and agricultural value. Although the Polish Act on the Protection of Agricultural and Forest Land provides legal protection for organic soils and mineral soils classified as quality classes I, II, and III, the example of the Cegłów Municipality demonstrates that these objectives are not always fully reflected in planning practice. Therefore, there is a need to strengthen planning instruments aimed at protecting the most valuable agricultural land and to limit further its conversion to non-agricultural uses (Act of 3 February 1995 on the Protection of Agricultural and Forest Land, Journal of Laws of 2024, item 82).

Planning decisions should also be based on comprehensive analyses of spatial, environmental, social, and economic conditions. Such an approach allows for accounting for the specific characteristics of individual areas and the needs of local communities, while reducing the risk of overly rigid, standardized planning solutions. At the same time, given the growing importance of functional and spatial relationships extending beyond municipal boundaries, stronger mechanisms for supra-local planning coordination should be introduced.

Finally, consideration should be given to the use of land ownership restructuring instruments to direct future development away from soils of high agricultural and environmental value. A well-designed land ownership structure could facilitate the designation of areas suitable for future development, ensure the long-term protection of high-quality agricultural land, and reduce the risk of permanent loss through urbanization and soil sealing.

Based on the results of the analyses, several courses of action for protecting agricultural land can be identified. One of the most important is the more effective integration of the protection of high-productivity land into spatial planning processes. While current regulations afford special protection to specific categories of agricultural land-including land in quality classes I-III and organic soils-an analysis of the draft general plan for the municipality of Cegłów indicates that protecting these resources also requires consideration of their spatial distribution when designating areas for development. Consequently, it is crucial to limit the siting of new development on high-productivity land, particularly when opportunities for expansion within the existing settlement structure are available.

Decisions regarding spatial development should be preceded by a comprehensive analysis of spatial, environmental, social, and economic factors. For the municipality in question, it is particularly important to consider the relationships between the existing settlement structure, areas designated for infill development, and the location of high-productivity agricultural land. Cegłów is characterized by a largely linear development pattern, typical of certain rural areas in Central Poland. In such structures, designating areas for infill development can be particularly challenging, as the aim of maintaining

the continuity of existing development may conflict with the need to limit the consumption of valuable agricultural land.

In this context, the use of instruments designed to restructure land ownership and spatial layout is also a potential course of action. It should be emphasized that this issue was not the direct subject of the conducted research; specifically, ownership structures, land parcel fragmentation, and the potential application of specific land management instruments were not analyzed. This conclusion stems from the observed relationship between the linear settlement pattern and the locations of infill development areas; it serves as a recommendation that warrants verification in future studies. For municipalities with similar settlement structures, a well-designed restructuring of land ownership and spatial layout-including the use of available land management instruments-could facilitate the creation of a more compact built environment and reduce pressure on high-productivity agricultural land.

At the same time, the analysis highlights the importance of coordinating planning activities within a broader spatial context, particularly where development processes and pressure on agricultural land extend beyond the administrative boundaries of a single municipality. However, this issue requires further research covering a larger number of local government units.

The presented results relate specifically to the Municipality of Cegłów and should not be automatically generalized to the national level. Nevertheless, the linear settlement pattern characteristic of the analyzed municipality-also found in other parts of Central Poland-means that this study can serve as a reference point for future comparative analyses of municipalities with similar settlement patterns.

References

- Bagiński E. (2011). Suburbanizacja – nieunikniona przyszłość osadnictwa? (*Suburbanization – the inevitable future of settlement?*). *Studia Miejskie*, 3, 11–16.
- Bielska A., Kupidura A., Rogoziński R. (2013). Analiza uwarunkowań środowiskowych w planowaniu i zagospodarowaniu przestrzennym gminy Cegłów (*Analysis of environmental conditions in spatial planning and development of the Cegłów commune*). Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa.
- Böhm A. (2008). Prokrajobrazowe instrumenty planistyczne w Niemczech (*Pro-landscape planning instruments in Germany*). *Czasopismo Techniczne. Architektura*, 1-A, 182–187.
- Build Europe (2022) No Net Land Take by 2050: Solving the unsolvable. Belgia.
- Brzeziński C. (2010). Procesy suburbanizacji obszarów podmiejskich na przykładzie gmin powiatu pabianickiego. Zmiany przestrzenne. (*Suburbanization processes in suburban areas as exemplified by municipalities in the Pabianice district. Spatial changes*). *Acta Universitatis Lodzensis. Folia Oeconomica*, 245, 169–177.
- Cendrowska R. (1998). Warunki życia ludności w strefie podmiejskiej Warszawy. (*Living conditions of the population in the suburban area of Warsaw*). Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa.

- Czarnecka A., Bielska A., Rogoziński R. (2012). Analiza i ocena krajobrazu wizualnego wsi na potrzeby opracowania planów rozwoju obszarów wiejskich (*Analysis and assessment of the visual landscape of villages for the purposes of developing rural development plans*). Studia Komitetu Przestrzennego Zagospodarowania Kraju PAN. p. 336–342.
- Czarnecki A. (2019). Urbanizacja kraju i jej etapy. Ciągłość i zmiana. Sto lat rozwoju polskiej wsi (*The country's urbanization and its stages. Continuity and change. One hundred years of rural development in Poland*). Instytut Rozwoju Wsi i Rolnictwa PAN, p. 51–76.
- Degórska B. (2007). Wybrane problemy zagospodarowania i ochrony środowiska związane z rozwojem suburbanizacji (*Selected development and environmental protection problems related to the development of suburbanization*). Biuletyn KPZK, 230, 75–88.
- Drozda G., Pięta S. (2025). Ochrona gruntów rolnych w planowaniu przestrzennym, Portal Prawa Samorządowego (*Protection of agricultural land in spatial planning, Local Government Law Portal*). <https://www.portalprawasamorzadowego.pl/post/ochrona-grunt%C3%B3w-rolnych-w-planowaniu-przestrzennym> [access: 20.09.2025].
- European Commission (2006) Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions: Thematic Strategy for Soil Protection, COM(2006) 231 final.
- European Commission (2011) Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Roadmap to a Resource Efficient Europe, COM(2011) 0571 final.
- European Environment Agency. (1999). <https://www.eea.europa.eu/help/glossary/eea-glossary/land-take> [access: 03.05.2025].
- European Environment Agency (2006) Urban sprawl in Europe: The ignored challenge. EEA Report No. 10/2006. Kopenhaga: European Environment Agency.
- Eurostat (2025) GDP per capita, consumption per capita and price level indices. https://ec.europa.eu/eurostat/statistics-explained/index.php?title=GDP_per_capita,_consumption_per_capita_and_price_level_indices [access: 10.06.2025].
- European Parliament and Council (2025) Directive (EU) 2025/2360 of the European Parliament and of the Council of 12 November 2025 on Soil Monitoring and Resilience. Official Journal of the European Union, L, 2025/2360.
- Flejterski S., Ziolo M. (2008). Centralizacja i decentralizacja zadań publicznych w świetle wybranych rozwiązań europejskich. Próba oceny (*Centralization and decentralization of public tasks in the light of selected European solutions. An attempt at evaluation*). Studia Regionalne i Lokalne, 33, 76–94.
- Gałka J., Warych-Juras A. (2018). Suburbanization and migration in polish metropolitan areas during political transition. Acta Geographica Slovenica, 58, 63–72.

- Ginzky H., Ruppel O.C. (2022). Effective governance for sustainable soil management at national level: Selected recommendations based on african and german soil law studies. International yearbook of soil law and policy 2022. https://doi.org/10.1007/978-3-031-40609-6_11.
- Gwiazdowicz M. (2010). Kryzys gospodarki przestrzennej. Biuro Analiz Sejmowych. Biuletyn Infos, Warszawa.
- Green C.T. (2006). The Origins of Urban Sprawl. Master's Thesis, The University of Georgia, Athens, GA, USA.
- Jędraszko A. (2007). Europeizacja gospodarki przestrzennej w Polsce: Zarys propozycji założeń nowej ustawy (*European nature of spatial economy in Poland: an outline of the proposed assumptions for a new law*). Problemy Rozwoju Miast, 4, 66–101.
- Harasimowicz A. (2018). Suburbanizacja a rola obszarów otaczających miasto – ujęcie teoretyczne (*Suburbanization and the role of areas surrounding the city – a theoretical approach*) Studia Miejskie, 115–130. <https://doi.org/10.25167/sm2017.029.08>.
- Hasse J., Lathrop R. (2003). Land resource impact indicators of urban sprawl. Applied Geography, 23, 159–175. <https://doi.org/10.1016/j.apgeog.2003.08.002>.
- Kelemen R.D. (2010). Globalizing European Union environmental policy. Journal of European Public Policy, 17(3), 335–349. <https://doi.org/10.1080/13501761003662065>.
- Koliński K. (2024). Plan ogólny gminy. Potencjalne narzędzie ochrony gruntów rolnych (*The commune's general plan. A potential tool for protecting agricultural land*). Wieś i Rolnictwo, 85–99. <https://doi.org/10.53098/wir.2024.2.203/04>.
- Kwartnik-Pruc A., Bydłosz J., Parzych P. (2011). Problemy przeznaczania, na terenach wsi, gruntów rolnych i leśnych na cele inwestycyjne (*Problems of destination of agricultural and forest land for investment purposes in the country areas*). Infrastruktura i Ekologia Terenów Wiejskich, 8, 97–108.
- Li G., Wang L., Wu C., Xu Z., Zhuo Y., Shen X. (2022). Spatial planning implementation effectiveness: Review and research prospects. Land, 11, 1279. <https://doi.org/10.3390/land11081279>.
- Litterer M. (1955). Zmiany w rozmieszczeniu i strukturze ludności polski ludowej w latach 1946 do 1950 (*Changes in the distribution and structure of the Polish People's Republic population in the years 1946 to 1950*). Prace Geograficzne/Polska Akademia Nauk. Instytut Geografii. https://rcin.org.pl/Content/17612/WA51_22050_r1959-nr16_Prace-Geogr.pdf [access: 20.09.2025].
- Maciantowicz M. (2018). Fragmentacja kompleksów leśnych jako istotne zagrożenie cywilizacyjne (*Fragmentation of forest complexes as a significant civilization threat*). Studia i Materiały Centrum Edukacji Przyrodniczo-Leśnej, 20, 135–147.
- McGuinness D., Greenhalgh P., Grainger P. (2018). Does one size fit all? Place-neutral national planning policy in England and its impact on housing land supplies and local development plans in North East England. Local Economy: The Journal of the

- | | | | | | |
|-------|---------|--------|-------|-----|----------|
| Local | Economy | Policy | Unit, | 33, | 329–346. |
|-------|---------|--------|-------|-----|----------|
- <https://doi.org/10.1177/0269094218772974>.
- Newman P., Thornley A. (1996). Urban planning in Europe: International competition, national systems, and planning projects. Psychology Press.
- Paleari S. (2017). Is the European Union protecting soil? A critical analysis of Community environmental policy and law. *Land Use Policy*, 64(64), 163–173. <https://doi.org/10.1016/j.LANDUSEPOL.2017.02.007>.
- Pařil V., Ondruřková B., Krajíčková A., Petra Z. (2022). The cost of suburbanization: Spending on environmental protection. *European Planning Studies*, 30, 2002–2021. <https://doi.org/10.1080/09654313.2021.2002270>.
- Petrov K., Marinov P. (2020). Development of suburbanization in europe. *Journal of Bio-Based Marketing*, 3, 71–81. <https://doi.org/10.5281/zenodo.3828305>.
- Serafin A., Nadolny A. (2023). Wpływ nowelizacji ustawy o planowaniu i zagospodarowaniu przestrzennym na trwające procedury planistyczne na przykładzie gminy Suchy Las (*The impact of the amendment to the Spatial Planning and Development Act on ongoing planning procedures on the example of the Suchy Las commune*). *Zeszyty Naukowe Politechniki Poznańskiej. Architektura, Urbanistyka, Architektura Wnętrz*, 15, 225–240.
- Simon Rojo M., Recasens X., Callau S., Duží B., Lohrberg F., Eiter S., Hernandez-Jimenez V., Kettle P., Pickard D., Scazzosi L., Vejre H. (2015). From Urban Food Gardening to Urban Farming.
- Sourisseau N. (2024). Are EU countries following the no net land take in 2050 recommendation? *Energy Cities*. <https://energy-cities.eu/are-eu-countries-following-the-no-net-land-take-in-2050-recommendation/> [access: 10.09.2025].
- Śleszyński P., Wiśniewski R., Szejgiec-Kolenda B. (2018). Demographic processes in Poland in the years 1946–2016 and their consequences for local development: Current state and research perspectives. *Geographia Polonica*, 91, 317–334. <https://doi.org/10.7163/GPol.0123>.
- Smutek J. (2012b). Wpływ suburbanizacji w strefie oddziaływania wielkiego miasta na dochody gmin z tytułu udziału w podatku dochodowym od osób fizycznych w Polsce (*Impact of suburbanization in zone of influence of big cities on gminas' revenues from share in PIT in Poland*). In: *Biuletyn IGSEiGP UAM Seria Rozwój Regionalny i Polityka Regionalna*, Vol. 20, pp. 103–121.
- Smutek J. (2012a). Suburbanizacja, rozwój niezrównoważony i jego konsekwencje dla wydatków gmin, na przykładzie obszarów oddziaływania miast wojewódzkich w Polsce (*Suburbanization, unsustainable development and its implications for gminas expenditures on example of metropolitan areas in Poland*). In: B. Kryk (ed.), *Trendy i wyzwania zrównoważonego rozwoju w XXI wieku*, Tom II, *Handel Zewnętrzny*, vol. lipiec-sierpień 2012, pp. 142–153.
- Sørensen E., Torfing J. (2019). The Copenhagen metropolitan 'finger plan': A robust urban planning success based on collaborative governance. In: M.E. Compton, P. 't Hart (ed.). *Great policy successes*. Oxford University Press, p. 218–243. <https://doi.org/10.1093/oso/9780198843719.003.0012>.

- Stelmaszewska N. (2020). Konsekwencje suburbanizacji dla miast i stref podmiejskich w świetle literatury krajowej i zagranicznej (*Consequences of suburbanization for cities and suburban zones in the light of domestic and foreign literature*). *Urban Development Issues*, 66, 25–34. <https://doi.org/10.2478/udi-2020-0008>.
- Stupak I., Mansoor M., Smith C.T. (2021). Conceptual framework for increasing legitimacy and trust of sustainability governance. *Energy, Sustainability and Society*, 11. <https://doi.org/10.1186/s13705-021-00280-x>.
- Szukalski P. (2023). Suburbanizacja a upodabnianie się zachowań demograficznych w wielkich polskich miastach i na terenach je okalających (*Suburbanization and the Convergence of Demographic Behaviors in Large Polish Cities and Surrounding Areas*). In: M. Grochowski (ed.), *Suburbanizacja. Człowiek – zmiana – przestrzeń*. Materiały z III Kongresu Demograficznego. Part 15. https://kd.stat.gov.pl/images/publikacje/suburbanizacja_warszawa_internet.pdf.
- Resolution No. 22/18 of the Mazowieckie Regional Assembly of 19 December 2018.
- Umweltbundesamt (2025). Siedlungs und Verkehrsfläche. <https://www.umweltbundesamt.de/daten/flaeche-boden-land-oekosysteme/flaeche/siedlungs-verkehrsflaeche> [access: 13.08.2025].
- Journal of Laws of 2024, item 82: Act of 3 February 1995 on the Protection of Agricultural and Forest Land, Journal of Laws of 2024, item 82.
- Vejre H., Primdahl J., Brandt J. (2007). The Copenhagen finger plan: Keeping a green space structure by a simple planning metaphor. In: B. Pedroli, A. van Doorn, G. de Blust, M.L. Paracchini, D. Wascher, F. Bunce (ed.). *Europe's living landscapes: Essays exploring our identity in the countryside*. KNNV Publishing, p. 310–328.
- Ziobrowski A., Pawlak H., Gałka, J. (2019). Relacje społeczne między mieszkańcami wsi i ludnością napływową z miasta w strefie podmiejskiej Krakowa – przestrzeń konfliktu czy współpracy? (*Social relations between rural inhabitants and urban immigrants in the suburban area of Krakow – a space of conflict or cooperation?*). *Konwersatorium Wiedzy o Mieście*, 4(32), pp. 63–78. <https://doi.org/10.18778/2543-9421.04.04>.
- Ziobrowski Z. (2009). Polityka przestrzenna a decyzje o warunkach zabudowy (*Spatial policy and decisions on development conditions*). *Problemy Rozwoju Miast*, 4, 21–25.