

Sustainable Urban Development: A Regulatory Framework for Environmental Protection in the EU

Role: Urban Planner

Audience: Policymakers, Urban planners, Environmentalists, and Stakeholders

Summary

KEY POINTS

Urbane sprawl, characterized by low-density expansion into agricultural and natural lands, significantly threatens ecosystems and biodiversity in Europe. This uneven urban growth transforms and fragments landscapes, particularly affecting high- and medium-productivity lands. Drivers such as car-based living and suburban housing preferences exacerbate sprawl, even in cities with declining populations. To balance urban development with ecosystem preservation, integrating Sustainable Development Goals (SDGs) 11 and 15 is crucial. These goals aim for inclusive, resilient, and sustainable human settlements while protecting terrestrial ecosystems. Furthermore, The European Green Deal (EGD) targets net-zero greenhouse gas emissions by 2050, with cities playing a key role. Strategies like Munich's "compact, urban, green" approach promote dense, mixed-use development to reduce car reliance and support sustainable growth and low emission patterns. Recommendations for mitigating urban sprawl include identifying potential development areas, densifying existing housing, and implementing a zoning grading system based on environmental sensitivity. Grade-based taxation and penalties can incentivize eco-friendly practices, while stakeholder engagement ensures compliance and community involvement. These measures are essential for preserving biodiversity and ensuring sustainable urban growth in the EU.

1. Urban sprawl, characterized by low-density expansion into agricultural and natural lands, significantly threatens ecosystems and biodiversity in Europe.

2. Car-based living and suburban housing preferences drive sprawl, even in cities with declining populations.

3. Key recommendations include identifying development areas, densifying housing, implementing an environmental zoning system, and engaging stakeholders for sustainable urban growth.

1. Urban Sprawl

Urban expansion significantly contributes to land-use changes, posing a serious threat to ecosystem and biodiversity conservation globally (IPBES 2019). As the need for land for housing and infrastructure grows, urbanization extends beyond established urban centers and their adjacent areas, leading to urban sprawl (EEA 2016). The term "sprawl" has long been central to discussions on the evolving roles and structures of contemporary cities. Critics use it to describe the unchecked expansion of urban areas, highlighting its negative implications such as the loss of agricultural and natural land, environmental and ecosystem damage, and increased traffic, noise, and congestion (Guastella et al., 2019). The European Environment Agency (EEA) also has described sprawl as "the physical pattern of low-density expansion of large urban areas, under market conditions, mainly into the surrounding agricultural areas" (EEA, 2006).

2. Urban Sprawl Trend in the EU

Current projections indicate that over 80% of the European population will reside in cities by 2050 (Guastella et al., 2019). Despite Europe's relatively low population growth rate, urban areas are unevenly expanding across the continent. Many European cities are growing in size much faster than their populations (Oueslati et al., 2015). Urban sprawl has been an ongoing issue. A report by the European Environment Agency (EEA) in 2006 called "Urban sprawl in Europe" criticized the spread

of urban areas into the rural outskirts of Europe as an ignored challenge, known as the 'urban fringe' (EEA 2016). According to the EEA report published in 2016 on urban sprawl, it can impact landscapes through three primary processes: transformation, degradation, and fragmentation. The conversion of previously pristine or agricultural lands into built-up areas is the most visually evident effect. The findings underscore an urgent call for action, emphasizing the serious long-term implications of urban sprawl. Further efforts are crucial to safeguard forests, agricultural soils, and other open spaces from urban sprawl. Additionally, the report identifies the most immediate priorities and outlines future research needs (EEA 2016).

Based on the EEA report, which is published in 2021, recent trends in land take indicate also a notable increase in diffuse residential expansion within the EU. Specifically, trends in land take within European Functional Urban Areas (FUAs) highlight that climate protection and biodiversity restoration goals at both European and global levels are being jeopardized. The recent data shows that land take and soil sealing are predominantly occurring on lands of high and medium productivity, which has effects on biodiversity by increasing fragmentation and reducing carbon sequestration. According to this report, unlike many other policy areas, land and land take have not been subject to specific policy targets. The report emphasizes the need for the development of new policies and the consistent implementation of existing regulations to protect the quality of land resources for future generations (EEA 2021).

In the EU-27 and the UK region, the key contributors to the formation of artificial areas - land surfaces that have been significantly altered by human activities for purposes such as housing, industry, transportation, and other urban developments - are indicated in Figure 1. The largest contributor in commuting areas was the expansion of industrial and commercial sites (871 km²), followed by the expansion of commuting areas (736 km²) from 2012 to 2018. Based on figure 2. North Europe experienced the highest population growth in Europe between 2012 and 2018, at 6.1%. This region also has the highest amount of artificial area per capita at 701 m², though this has decreased by 25 m² since 2012. In contrast, Central Europe, the most densely populated, saw a modest population growth of 2.6% and maintained stable artificial areas per capita at 466 m². South-east Europe experienced a population decline of 0.3%, likely due to emigration, while its artificial areas increased

by 2.3%, reaching the lowest per capita amount of 303 m². South Europe had below-average growth in both population and artificial areas, with artificial area per capita decreasing slightly to 326 m². West Europe saw significant population growth of 7.9%, more than double the increase in artificial areas, resulting in a per capita figure of 414 m², which has declined by 23 m² since 2012 (EEA, 2021).

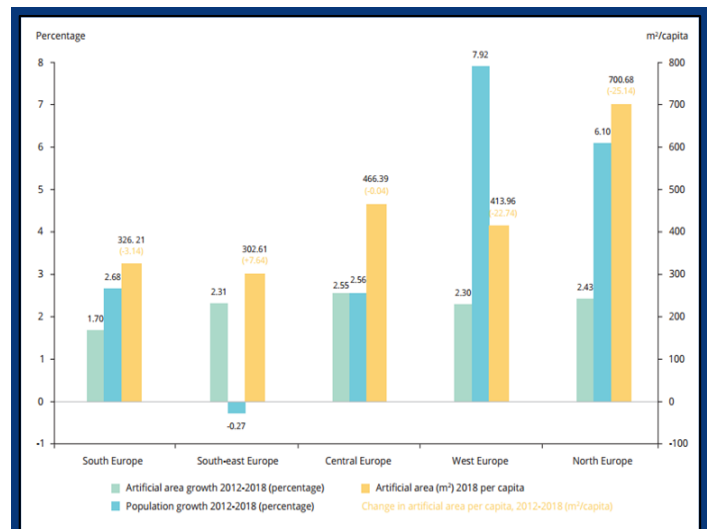


Figure 2: Change in land take and population in the main European regions (EEA, 2021)

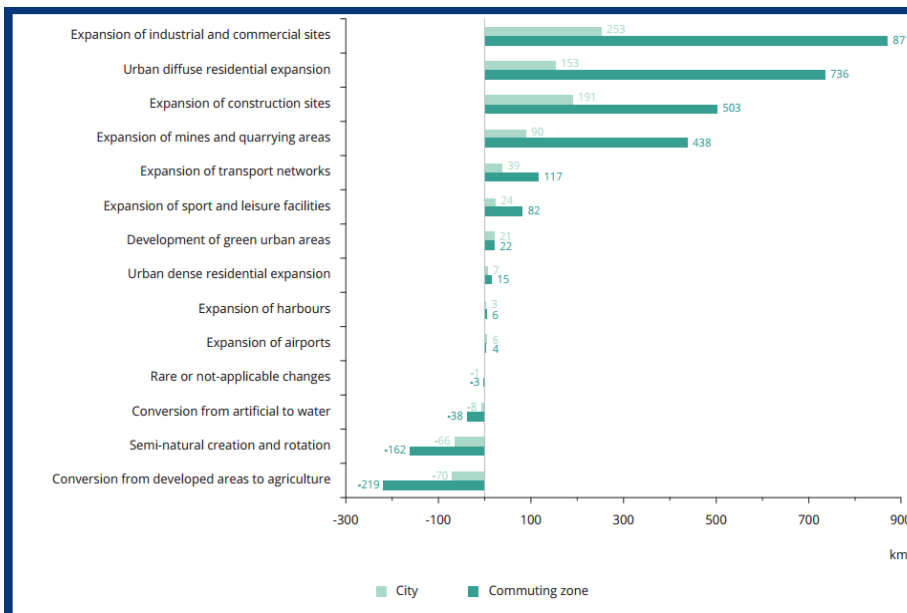


Figure 1: Change in artificial area (in km²) between 2012 and 2018 in the EU-27 and the UK region by land use (EEA, 2021)

3. The Effect of Urban Sprawl on the Environment

The conversion of natural and semi-natural land into housing, settlements, or recreational areas primarily impacts grassland habitats and forests (EC, 2020a). These changes have a profound impact on the social and cultural benefits derived from forests, leading to reductions in carbon storage, nutrient cycling, and water and air purification. They also diminish the availability of wildlife habitats and resources such as timber, fuel, and food production. Grasslands play critical roles in water supply and regulation, carbon storage, erosion control, climate mitigation, and pollination, while also offering cultural and recreational benefits. Urbanization affects these areas extensively. For instance, by altering the composition and spatial arrangement of landscape elements, thereby exerting pressure on biodiversity, ecosystem functioning, and environmental quality (Wu, 2014).

In floodplains, erosion and sedimentation take place due to the construction of new roads and buildings. Urban sprawl heightens the risk of landslides, particularly when riparian vegetation is cleared from steep slopes. Floods resulting from these changes lead to economic losses and, in the case of flash floods, can directly endanger human lives. Sealing floodplains exacerbates flood risks by accelerating excess water runoff, illustrating another negative consequence of land take (EEA, 2021).

4. Main Drivers of Urban Sprawl

The expansion of sprawled areas is driven by a variety of factors. However, some studies attribute sprawl to a single dominant factor, such as car-dependent lifestyles or the prioritization of highway construction over public transport (EEA, 2016).

The widespread use of cars for transportation and substantial investments in road infrastructure have facilitated longer commuting distances, enabling people to fulfill the desire for larger homes, potentially with private gardens. In contemporary urban settings, there has been a shift in housing demand from city centers to peripheries where land is more abundant and affordable per square meter, leading to the development of low- and very low-density suburban areas (Guastella et al., 2017)

Additionally, modern societies are increasingly adopting lifestyles that require more space per person, as preferences for proximity to open spaces and detached houses drive landscape fragmentation. Consequently, there is evidence of urban expansion in cities where the overall population has declined (Guastella et al., 2019)

5. Integrating SDGs 11 and 15 for Inclusive Urban Development and Ecosystem Preservation

In 2015, the United Nations (UN) adopted the 2030 Agenda for Sustainable Development, which serves as the foundation for the 17 Sustainable Development Goals (SDGs) and 230 associated indicators. According to the United Nations (2018), these SDGs and their

indicators are outcomes of societal collaboration and a shared commitment to achieving a balance between human development and environmental protection (Zhenfeng et al., 2019).

In the context of sustainability, the natural environment and its ecosystems serve as the essential providers of all products and services that humans depend on for survival. However, due to the dynamic changes in climate, these ecosystem services have undergone alterations that affect their effectiveness and reliability (Korah and Cobbinah, 2019).

It is crucial for planners and decision-makers to gain a deeper understanding of the trade-offs involved in various development scenarios by embracing SDG 11, which aims to create inclusive, safe, resilient, and sustainable cities and human settlements as well as SDG 15, which aims to promote the sustainable management of terrestrial ecosystems, including the protection, restoration, and sustainable use of forests, combatting desertification, and reversing land degradation, along with halting biodiversity loss (Zhenfeng et al., 2019).

6. The contributions and needs of cities to achieve the European Green Deal Goals

The European Green Deal (EGD) represents an ambitious set of policy initiatives aimed at achieving net-zero greenhouse gas (GHG) emissions by 2050 and transitioning to a clean, circular economy across the continent. Objectives of the EGD include providing clean energy and sustainable transport transitions,

areas where cities are already making significant contributions. Urban areas in Europe account for a substantial portion of the EU's energy consumption and are responsible for 23% of the EU's GHG emissions from transport. However, the EGD has yet to fully acknowledge and capitalize on these opportunities. Cities have played a pivotal role in the controversial discussions surrounding the EU's 2030 Climate Target Plan, which will shape the bloc's capacity to meet the objectives of the Paris Agreement and its own 2050 targets. Unlike cities in developing countries, European cities face less pressure to develop new urban and transport infrastructure but must instead focus on adapting existing infrastructure to support low-emission patterns (CIDOB, 2021).

To achieve the goals of the European Green Deal (EGD), cities need to adapt sustainable urban growth practices. Some cities in the EU have successfully achieved low-emission patterns, with Munich, Germany, serving as a notable example.

7. Munich's Urban Compactness and Green Integration Strategies for future settlement

Munich's "Compact, urban, green" strategy for spatial development emphasizes dense urban land use that integrates mixed-use developments over single-function commercial or residential areas.

This strategy, coupled with a polycentric system of district centers spread throughout the city, aims to foster vibrant social interactions and reduce commuting distances for residents accessing work, schools, and shops. By encouraging walking, cycling, and public transport use over private cars, these initiatives contribute modestly but significantly to climate change mitigation and the imperative to lower CO2 emissions. They are crucial components for promoting sustainable urban growth across European cities (Thierstein, 2008).

8. Recommendations

Urban sprawl, characterized by the unplanned expansion of urban areas into rural lands, poses significant challenges to sustainable development and environmental protection. To address these challenges and promote sustainable growth, a comprehensive set of practical recommendations has been developed.

1. Identifying and Mapping Potential Development Areas in the EU

- Create maps that highlight areas with potential for future development based on zoning regulations and land use policies.
- Map out vacant or underutilized parcels of land within the urban area.

2. Adding Additional Floors to Existing Structures

- Conduct structural assessments to determine the feasibility of adding additional floors to existing buildings.

- Review and update building codes and regulations to facilitate vertical expansion.
- Develop incentive programs to encourage property owners to add additional floors, such as tax breaks or grants.

3. Annual Housing Target Based on Available Internal Lands and Population Growth

- Set an annual housing target based on the housing demand and the capacity of available internal lands.

4. Establishing a Grading System

Highly Protected Zones (**Grade A**): Areas with high environmental sensitivity, such as wetlands, protected habitats, or critical watersheds. In these areas, the urban development restrictions must be severe.

Moderately Protected Zones (**Grade B**): Areas with moderate environmental sensitivity, including agricultural lands or areas prone to erosion. In these areas, the urban development restrictions can be moderate.

Low Protected Zones (**Grade C**): Areas with lower environmental sensitivity, such as urban fringe areas or previously developed lands. These areas could be considered as the best choice for the future urban development.

4.1. Taxation/Penalties System based on the grades

Developers in Grade A zones face higher tax rates compared to Grade B and Grade C zones.

5. Stakeholder Engagement

- Establish advisory boards comprising diverse stakeholders to provide ongoing input and oversight.
- Conduct outreach activities to raise awareness about the importance of environmental protection and involve communities in conservation efforts.
- Engage environmental experts, ecologists, and conservation biologists to provide technical guidance on zoning decisions and habitat management strategies.

These recommendations aim to identify areas with high potential for future construction development, encourage the densification of existing housing areas, facilitate vertical expansion of existing structures, set annual housing targets based on available lands, and establish a grading system to protect environmentally sensitive zones. By integrating zoning regulations, land use policies, and environmental considerations, these strategies seek to balance urban growth with ecological preservation, ultimately fostering more sustainable and resilient urban environments.

9. References

1. Barcelona Centre for International Affairs (CIDOB). (2021). Towards a European Green Deal with cities (The urban dimension of the EU's sustainable growth strategy)
2. EC. (2020a). Report from the Commission to the European Parliament, the Council and the European Economic and Social Committee — The state of nature in the European Union: report on the status and trends in 2013 2018 of species and habitat types protected by the Birds and Habitats Directives (COM (2020) 653 final).
3. European Environment Agency (EEA). (2006). Urban sprawl in Europe — the ignored challenge (EEA Report No 10/2006). European Environment Agency, Copenhagen.
4. European Environment Agency (EEA). (2016). Urban sprawl in Europe. <https://doi.org/10.2800/143470>
5. European Environment Agency (EEA). (2021). Land take and land degradation in functional urban areas. <https://doi.org/10.2800/714139>
6. Glaeser, E. L., & Kahn, M. E. (2004). Sprawl and urban growth. In *Handbook of Regional and Urban Economics* (Vol. 4, pp. 2481–2527). Elsevier.
7. Guastella, G., Pareglio, S., & Sckokai, P. (2017). A spatial econometric analysis of land use efficiency in large and small municipalities. *Land Use Policy*, 63, 288–297. <https://doi.org/10.1016/j.landusepol.2017.01.023>
8. Guastella, G., Oueslati, W., & Pareglio, S. (2019). Patterns of urban spatial expansion in European cities. *Sustainability*, 11(2247). <https://doi.org/10.3390/su11082247>
9. IPBES (Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services). (2019). Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. IPBES Secretariat, Bonn.
10. Korah, P. I., & Cobbinah, P. B. (2019). Institutional responses to climate change adaptation: Flood management at the metropolitan level in Accra, Ghana. In P. B. Cobbinah & M. Addaney (Eds.), *The Geography of Climate Change Adaptation in Urban Africa* (pp. 451–478). Springer International Publishing. https://doi.org/10.1007/978-3-030-04873-0_16

11. Oueslati, W., Alvanides, S., & Garrod, G. (2015). Determinants of urban sprawl in European cities. *Urban Studies*, 52(9), 1594–1614.

<https://doi.org/10.1177/0042098015577773>

12. Thierstein, A., & Reiss-Schmidt, S. (2008). Urban development management in Munich, Germany. Paper presented at the 44th ISOCARP Congress.

13. Shao, Z., Sumari, N. S., Portnov, A., Ujoh, F., Musakwa, W., & Mandela, P. J. (2020). Urban sprawl and its impact on sustainable urban development: A combination of remote sensing and social media data. *Geo-spatial Information Science*. <https://doi.org/10.1080/10095020.2020.1787800>

14. Wu, J. (2014). Urban ecology and sustainability: The state-of-the-science and future directions. *Landscape and Urban Planning*, 125, 209-221.

<https://doi.org/10.1016/j.landurbplan.2014.01.018>

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