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Evidence from the ESPON SUPER project

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A Reflection on the Sustainability of Urbanization in Europe since 2000

Evidence from the ESPON SUPER project

Abstract

As a push towards sustainability, the European Union has set a goal of achieving ‘no net land take by 2050’ (NNLT) – essentially calling for a halt to urban development. Thanks to relatively detailed land cover data for the 2000–2018 period, we can evaluate the progress towards this goal as well as question whether this is a suitable metric for sustainable land use. In purely quantitative terms, NNLT is far from being achieved. Focussing on urbanization alone is however insufficient. As the vast literature on sprawl has demonstrated, it is not only the amount of land being developed which matters for sustainability, but also its form. To evaluate this, NUTS-3 regions in Europe were classified in terms of their urban (sub)structure and the changes to this (sub)structure in the 2000–2018 period. The results reveal that the most common structure is ‘polycentric’ and that most countries possess both compact and more diffuse structures. Worryingly, some countries are becoming increasingly diffuse, particularly Poland. We argue that both aspects should be taken together when considering the sustainability of urban development, even though the latter is not on the European policy agenda.

1. Stopping land take and urban sprawl

In June 2023, the European Commission is expected to publish a proposal for a Soil Health Law containing an objective to achieve ‘no net land take in 2050’ (NNLT), essentially mandating that urbanization be brought to a halt (European Commission et al. 2016). For rapidly growing countries like the Netherlands, this target has come at an inconvenient time: a newly appointed minister for Housing and Planning recently pledged to build close to a million new homes as quickly as possible. Until now, it was assumed that many of these would be realized on the greenfield sites on the urban fringe where developers had been amassing land (Ten Cate 2022). The realization that the European Union could stymie these plans has produced disbelief and consternation in the Netherlands and elsewhere (Build Europe 2022). At the same time, this target is over a decade old.

A reason why NNLT has come as such a surprise is that its origins lie outside the domain of planning, which is not formally a competence of the European Union (Faludi and Waterhout 2002). For planners, ‘land take’ conjures up other images than urbanization – in the United States and elsewhere ‘takings’ is given to mean eminent domain or downzoning

* Netherlands Environmental Assessment Agency (PBL).

(Alterman 2010) – but in environmental sciences and policy it is a common term referring to the destruction of high-quality topsoil by sealing/construction. The first EU policy appearance of NNLT was in a document on natural resource efficiency (European Commission 2011). Soil protection has since gained ground by its 2014 inclusion in the revised EIA directive (Schatz et al. 2021) and by its 2020 inclusion in the European Green Deal taxonomy.¹ The codification of NNLT in the upcoming Soil Health Law is therefore a logical and significant step in an ongoing policy process. According to the most prominent definition, NNLT takes an absolute stance: every hectare of land ‘taken’ from agricultural or natural areas for urban use is deemed unsustainable.

The European Commission has so far been reluctant to link this goal of arresting urbanization (NNLT) to curbing urban sprawl. This is understandable from a legal perspective, but this choice has the disadvantage of excluding urban form from the discussion. Sprawling urban development produces more land take per capita and carries additional disadvantages for sustainability such as car dependency, landscape fragmentation and reduced energy efficiency (EEA and FOEN 2016). Moreover, it misses the opportunity of engaging the same European spatial planners who are ultimately needed for the implementation of NNLT.

The fact that both aspects of urbanization – quantitative (land take) and qualitative (sprawl) – are important for sustainability was acknowledged by the ESPON programme in a 2019 call for tender: “the service shall provide evidence, recommendations and measures on how sustainable land use can be promoted and how *land-take* and *urban sprawl* can be avoided, reduced and compensated in Europe, its cities and regions” (my emphasis). The contracted party operating under the name Sustainable Urbanization and land-use Practices in European Regions (SUPER), went a step further by rejecting both terms in favour of the more neutral ‘urbanization’ and ‘urban form’. The remainder of this chapter builds on the findings of this project and subsequent work by its authors.

2. Urban growth in European regions

Only with the production of uniform and periodically updated pan-European data on land cover has it been feasible to consider a European target on land take. The Corine Land Cover (CLC) and Corine Change (CHA) datasets contain information on the European Union as well as Turkey, Iceland, and the Balkans. The monitoring extends back to 1990, but the most reliable period for comparison is 2000–2018. Even though higher resolution datasets exist (e.g. GSF, GUF, GHSL), Corine remains the industry standard – and the preference

¹ Under the activity ‘construction of new buildings’ it is stipulated that the “new construction is not built on one of the following: arable land and crop land with a moderate to high level of soil fertility and below ground biodiversity as referred to in the EU LUCAS survey (609); greenfield land of recognised high biodiversity value and land that serves as habitat of endangered species (flora and fauna) listed on the European Red List (610) or the IUCN Red List (611); land matching the definition of forest as set out in national law used in the national greenhouse gas inventory, or where not available, is in accordance with the FAO definition of forest (612)” (European Commission 2020).

among European institutions – for monitoring European land take because it offers a high number of land cover classes (44). The ESPON SUPER project combined Corine and other key data into a publicly available spreadsheet,² allowing rudimentary monitoring of land take in Europe at the NUTS-3 level (Van Schie et al. 2020).³

According to this database, urban areas constituted a small fraction of European land cover in 2000 (4%) compared to categories such as agriculture (45%) and nature (51%). By 2018, the share had increased to almost 5%. While an increase of less than a percentage point may seem insubstantial, in absolute terms the amount of land take is considerable: about 1.17 million hectares (almost as large as the Austrian state of Oberösterreich), or about 184 ha per day. Approximately, 8.6 times more land was transformed into urban/artificial use than vice versa.

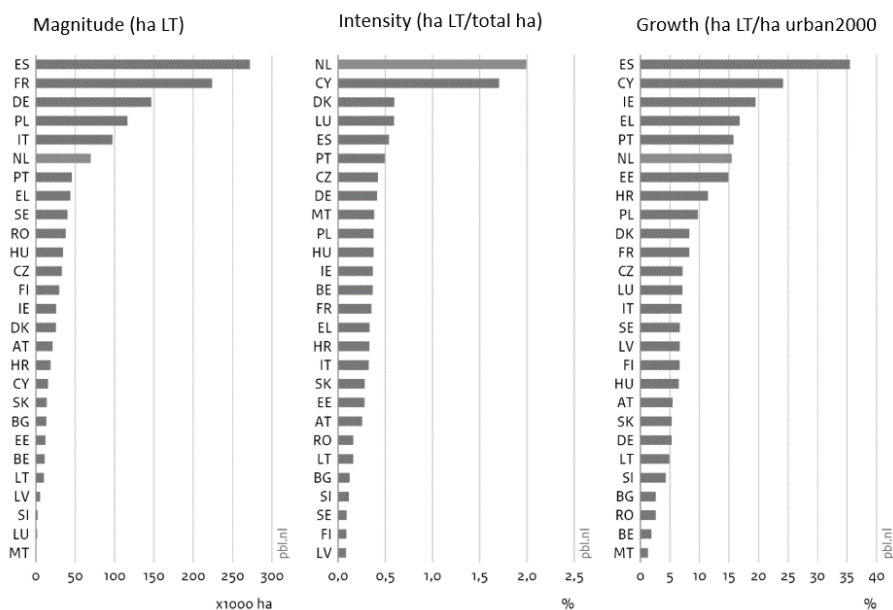


Figure 1: Land take in EU member states. Source: CHA/CLC, own calculations.

From a perspective of protecting a finite resource, the NNLT objective is understandable; the cited figures are far from zero. Still, five important caveats should be borne in mind.

² The database can be downloaded at: <https://www.espon.eu/super>

³ In this section we refer to ‘Europe’ as the European Union plus several non-EU member states which have close ties, politically, economically and geographically with the EU. These are the United Kingdom, Switzerland, Lichtenstein, Iceland and Norway. This selection reflects the participants of the ESPON programme, which funded the research and is sometimes referred to as the ‘ESPON space’ (which, like the EU, evolves over time). Even though NNLT applies only to EU member states, other countries – notably Switzerland – have similar policies in place.

First, there is significant variation in land take across member states in absolute terms, intensity, and growth (see Figure 1). At present, the absolute value (magnitude) has gained most attention, but the other relative figures provide insight into how detrimental this is. A thousand hectares land take in a small, highly urbanized country means something very different from the same amount in a large country with large open spaces.

Second, Corine data is problematic for measuring urbanization in countries with very small-scale developments like Belgium. This is because the change is too small to be accurately observed. Either it is disregarded as a land-cover change entirely, or it falls within an area already designated as urban. The SUPER project performed an analysis of likely overestimations and underestimations per NUTS-3 region by comparing Corine to high-resolution GUF data for the same year (2012). Because the latter dataset makes no distinction between urban and rural functions, some of the discrepancy is due to definitions rather than errors in coding. For example, farmhouses, greenhouses or livestock sheds are built-up structures, whose ‘urban footprint’ is registered in GUF but coded as ‘agriculture’ in Corine.

Third, the Corine data shows a clear deceleration of land take over the 2000–2018 period: 44% of all conversions to urban use took place during 2000–2006, 35% in 2006–2012, and 21% in the 2012–2018 period. Many regions in central and eastern Europe were exceptions to this trend, as was almost all of the UK, which saw the most growth in the post-2012 period. Given the demographic outlook for Europe of low natural population growth, land take at the European level could be expected to continue to decline, but with significant regional variation. This raises the question of whether NNLT should be achieved at the EU level, within each member state, or within each region.

Fourth, different places have different development pressures. A stable or shrinking region will have much less difficulty reaching NNLT than a rapidly growing region. Unlike NNLT, the United Nation’s SDG11 indicator for sustainable urban development, urbanization per capita, takes this somewhat into account. A simple indicator states that if the growth rate of urbanization is lower than the population growth rate, it can be considered sustainable. However, this penalizes already dense areas. An alternative measure proposed by Schiavina et al. (2019), Marginal Land Consumption per New Inhabitant (MLCNI), is more balanced. Calculating MLCNI values for European countries yields a quite different picture than Figure 1 using the exact urbanization data. Heading the list, Portugal urbanized one hectare for every new inhabitant in the 2000–2018 period, followed by Slovakia and Cyprus. Malta, Belgium, Ireland and Austria had the most efficient urbanization. Furthermore, urbanization in Greece, Poland and Estonia occurred in the face of negative population growth (Evers, van Bommel, and Spoon 2023). This measure, of course, does not differentiate between natural growth and migration; the latter is more linked to economic development, which probably will entail more demand for infrastructure and industrial/commercial urban development.

Fifth, one can question the land-use categories used to calculate land take in the light of its underlying aim to conserve and improve soil health. One example is renewable energy (often coded as industry), which is often temporary and can leave soils intact (Cole et al. 2022). Moreover, a recent study examining the quality of ecosystem services (one of the arguments for NNLT) across Corine categories in the Netherlands found that agricultural land scored very poorly (approximately equivalent to urban fabric) and significantly worse than ‘urban green’ which is considered already taken (Evers, van Bommel, and Spoon 2023). While this can reflect the unique situation in the country under investigation (the Netherlands is renowned for intensive, export-oriented farming with a high share of livestock and horticulture) it does call into question the sanctity of CLC categories in defining land take. At present, clearing a pig shed for a golf course constitutes land take, whereas building over a city park does not. In the Dutch study, terrestrial nature clearly scored highest on delivering ecosystem services (Evers, van Bommel, and Spoon 2023). It is thus fortuitous that urbanization generally occurs at the expense of agricultural land (78%) rather than nature – only some Scandinavian countries (except Denmark), Croatia, Greece, Iceland and Portugal (as well as a few regions in Austria and Scotland) saw a majority of new urban land coming from terrestrial nature. However, even here, further investigation would likely reveal significant differences in soil quality among relevant CLC classes (e.g. deserts, permanent snow nature versus nature-inclusive agriculture). Such matters of definition can have far-reaching consequences: if urbanization of agricultural land is excluded from the definition, many countries would have a negative land take. The last word has yet to be said on this issue.

In conclusion, implementing a policy comprised of a generic rule such as NNLT is difficult to justify given the highly differentiated composition of Europe. The considerable territorial diversity makes it very difficult to create fair and accurate definitions. Ultimately some forms of urban development will be ignored, while others exaggerated due to vast differences in spatial structures. In addition to this quantitative element there is the question of implementation. Each member state has its own system of spatial planning which will be (potentially) responsible for bringing current urbanization levels down to zero. Each of these systems has its own idiosyncrasies and abilities. Many systems are oriented towards and only function in a context of growth and most regional politicians view growth as synonymous with success. Ignoring these matters ‘on the ground’ will make it very difficult to make progress on this EU objective.

3. Urban form in European regions

In 2006, the European Environment Agency issued a report where they labelled urban sprawl as an ‘ignored challenge’ in European policy (EEA 2006). As noted earlier, this is understandable given that spatial planning remains an exclusive competence of the member states. Still, this has not stopped the EU from supporting initiatives to study or curb sprawl. Like land take, urban sprawl is a normative term with a negative connotation, with the implicit assumption that it is unsustainable (cf. Bruegmann 2006; OECD 2018). For this

reason, the ESPON SUPER project opted for the more neutral term urban form or morphology.

Urban form/morphology is often determined by physical characteristics such as rivers, coasts and steep inclines, but is also affected by infrastructure and land-use decisions (e.g. Copenhagen's iconic finger plan). One useful dimension by which to classify urban form is its concentration in space (i.e. the region). For example, we can posit urban regions with a monocentric structure (Madrid, Berlin) at one end of the spectrum, more polycentric regions (Randstad, Ruhr area) of roughly equivalent distinct cores in the middle, and relatively diffuse urbanization (Flanders, Veneto) at the opposite extreme. The latter has an affinity with urban sprawl, as it usually concerns low-density and car-oriented development.

This continuum, referred to as 'nuclearity' by Galster et al. (2001), comprised the basis to gauge the urban form of all NUTS-3 regions in Europe. This was done on a Likert scale (1. Compact monocentric, 2. Compact-dual/linear, 3. Polycentric, 4. Polycentric-diffuse, 5. Diffuse) according to a visual assessment model (see icons in the middle of Figure 2). An indicator for the last category is ribbon development, as this is often associated with sprawl (Siedentop and Fina 2012, 2768).

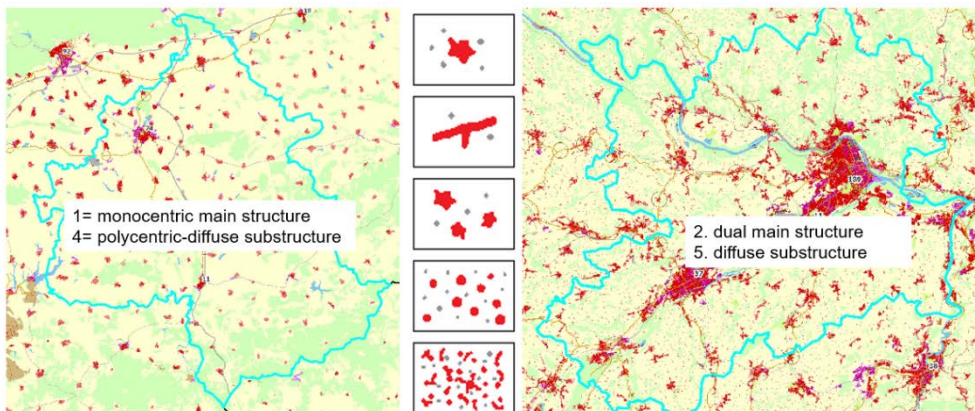


Figure 2: Application of the urban morphology assessment model.

Source: Van Schie et al. (2020).

During testing, it was discovered that a single measurement was insufficient to capture urban form as many regions contained multiple types. To account for this, the analysis was performed twice: once to classify the most prominent features (main structure) and a second time for the remaining area (substructure). Therefore, a compact monocentric city (type 1) could have a hinterland that was empty (1) or diffuse (type 5), producing a score of 1/1 and 1/5 respectively. This analysis, although ultimately based on 'subjective' human judgement rather than 'objective' computation (e.g. the OECD (2018) sprawl report which counts urban fragments per km² and high-density peaks), has the advantage of capturing this (sub)structure nuance (see Figure 2).

The analysis was performed by hand for all NUTS-3 regions in Europe for the situation in 2018 as well as for the changes over the 2000–2018 period. A first finding was that the most common urban structure in European regions was polycentric (main structures plus substructures). Not surprisingly, substructures tended to be more diffuse than main structures; the most frequent substructure type was polycentric-diffuse, whereas this was polycentric for the main structure followed closely by compact. In general, more diffuse main structures were accompanied by more diffuse substructures. Interestingly, the analysis also found that the most diffuse substructures (i.e. sprawl) was as common around monocentric as polycentric regions. A seminal study on this topic had similar findings (Siedentop and Fina 2012). There were also clear territorial variations. Compact morphology is more prevalent in southern and northern Europe, whereas central Europe gravitates towards polycentric and diffuse (see Figure 3). Aggregating scores to the national level show Hungary, Poland and Slovakia to possess the most diffuse substructures.

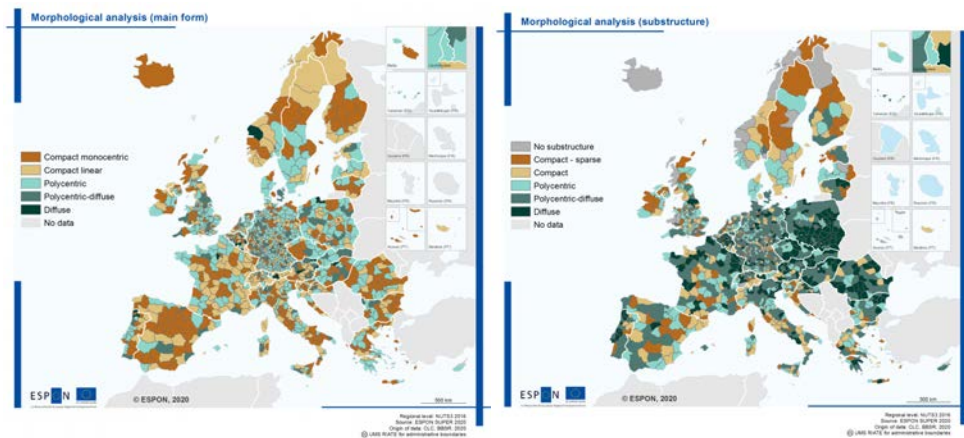


Figure 3: *Urban structure (left) and substructure (right) of European regions.*
Source: Van Schie et al. (2020).

The dynamic analysis revealed that the main structure in Poland and northern England became more dispersed in the 2000–2018 period, whereas new development in Spanish regions was far more compact. Fragmentation of the substructure was more common, although less so, in Scandinavia and the Baltic states. Interestingly, recent urbanization in Hungary, the Czech Republic and Slovakia was compact even though the overall substructure is relatively diffuse. All this demonstrates that morphological development is partly, but not completely, path dependent, suggesting that spatial planning and other public policies may have an impact on how urban form evolves (Evers et al. 2020).

The availability of a quantitative measure for urban form across NUTS3 regions allows comparison with other indicators. For example, we can investigate how urban form relates

to the concentration of population over cores.⁴ An initial analysis found, counterintuitively, that regions with a lower primacy rate (more dispersed population) tended to have more compact urban forms than regions with a clearly dominant core. This relationship was most pronounced in the substructure, yet still visible in the main structure. Less surprising was the finding that regions with higher populations overall leaned towards more compact urban structures. Additionally, these regions exhibited more compact development (e.g. infill or contiguous rather than discontinuous) during the 2000–2018 period (Van Schie et al. 2020). It should be noted that all this concerns an initial analysis; more sophisticated research – for example, by using grid cells to account for administrative border biases – is needed to confirm these findings.

Although it is tempting to automatically label regions with diffuser substructures as less sustainable, a regression analysis performed on the results of the SUPER morphological analysis against various sustainability indicators produced largely inconclusive results: only the most diffuse category scored significantly lower than the rest on the self-constructed sustainability index value. Other variables such as affluence (GVA per capita) proved much better predictors for sustainability than urban form (Lardinois 2021). Again, more sophisticated analyses will need to be performed to determine whether these initial signals are correct.

4. Conclusion

It is too easy to dismiss all urban growth (land take) and dispersal (sprawl) as inherently unsustainable. Not only should both be evaluated in relative terms, but the notion of sustainability should be interrogated as well. The SUPER project, for example, took a broad perspective by drawing up a multicriteria assessment framework to evaluate urban form using the familiar environmental, economic and social dimensions (Evers et al. 2020). This exercise revealed tensions not only between dimensions, but also within dimensions (e.g. environmentally, compact development was positive for greenfield preservation and energy efficiency, but negative for air pollution concentration and heat-island effects). Given these trade-offs, urban development and urban form should ultimately be considered a normative decision rather than a technical one. Bearing this in mind, we can revisit the title of this chapter and consider whether the various analyses of the changing urban landscape of Europe cited here can be considered sustainable.

With respect to land take, the decline in fertile soil delivering essential ecosystem services in the 2000–2018 period due to urbanization is a valid sustainability concern. Far more land is converted to urban use than vice versa, and the damage is often irreversible. Framing urbanization as ‘land take’ suggests that the action is unwarranted or even illegal (as opposed to buying, using, developing) and that land is disappearing. In reality, land is being converted to other uses, sometimes for very legitimate reasons given acute housing shortages

⁴ For this we use the primacy rate (the ratio between the largest urban unit (measured at the municipal/LAU level) and the total population in the NUTS 3 region).

in many European regions. An economist would interpret the same phenomenon positively as increasing land values, and thus welfare (whether or not it is economically sustainable is however open to debate). Spatial planners are more ambivalent, and usually try to strike a balance between competing interests within a particular territorial context. They strive to arrive at a responsible material land-use decision, fully aware of the possible consequences of that decision for the unique qualities of an area. These decisions are ideally made in collaboration with stakeholders and after a public debate about the future of the area. As NNLTL is quantitative, generic, and absolute in its approach, it risks alienating the planners who will ultimately be responsible for implementing it. In line with the proportionality principle, it may be wise to explore less drastic and more direct alternatives to NNLTL for improving soil health in Europe. This could be done, for instance, by tightening environmental standards on soil pollutants and adjusting conditionality for agricultural subsidies as well as promoting nature-based solutions.

So how, as spatial planners, should we view the fact that over one million hectares of land was urbanized in Europe in the 2000–2018 period? First, we should note the trend of decreasing urbanization and the divergent regional trajectories. Second, and more importantly, we should evaluate whether the new buildings, parks and infrastructure were responses to societal needs, or more supply driven (landowners seeking profit). More sustainable land-use practices are certainly needed in rapidly urbanizing regions with declining populations. Third, the quality of planning should play a role: taking land for an out-of-town shopping mall with hectares of parking is different than taking the same amount of land for a walkable mixed-use neighbourhood with ample green space.

Although policies to affect the development of urban form is not a competence of the European Union, there are clear links with sustainability which *is* a key priority. There is a vast body of evidence showing the environmental costs of urban sprawl. This literature should be viewed critically to avoid tautologies (some definitions of sprawl include its causes and/or impacts) and normativity. The regional classification of urban form and sustainability assessment in the SUPER project could be used as a starting point to this end. Still, like land take, discouraging diffuse urban forms should not be seen as an end in itself. And, like land take, there can be good reason for this kind of development (e.g. an ‘off-the-grid’ self-sufficient eco-community), even with respect to environmental sustainability. Sustainable urbanization will ultimately require a territorially differentiated approach.

References / Literature

Alterman, Rachelle, 2010. *Takings International: A Comparative Perspective on Land Use Regulations and Compensation Rights*. Chicago: ABA Publishing.

Bruegmann, Robert, 2006. *Sprawl: A Compact History*. Chicago: University of Chicago Press.

Build Europe, 2022. *No Net Land Take by 2050, Solving the Unsolvable: 10 Solutions for an Improved Management of European Land*. <https://buildeurope.net/wp-content/>

uploads/2022/01/No-net-land-take-by-2050-Solving-the-unsolvable.pdf (Last Access: 28th October, 2022).

Cole, Beth et al., 2022. Dynamic Landscapes in the UK Driven by Pressures from Energy Production and Forestry – Results of the CORINE Land Cover Map 2018. *Land* 11(2): 192.

EEA, ed., 2006. *Urban Sprawl in Europe: The Ignored Challenge*. Copenhagen, Denmark: Luxembourg: European Environment Agency; Office for Official Publications of the European Communities, [distributor].

EEA and FOEN, 2016. *Urban Sprawl in Europe*. Luxembourg: European Environment Agency and Swiss Federal Office for the Environment. <http://bookshop.europa.eu/uri?target=EUB:NOTICE:THAL16010:EN:HTML> (Last access: 15th November 2019).

European Commission, 2011. *Roadmap to a Resource Efficient Europe, 1067-8 Final*. Brussels: European Commission.

European Commission, 2020. *EU Taxonomy for Sustainable Activities*. https://finance.ec.europa.eu/sustainable-finance/tools-and-standards/eu-taxonomy-sustainable-activities_en (Last access: 22nd February 2023).

European Commission, Directorate-General for the Environment, University of the West of England (UWE), and Science Communication Unit, 2016. *No Net Land Take by 2050?* Luxembourg: Publications Office. <http://bookshop.europa.eu/uri?target=EUB:NOTICE:KHBB15003:EN:HTML> (Last Access: 15th November 2019).

Evers, David et al., 2020. *ESPON SUPER Final Report – Main Report*. Luxembourg: ESPON. Main Report.

Evers, David, van Bommel, Bas and Martijn Spoon, 2023. *Quickscan Toename van Het Ruimtebeslag in Nederland*. Den Haag: Planbureau voor de Leefomgeving.

Faludi, Andreas and Bas Waterhout. 2002. *The Making of the European Spatial Development Perspective: No Masterplan*. 1st ed. Routledge. <https://www.taylorfrancis.com/books/9780203378878> (Last access: 6th December 2019).

Galster, G. et al., 2001. Wrestling Sprawl to the Ground: Defining and Measuring an Elusive Concept. *Housing policy debate* 12(4): 681–717.

Lardinois, Bono, 2021. *Is Sustainability Earned or Inherited? The Significance of Regional Characteristics on Sustainability*. BA Thesis. Universiteit van Amsterdam.

OECD, 2018. *Rethinking Urban Sprawl: Moving Towards Sustainable Cities*. Paris: OECD. https://www.oecd-ilibrary.org/environment/rethinking-urban-sprawl_9789264189881-en (Last access: 15th November 2019).

Schatz, Eva-Maria et al., 2021. Land Take in Environmental Assessments: Recent Advances and Persisting Challenges in Selected EU Countries. *Land Use Policy* 111: 105730.

Schiavina, Marcello et al., 2019. Multi-Scale Estimation of Land Use Efficiency (SDG 11.3.1) across 25 Years Using Global Open and Free Data. *Sustainability* 11(20): 5674.

Siedentop, Stefan and Stefan Fina, 2012. Who Sprawls Most? Exploring the Patterns of Urban Growth across 26 European Countries. *Environment and Planning A: Economy and Space* 44(11): 2765–84.

Ten Cate, Flip, 2022. Eu-Stop Op Verstedelijking Is Te Defensief | Federatie Ruimtelijke Kwaliteit. <https://www.ruimtelijkekwaliteit.nl/nieuws/nieuwsbrief/Nieuwsbrief%2062/Commentaar> (Last Access: 11th January 2023).

Van Schie, Maarten et al., 2020. ESPON SUPER Final Report Annex 1 – Evidence on Developments. Luxembourg: ESPON.