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Post-Growth Ambitions and Growth-Based Realities in Sustainable Land-Use Planning

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Abstract

Governments have developed, agreed, and often embraced ambitious targets to meet sustainability and climate change demands. The use of land is foundational for long-term success and one of the most crucial resources where absolute limits of development become tangible. In Europe, success in stopping the expansion of settlement uses through building on natural or agricultural land remains limited in scope and speed. While planning instruments could be open for versatile uses, a pro-growth pathway continues at all planning scales. The premise of this article is that growth fixation is inscribed in planning instruments. We build on post-growth planning literature to conceptualize the relevance of (post-)growth for land-use planning. Two examples of planning instruments (modelling regional land use needs, density concepts) and their application in German case studies illustrate wherein growth has been locked and within which potentials for change lie. We investigate inscribed premises of the causal relation between population and household growth to land consumption that are leading to a divergence between the need for land and the provision of land. By doing so, we position post-growth planning to understand contemporary challenges in reducing the net consumption of land, and as a crucial body of thought that better accounts for the tangible limits of available land.

Keywords

land-need-modelling; land consumption; land-use planning; planning instruments; post-growth planning; sustainable land-use

1. Introduction

Sustainability along with the governance and planning of land uses are closely intertwined issues (Meyfroidt et al., 2022; Owens & Cowell, 2002; Weith et al., 2019). Policy ambitions have been set at international, national, regional, and local scales regarding sustainability and climate change, as well as their land-related implications. In the European context, statutory spatial planning within public administrations at multiple levels is the major institutional process by which land uses are organized and far-reaching changes can be realized. Countries like Germany have adopted a quantified net zero target for land consumption in their sustainability agenda (Akademie für Raumentwicklung in der Leibniz-Gemeinschaft, 2021; Bundesregierung, 2018; Eichhorn et al., 2024). This would be a key step towards a moderate post-growth scenario for land. The goal was further embedded within the implementation of the SDGs in Germany and is in line with the soil strategy of the European Union; the latter aims to reduce land consumption to net zero by 2050 (European Commission, 2021). This would mean moving to a closed-loop cycle/circular model of land use by which (in sum) no new land surfaces or greenfields are sealed by buildings or infrastructures. However, we observe a paradox in the application of planning instruments. At best, approaches achieve relative decoupling of growth from resource use, but conclusive signs of absolute decoupling are absent across contexts (Durrant et al., 2023; European Observation Network for Territorial Development and Cohesion, 2020; Næss et al., 2020). By planning instruments, we mean the mechanisms through which spatial planning connects policy to actual land-use changes, covering both statutory land-use plans themselves and the supporting tools that are used to develop and adopt these plans. In the following, the focus is on modelling regional land use needs and density concepts.

Post-growth approaches are recognized for their potential to reach ambitious climate change and sustainability targets more effectively (European Parliamentary Research Service, 2023; Intergovernmental Panel on Climate Change, 2022). To meet sustainability goals, governments and spatial planning aim to reduce net coverage of land (land consumption), conserve or restore natural areas, and focus on densification and redevelopment. However, while ambitions are often high and clear, actual realities are mixed: Open spaces, natural areas, and agricultural land are covered and sealed every day, causing major implications. Impacts include but are not limited to the loss of biodiversity, accelerating resource use for building and operating, endangered food production, and threats to public health (Meyfroidt et al., 2022; Owens & Cowell, 2002; zu Ermgassen et al., 2022). Post-growth debates emerge within spatial planning and criticize the continuing focus of theory, research, and practice on economic growth and on fostering growth through planning for new land uses (Durrant et al., 2023; Rydin, 2013; Savini et al., 2022). Advanced and wealthy economies could be testbeds in post-growth directions as they have sufficient resources, finances, and wealth to (re-)distribute while meeting the needs of their population sufficiently (Dixson-Decleve et al., 2022). However, moving into the European context, evidence indicates growing demands for new land and resources for fast-growing metropolitan areas, and even more so for remote and shrinking cities and regions (Grundel & Magnusson, 2023). What and where has this gone wrong? Through the various levels of government and scales of planning, post-growth goals seem to trickle down as growth-oriented realities. We see this because of an often-unquestioned growth bias in spatial planning that is institutionalized at all scales of land-use planning and affects how instruments are used. Unchecked bias driving action in terms of the neo-liberalization, financialization, and commodification of land, it is no wonder that growth critiques highlight the potential divergence between the societal needs for land and the market demand, which leads to a diminishing role of welfare states and in particular state and regional planning (Galland, 2012; Janssen-Jansen et al., 2012).

To shed light on this paradox between high and outspoken sustainability ambitions and actual realities in the application of instruments in land-use planning, we ask one major question: How is growth an imminent part of instruments in land-use planning? We deliberately choose a context-specific example to fill a gap in a more fine-grained understanding of post-growth critiques and potentials in spatial planning. While this reduces the immediate generalizability to other contexts, our aim is to leverage power and understanding of particular cases (Flyvbjerg, 2006). Academically, we contribute to understanding why spatial planning continues a pro-growth pathway, though ambitious political targets and tangible resource limits are clear. Practically, this understanding could help build anchoring points for integrating post-growth into spatial planning. This is made possible by identifying points where earlier decisions remained unquestioned (path dependencies), where times and delays of changes play a role, or where growth dependencies are either invisible or deeply nestled in sophisticated planning instruments. We use the term post-growth because it opens the search for new roles and practices within spatial planning, while acknowledging the overlapping critiques and directions with degrowth (Durrant et al., 2023). Our scalar point of entry is through spatial planning above the local level (*Raumordnung*) in the German planning system with a focus on statutory plans. We also draw on related instruments and methods to grasp points that show why successes in reaching the net zero goal remain mediocre, at best.

In the following sections, we first outline the relation between land-use planning and policies for sustainability, then shed light on the bias towards growth in instruments of land-use planning. Subsequently, we analyze the state, regional, and local levels for the German state of North Rhine-Westphalia to understand the sequences of steps from policy ambitions to implemented realities. Afterwards, we reflect on the extent of challenges within the instruments themselves. Lastly, we reflect on the potential towards post-growth planning for achieving sustainability goals more effectively.

2. Sustainability Policies, Land-Use Planning, and Growth Bias

Land and sustainability are strongly connected. As a crucial factor in sustainability strategies globally, land—the use and the planning thereof—is pivotal to the successful implementation of sustainability goals (Owens & Cowell, 2002). Building on land or sealing land reduces available future options, can lead to path dependencies and lock-in situations, and implies challenges in relation to ownership, governance, and the instruments by which we deal with the use and transformation of land (Meyfroidt et al., 2022). In the German context, policy goals for land-use planning have incorporated sustainability since the 1990s. Formal articulations for sustainable development are through planning laws at the Federal level for state and regional authorities (*Raumordnungsgesetz*) as well as the local level (*Baugesetzbuch*) in 1998.

The Federal Climate Adaptation Strategy of 2008 quantified the goal of limiting land consumption to a maximum net value of 30 ha per day until 2020 with a long-term prospect of reducing to net zero. This target is also set and updated within national policies for the implementation of the SDGs as well as monitoring thereof until 2030; net zero is envisioned for 2050 (Bundesregierung, 2018). A fast-growing landscape of (applied) research on reducing net land-use includes evaluations showing Germany as a frontrunner in science and practice debates, but much less effective in actual implementation (Weith et al., 2019). In 2021, the daily number was still at 58 ha. Reduction after 2008 was attributed to the aftermath of the financial crisis. Watered-down targets of less binding guidelines or recommendations at lower scales of

spatial planning, such as debates around the State Development Plan in North Rhine-Westphalia in 2013, were of little help (Lamker et al., 2014).

Planning policies internationally have fostered densification and infill development (Næss et al., 2020). In Germany, and arguably beyond, they remain conflictual with regard to socio-ecological goals like preventing urban heat islands as a climate adaptation measure, or improving access to small-scale green open spaces, urban gardens, and playgrounds to support social cohesion. Existing studies focus on single levels of governmental decision-making and point to the relevance of the local level as the level where decisions about land uses are put into practice in contexts like Germany (overview in Eichhorn et al., 2024). However, we argue for the engaged interplay of all strata within a multi-level governance setting and, following the subsidiary principle in German law, overarching frames that relate to local decisions. Recent developments around climate change and the global climate crisis see faster and more fundamental needs for policy changes, culminating in the Federal Climate Law in 2019 and far-reaching legal and constitutional implications (Krämer-Hoppe, 2021). The responsibility of climate change actions in Germany extends towards other parts of the world by shifting problems and externalizing costs to the Global South (Akademie für Raumentwicklung in der Leibniz-Gemeinschaft, 2021), as well as limiting the freedom of future generations (Krämer-Hoppe, 2021). Questions around the foundations of democracy and justice open the scope for perceiving sustainability beyond balancing three equal dimensions of social, environmental, and economic concerns.

Globally, cities and regions trespass on limits for land conversion; these incursions, now appropriately protected spaces, incite conflicts between climate change, biodiversity, and economic development, and provoke contested debates (Meyfroidt et al., 2022; Reese, 2023). Post-growth emphasizes planetary boundaries and the limits we are already transgressing with economic justifications and related resource overuses (Lange et al., 2021; Savini, 2023). We will not delve further into these directions but recognize how contemporary debates in sustainability and post-growth discourses link deeply with (global) social justice, democracy, and even human survival (Dixson-Decleve et al., 2022; Intergovernmental Panel on Climate Change, 2022; Lange et al., 2021; Savini et al., 2022). We also acknowledge academic discussions about deeper structural constraints rooted in capitalism or neo-liberal ideology (Barry, 2020) and the search for alternatives beyond a capitalist market economy in spatial planning (Savini et al., 2022) and geography (Lange et al., 2021). The first years after the Covid-19 pandemic show that physical development, especially at the local scale, is not as much a question of money, but equally of available resources, materials, and qualified workers afforded through the scaffolding of such macro concepts.

Post-growth perspectives criticize spatial planning from two directions. First, they address structural constraints connected to the economic system (Barry, 2020). Most fundamentally, this regards how capitalism and economic growth inevitably lead to resource depletion by means of immediate spatial interventions, but also through consumption-driven demands with global and distant reaches (Bues & Lucht, 2023). This position closely relates to the fields of ecological economics (zu Ermgassen et al., 2022) and political ecology with climate and environmental justice (Porter et al., 2020). Second, continuing from sustainability debates, post-growth perspectives challenge roles and practices within spatial planning while searching for alternatives from within by removing the need and desire for growth from the planning equation. This position has also been named planning "beyond growth" (Rydin, 2013), or a precautionary post-growth position that already finds wider agreement among German environmental specialists (Lehmann et al., 2022).

Moreover, post-growth positions relate to established debates about shrinking cities or regions in Europe and beyond (Wiechmann & Pallagst, 2012). Even though this has led to the development of new planning ideas and the adjustment of how to deal with changing empirical realities, research shows that shrinking cities continue with or even foster their dedication to growth (Grundel & Magnusson, 2023). An empirical reality of a declining population number is neither a necessary nor a sufficient condition for post-growth planning. Struggles for a new viable planning idea persist in growing and non-growing regions; both regularly continue to rely on growth or set growth as a goal. Durrant et al. (2023) argue that shrinking cities and growing cities might both be testbeds for post-growth. Whether in relation to population growth (as a measure against shrinkage) or economic growth (as a measure against loss of welfare), public policies to foster growth are regularly coupled to find and develop new land uses for business, industry, and housing. We argue that this is an inherent growth bias in contemporary spatial planning, in line with what Leick and Lang (2018, p. 223) describe for European non-core regions as an "ideological fix on growth-based thinking." So, it seems that while acceptance of post-growth grows among public, political, and environmental experts (Lehmann et al., 2022; Paulson & Büchs, 2022), its effect in the form of reduced land consumption is yet to be widely internalized and exercised.

3. Methodological Approach

To understand how a growth bias is immanent in spatial planning, we choose the German state of North Rhine-Westphalia as an explanatory context for our contribution. It is the most populated of the 16 German states (*Bundesländer*) and was recently the point of attention for research linking sustainable development and achieving net zero targets for land consumption (Eichhorn et al., 2024; Lamker & Terfrüchte, 2018). It is state-wide coherent from state to local scales in the type of steering settlement development across sub-regions (Pehlke, 2023). Furthermore, the state has an established history of engaging with the reduction of settlement-driven land use through both strategic and state-level goals (Lamker et al., 2014), along with supporting tools and methods to calculate needs (Vallée et al., 2012). We position post-growth planning twofold: first, to understand contemporary problems to reduce the net consumption of land within spatial planning, and second, as a crucial body of thought to orient the use of planning instruments so that tangible limits of available land are more effectively accounted for. We do not aim to downplay the contemporary European housing crisis nor the need to transform energy or production/consumption systems with related spatial implications. Rather, we aim to engage with the underlying assumption that all of this is only possible with an expansive appetite for land and uses thereof, while the basic needs of many are still not met.

In our policy analysis, we look at current statutory land-use plans at the state, regional, and local governmental levels in North Rhine-Westphalia and tools that regularly support their development and adoption (planning instruments). First, we examine the State Development Plan (*Landesentwicklungsplan*) in the version that was adopted in 2017. Complementing this, we included all amendments and changes that have been made up to and including October 2023. Two major amendments relate to the amount of land use in 2019 and 2023. Second, we assess the six currently adopted regional plans in the state area. Furthermore, drafts of not-yet adopted plans for four regions were included in our analyses after they were available in October 2023. Third, we use statistical data from respective public authorities at the federal and state level (especially from www.regionalstatistik.de) for the development of land use, employment, population, and private households since the adoption of the first net zero goal in 2008. The authors have further gained insights during the past 15 years in research projects, consultancy work, and working groups, on questions of land-use planning, evidence-based planning, and sustainable development.

4. Policy Analysis: From Ambitions to Instrumental Reality

Since the sustainability strategy of 2008, aims to absolutely decouple land use from population growth have not been achieved and lack teeth as the split is even increasing again (see Figure 1). This is worrying from an environmental perspective. Even more worrying is that costs for maintaining private and public buildings and spaces will have to be financed by fewer people—an experience already shared in other countries (Grundel & Magnusson, 2023). Studies for North Rhine-Westphalia show that the largest increase in net land-use is in rural areas with lower growth rates of economy or population. This may not be a growth fetish but an indication that public administrations still lack alternative ideas or retain flaws in how they make use of existing planning instruments. We argue that this is also grounded in the divergence of projections between higher and lower levels of government, planning approaches with safety buffers at each scale, as well as political contexts and competition. We follow a step-by-step approach in which we analyze independently, and in their connections, the state level, the regional level, and to a minor degree the local level.

The absolute annual utilization of new settlement areas in Germany has decreased significantly. However, between 2008 and 2022, the population has grown by 0.2 % per year and the number of households by 0.25 % due to decreasing household sizes. At the same time, the number of housing units outperforms this. It has increased by 0.57 % per year and the number of residential areas by 1.35 % (own calculations, based on Statistische Ämter des Bundes und der Länder, 2023). As Figure 1 shows for the period of 2008/2009 to 2021 in North Rhine-Westphalia, the annual change of residential areas almost consistently exceeds the population development and is always positive. The population data for 2011 (adjusted from 2011 because of the national census) and the area data for 2016 (new categories from 2016) are not shown here. The year 2015 shows a peaking inflow of migrants. While land development might have become more efficient in each

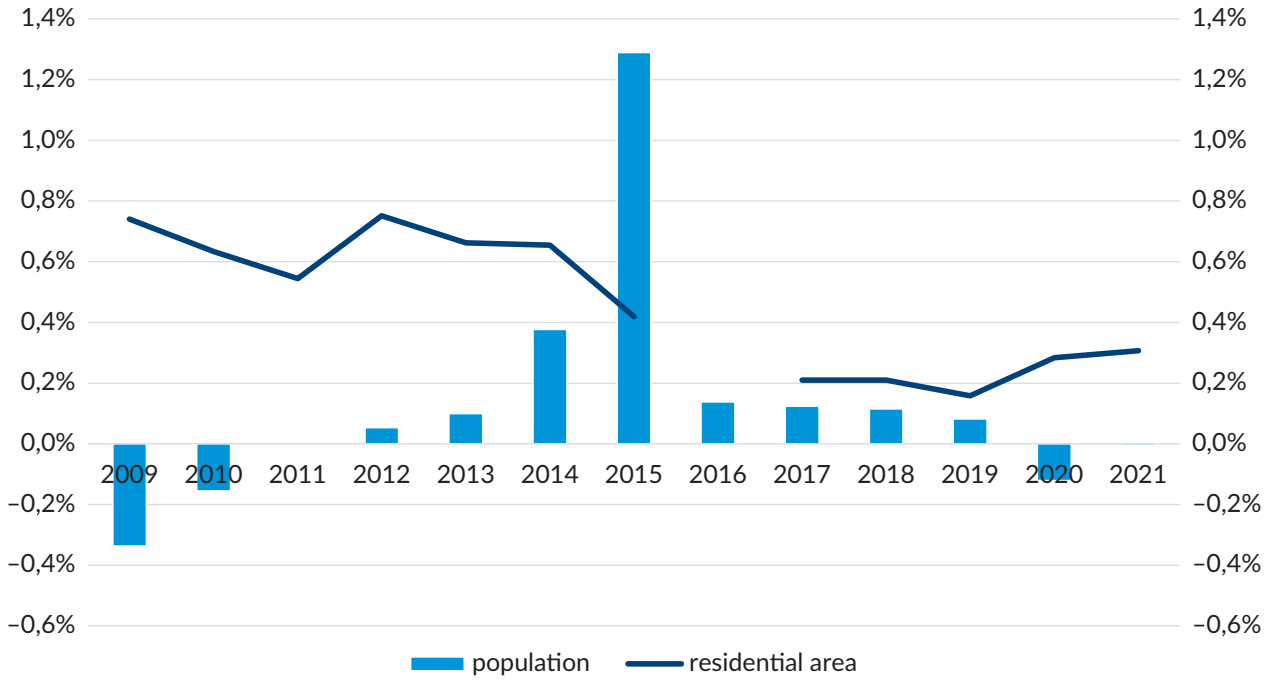

Figure 1. Development of population and residential areas in North Rhine-Westphalia 2009–2021. Source: Own calculation and illustration based on data from Statistische Ämter des Bundes und der Länder (2023).

project, the data demonstrates an increase in demand by 1.1 % more residential area per household in 2022 in comparison to 20 years earlier. Efficiency gains have led to even more land consumption (rebound effect).

The federal sustainability strategy envisages a reduction in new land use to 30 ha per day by 2030 and net zero development by 2050 (Bundesregierung, 2018). Although this quantified ceiling is not taken up in the Spatial Planning Act (*Raumordnungsgesetz*), its intent is embodied in the legislation's guiding principle of sustainable spatial development (Bundesrepublik Deutschland, 2008). This is further specified in the legislation with the supporting principles of: supporting sustainable economic growth, inclusion of demand forecasts from state and regional planning, spatial localization and concentration of settlement activity around central locations (central places), and protection of open space. There is therefore no formal obligation to reduce the amount of new land consumption as such.

4.1. State Level: Law, Principles, and Methods

The State Planning Act (*Landesplanungsgesetz*) sets the legal foundation at the state level and specifies the organization of spatial planning in North Rhine-Westphalia. Meeting the spatial needs of climate protection is mandatory (Bundesrepublik Deutschland, 2008), but reduced land consumption is not explicitly seen as a contribution to reducing greenhouse gas emissions. The state development plan derives a state-wide target for reduction in land consumption of 5 ha by 2020 and net zero development in the long term as dictated by federal targets. However, none of these goals are binding nor do they include any number in the state planning target called "Land-saving and needs-based settlement development" (Ministry for Economic Affairs, Industry, Climate Action and Energy of the State of North Rhine-Westphalia, 2017). The needs-based designation of settlement areas is legally assigned to regional planning and standardizes methodology for quantifying these needs. A review of the Sustainability Strategy 2020 of the state does not reveal further concrete details. It merely states that the state development plan "can make an appropriate contribution to achieving the goal of the German Sustainability Strategy to reduce land consumption" (Land Nordrhein-Westfalen, 2020, p. 56, own translation).

The process of developing the current state development plan (adopted in 2017) began with high demands for quantification and strong use of regulatory instruments, via restrictive targets (Lamker et al., 2014). A new coalition government under Christian Democrats and Liberals since 2017 led to far-reaching changes in a memorandum from 2019: The 5 ha principle was removed, and municipalities were conferred rights to designate land for development based on needs and beyond local self-development in smaller settlements (Land Nordrhein-Westfalen, 2021). The explanatory memorandum states that state development would now be more sustainable and flexible so that "the economy would be granted sufficient room for development in line with its needs," that "unnecessary obstacles to the designation of building land would be removed" in order to "quickly unleash spatial development potential" (Land Nordrhein-Westfalen, 2021, own translations). The state government recognized land as a finite resource but saw that more adequate and proportionate measures would be taken to achieve the objectives and focused on the goal of needs-based development. With the coalition of Christian Democrats and Green Party in 2022, new directions were set in June 2023 but have not yet been formally adopted. The intents of more sustainable land development, in particular a 5 ha principle in line with more efficient land use will be reintegrated and further changes to save land will be examined (Land Nordrhein-Westfalen, 2023).

Debates have focused much on the word *needs* as the lynchpin with which future land uses might be added. To find potential growth-based lock-ins, it is crucial to understand how these needs are defined in the plan itself (Land Nordrhein-Westfalen, 2022, especially pp. 49–52), and to distinguish these needs from market demands. Settlement development should be "geared towards population growth, economic development, existing infrastructure and the development potential of the natural and cultural landscape in a space-saving and needs-based manner" (Land Nordrhein-Westfalen, 2022, p. 44, own translation). Quantification and localization are devolved to the regional level. Even if the foreseeable development of private households is negative for individual municipalities and therefore could assume no need for new construction, the state development plan defines a calculated "basic need amounting to half of the replacement requirement" (Land Nordrhein-Westfalen, 2022, p. 50). This replacement need is defined as 0.2% per year of the housing stock—a rate determined by statistics that merged demolition and residential unit counts from the time when the plan was drawn up. Needs for housing units are converted into needs for land by using settlement densities that are typical for the respective municipalities. Calculations do not build a normative target, e.g., accounting for increases in density in line with growing resource concerns or changing household needs and demands. This means the long-term net zero target cannot be achieved even if the population and number of households shrink—unless a simultaneous reduction in other areas happens or is required. For North Rhine-Westphalia, with around 8.5 million households, an annual replacement need of 8,500 residential units is assumed, which means a need of 142 ha (at 60 residential units/ha) to 425 ha (at 20 residential units/ha) of land per year, depending on the settlement density.

Even more, the greater the inter-municipal fluctuation, the greater the need for additional land. This means that those cities with migration gains in household forecasts also have an attributed need for new construction. Migrations between a city and the surrounding area or between cities then give rise to a need for new construction on both ends: to meet the needs of a migration surplus and to cover basic needs in the place where people are leaving. In a zero-sum situation at the state level, ie., there is neither growth nor shrinkage, this results in the following needs for the North-Rhine-Westphalian municipalities in total (per year):

- New demand due to additional households: 0 housing units
- Replacement needs: 8.5 million units × 0.2% per year = 17,000 units per year
- Fluctuation reserve: 8.5 million units × 1% per planning period (25 years) = 3,400 units per year
- Total needs in stagnation scenario: 20,400 units per year or 56 units per day
- Area needs for residential development: 0.9 ha (with 60 units/ha) to 2.8 ha (with 20 units/ha) per day

For the state level, the need to consume new land is justified independently of growth through the number of employees or households and that growth in space (largely decoupled from the former) is therefore immanent in the instrument itself. In this understanding, saving land is also primarily operationalized with efficient land use (i. e., a minimum number of residential units per hectare) and not with sufficient land use, calling into question existing modes and pushing for deeper innovations and transformations.

We have shown that the annual growth rates of land consumption exceed the growth rates of population and households. While we focus on residential areas in the remainder of this article, it should be noted that similar trends are visible for commercial land use. State planning also addresses commercial, industrial, and transport areas; as well, it aims to integrate between different demands. However, we also observe here

that planning instruments are designed in a way that inevitably leads to growing land consumption. For commercial and industrial land, it is assumed that the development of the past will continue in the future, while innovative technologies and trends, business models, and societal preferences might alter this growth bias (e.g., working from home, urban production, artificial intelligence). Between 2016 and 2022, 910 ha of industrial and commercial space were added in the state, which equates to 130 ha per year or 0.4 ha per day.

4.2. Regional Level: Coordination and Allocation

Concerning regional planning, public administrations do justice to the regional characteristics of settlement development by focusing on the concrete determination of land needs. This is in accordance with the specifications and scope of the state development plan as well as the spatial allocation of (additional) land. In the case of residential development areas, the actual density key used (conversion of housing units to hectares) can be determined at the planner's own discretion following the settlement density class (< 1,000; 1,000–2,000; and > 2,000 inhabitants/km²) and the specified corridors (20–35; 30–45; and 40–60 units/ha). Deviations are possible but based on empirical investigation. The Cologne regional planning authority has made use of the option to deviate and defines four classes (20; 30; and 40 units/ha), by using the lower end of density in each category and adding a metropolitan category, reaching the maximum of 60 units/ha (Bezirksregierung Köln, 2021, p. 40). The regional plan Detmold, on the other hand, utilizes the possibility of a fundamental deviation from the state-wide density keys, justified by history, typology, and individual characteristics. Minimum densities are intentionally not assumed in the determination of land needs as the regional planning authority has not been authorized to do so by state planning. The draft regional plan assumes that, despite falling household numbers, there is still need for land in some municipalities in the region, as "the housing needs of prospective home builders and prospective tenants can only be partially met in existing buildings (qualitative need)" (Bezirksregierung Detmold, 2023, p. 114, own translation). Minimum densities or alike are not defined.

Regional planning authorities take different approaches regarding how commercial and industrial land needs are determined. This is possibly due to the reduced availability and experience with models and their assumptions, in contrast to population projections. For example, the district government of Detmold remains close to the specifications of the state development plan and derives a trend extrapolation of land utilization based on future needs. In comparison, the district government of Cologne derives the land use needs by extrapolation from employment data and industry-specific employment densities exclusively at the given moment (Bezirksregierung Köln, 2021). Potential changes and transformations accounting for economic structures and land uses are not part of the equation.

4.3. Local Level: Designation and Building

Regional planning hands over the task of development and land-use planning implementation (i.e., the legally binding designation of building rights) to the municipalities. In this article, we are only explicitly referring to the designation of new land and not to other spatial changes beyond the land designation and land coverage (such as infill developments and upgrading existing buildings). While the regional plan uses density criteria to calculate local needs, it does not determine actual building densities. Municipalities can realize lower densities than assumed and thereby not even meet the assumed need for land made available. In turn, this

gives them justification and proof towards regional planning for the need for additional land to develop (e.g., Bezirksregierung Detmold, 2023, p. 116).

More fundamentally, municipalities may not even have an interest in realizing assumed densities and therefore meet the calculated housing need within the calculated land use needs. For example, the city of Bornheim, lying between Cologne and Bonn, has a density of 40–60 units/ha according to the density key of the state planning authority and is planned with 40 units in the Cologne regional plan. However, they conducted empirical surveys and arrived at an average density of 24 units/ha. Recently planned developments had densities of 15 to 30 units/ha. The city council has therefore unanimously decided on a municipality-wide target density of 25 units/ha (Wildermann, 2018). One councilor recognizes publicly that: "At some point, we will have to go to a certain level. But our successors will then deal with this point. At the moment, we should defend the values we have" (Wildermann, 2018, own translation). The intent of sustainability in land-use planning is rendered irrelevant.

Further tensions arise in regions with imbalances between growth and shrinkage, or between strong core cities and small regional municipalities. For example, Everswinkel-Alverskirchen in the vicinity of Münster is recognized by the state level as a location for self-development only (*Eigenentwicklung*) with less than 2,000 inhabitants. Local disputes circled around the inability to hold population without adding land use needs, therefore removing the potential to counteract shrinkage by increasing land use. Experts have been consulted to calculate needs on the local level (Schulten Stadt- und Raumentwicklung, 2018). However, local calculations differ from regional ones, and make further assumptions, e.g., that one third of all out-migrating households would have stayed had they been able to designate more land for residential uses and supporting infrastructures. This contributes to a vicious circle of increasing land consumption.

5. Changing Planning Instruments Towards Net Zero Land Consumption

We argue that engaging with the realities of planning instruments serves three ends. First, it enables a better understanding of what it means to criticize growth-biased planning. What seems intentional and clear from the external critiques (such as in Barry, 2020; Savini et al., 2022) is much harder to locate in existing planning systems and the instruments by which goals, mediated through levels and through time, become reality. Second, we aim to foster debates in land-use planning about far-reaching (strategic) sustainability goals that encourage the identification of decision spaces across levels and the (political) choices that are consciously or unconsciously made. A perspective from post-growth planning enables the identification of entry points to overcome an intentional and unintentional bias (Akademie für Raumentwicklung in der Leibniz-Gemeinschaft, 2021). Third, this will enrich conceptualizations of a growth-independent planning itself. Learning from the German experiences as an early frontrunner in aiming for net zero land consumption offers lessons for theory and practice more widely.

The net-zero target for land use could align with moderate post-growth planning directions or a precautionary post-growth approach (Akademie für Raumentwicklung in der Leibniz-Gemeinschaft, 2021; Durrant et al., 2023; Lehmann et al., 2022), leaving aside for now wider questions of system changes in economy and politics. However, a lock-in makes it almost impossible to readily open non-growth development scenarios. Across scales and instruments, what starts with ambition ends up following a laissez-faire scenario (immanent in models, instruments, projections). As we have shown, the absolute

land-saving target, however quantified (30 ha, 5 ha, net zero), is hardly compatible with the way additional land use needs are calculated, allocated, designated, or deliberated. The determination of needs is always open-ended and does not factor in a ceiling. Land utilization is the dependent variable and growth (population, households, economy) the independent variable, leaving difficult enforcement options to those at the local level (Kießling et al., 2021). This makes it possible for political decision-makers to rally behind needs-orientated land development regardless of their ideology, though methods and reasoning often shift between serving identified needs (e.g., of households for housing) or recognizable demands (e.g., of local, national, and international market actors to buy property).

More specifically, the examples of the regions of Detmold and Cologne and the cities of Bornheim and Everswinkel show the need to revisit the interplay between levels of multi-level governance. While the counter-current principle of working up and down the levels is a foundation of federal democracy in Germany, it unveils deficiencies in effectively, efficiently, and transparently addressing fundamental transformation such as is the case with removing the requirement of building on new land in land-use planning. The examples show the acute and deliberate actions of hoarding more land than needed and illustrate a shift of burdensome decision-making onto future generations, contrary to sustainability and intergenerational justice (Meyfroidt et al., 2022). While the general agreement to see the reduction of land consumption, especially towards net zero, tends to hold, its less leading role in the calculation of needs, and general increase in ambiguous articulation at lower levels of government have a much steadier hold.

We have uncovered that practice in North Rhine-Westphalia orients visibly towards growth with regard to planning, its methods, and parameters, as well as the respective flexibilization. The aim remains to identify and provide land for growth-induced demands. This diminishes a push to think or experiment with post-growth planning directions, such as focusing on circular use of resources (Savini, 2023) or fostering diverse and alternative ways of economic and housing development (Lange et al., 2021; Savini et al., 2022). For example, additional households could live with, or even desire, other needs than their predecessors'. Migration across municipal boundaries could work well without inducing new land use needs. Even if sufficiency could become a leading paradigm, the current use of land-use planning instruments would not push against competing directions or would even counteract them.

6. Conclusion: Potentials of Post-Growth to Change Planning Instruments

Starting with the recognition of post-growth planning debates and their critique of an inherent growth bias in spatial planning (Durrant et al., 2023; Rydin, 2013), we have used the case of the German state of North Rhine-Westphalia to analyze where and how far this can be seen in the practice of statutory land-use planning. We looked at the key planning instruments for identifying, allocating, and designating land for building uses (housing, commercial, industry). We have worked through the state, regional, and local levels to uncover how far growth is immanent and unquestioned in the use of instruments in land-use planning. We have shown how an ambitious sustainability goal of net zero land consumption is watered down to partial successes and signs of potential relative decoupling. We have identified hindering premises within instruments, their use, and deliberate statements that contrast with opening pathways towards a post-growth future for land use. These are deeply nested within calculations of needs, density criteria, and the reliance on past developments or the current status quo to plan.

Building upon this, we have shown that critical junctures exist where instruments are used in a particular way to support ongoing growth agendas. Whether consciously or unconsciously, there is an underused potential in the existing planning instruments. Inevitably, planning becomes re-politicized again and cannot simply react to projections in the established ways. A relevant starting point here is to recognize the divergence between societal need for and economic demand for land; this follows calls for a deeper and more critical engagement with economic underpinnings in spatial planning practice (Adrian et al., 2018; Janssen-Jansen et al., 2012), but also more widely in spatial planning education (Kunzmann, 2017). This may explain why a differentiation between societal needs (such as for housing) and market demands (such as for financial investment) is often not or only vaguely made. It may also explain why, beyond the scope of this article, the implications of financial markets and changing interest rates on the demand for real estate and land seem surprising. To respond to these tangential but vital points, it is worth tuning into how sufficiency debates within post-growth touch on such questions of living, well-being, justice, and participation within ecological boundaries (Bues & Lucht, 2023). Also outside of the scope of this article are concerns with the entanglement of planning instruments with collective action, citizen involvement, legal considerations, and political disputes, which would deserve future case studies. Considering the global challenges of sustainability, it would be crucial to understand our concerns also in other contexts and the Global South and the non-Anglo-American world that is less represented in international scholarship. This should be done by research from the Global South, which could further delineate a practice-oriented approach to post-growth planning globally.

We have argued for a better understanding of how existing and proven instruments are limited in their means to foster immediate adjustments in practice. We recognize potential avenues to achieve sustainability in land-use planning by changing existing and developing new instruments as part of a wider change in thinking towards post-growth planning. Beyond more radical demands, we argue that a more intimate understanding of instruments and how they are used opens pathways within spatial planning practice and research to understand where, how, and why land-use planning could change. This more meticulous insight could make us better and structurally address growth-oriented biases or behaviors that underpin global, regional, and local sustainability crises. The pathway towards achieving net zero in land consumption and thus a potential piece of post-growth planning requires that we re-plan the use of planning instruments through daily practices. Only then can we in a similar fashion begin the re-tooling of planning as a discipline.

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Conflict of Interests

The authors declare no conflict of interests.

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