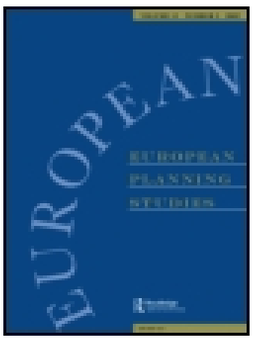

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Transformative or piecemeal? Changes in green space planning and governance in eleven European cities

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ABSTRACT

Green (and blue) spaces receive attention as important components of cities that can help to mitigate the effects of climate change, support biodiversity and improve public health. Green space planning aims to transform cities towards urban sustainability and resilience. In a longitudinal study, representatives from eleven European municipalities that had previously been interviewed in 2014 were re-interviewed in 2020–2021 on changes in urban greening and related practices. The interviewees reported mainly advancements in dealing with

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ecological issues, such as new plans, strategies, regulations or funding programmes for climate adaptation or biodiversity support, as well as some progress in co-governance with non-governmental stakeholders. Promising developments include breaking professional silos by creating new units that can better deal with complex urban issues. In a few cases, high-level local politicians induced profound changes. These changes stimulated the development of new planning and governance cultures, resulting in more co-creation of urban green spaces. However, from a transformation studies perspective, incremental strategies dominate, and even when municipal representatives are aware that substantive changes are needed, they often lack the means to act. For more radical system change, significant extra efforts are needed.

1. Introduction

Green (and blue) spaces are increasingly considered as important elements of urban systems (Babí Almenar et al. 2021; World Health Organization 2017). EU policies, like the European Green Deal or Strategies on Adaptation to Climate Change and on Biodiversity coin green and blue elements as 'solutions' for complex issues such as adaptation to climate change, biodiversity loss or social cohesion. By using terms like green infrastructure, ecosystem services, and nature-based solutions, they consider urban greening as an important pathway to tackle societal challenges (see EC 2021). The EU-Biodiversity Strategy for 2030 calls for ambitious urban greening efforts in every European city, and the 'Green City Accord' is a new EU initiative for committing to green and healthier cities (EC 2020a; EU 2020). Moreover, EU member states recently adopted the New Leipzig Charter for sustainable urban development. The charter calls on cities to enhance their biodiversity, regenerate endangered ecosystems, and create green and blue networks. In addition, it highlights the need of citizen participation and co-creation of urban spaces, i.e. new planning cultures and practices for sustainability transformations (EC 2020b).

These EU policies are supplemented with EU-funded research with a major research line in establishing an evidence-base for the benefits provided by green spaces (i.e. EC 2021) and another research line in transdisciplinary and participatory approaches for societal transformation (Buijs et al. 2019; Bulkeley 2020). Recently, there has been an increased focus on social justice and the unintended effects of urban greening on vulnerable groups, raising attention to the fact that investments in green spaces have complex social impacts (Anguelovski, Connolly, and Brand 2018; Kronenberg et al. 2021).

In civil society, public awareness of global challenges such as climate change, biodiversity loss, or social injustice as well as citizens' demands for a healthy living environment are resulting in citizens pressuring politicians to act for a sustainable transformation of their cities, including urban greening (Frantzeskaki et al. 2016; Mattijssen et al. 2019). Combining support from policies, research, and society, green space planning and governance have gained tailwind and European cities have been encouraged to explore the role of urban greening as part of deliberate sustainability transformations. However, to date there is a lack of scientific evidence on whether green space planning has improved in European cities over the past decade.

Against this backdrop, this paper seeks to study changes in green space planning over time and its contribution to urban transformations. In 2014, we studied 20 European cities as part of the EU-funded research project GREEN SURGE, revealing the cities' differences and commonalities in their approaches to e.g. protecting green spaces from densification, combating the effects of climate change or delivering more inclusive governance processes (Buizer et al. 2015; Davies et al. 2015). For this follow-up study, we examined how planning practices in eleven of these European cities have evolved, setting out to answer the following questions:

- How have urban green space planning and governance changed and what influenced these changes?
- What is the contribution of current urban green space planning and governance to urban transformations?

2. Definitions and analytical framework

2.1. Core terms and concepts

In the field of green space planning and governance, different terminologies, instruments and other specificities are current in different countries which are partly difficult to translate or compare. Here, we use umbrella terms such as planning and governance but if needed deviate from the original terminology from the literature or our cases. For clarity, we defined core terms in Appendix 1.

In the following, green space *planning* refers to formal, government-led processes to protect, enhance, and implement public urban green (and blue) spaces for various socio-cultural and environmental goals using a wide range of instruments, such as strategic plans or policies, regulations, and action programmes. Green space *governance* is used to highlight the involvement of multiple actors in the process of governing green spaces, often in a decentralized, networked and participatory manner (Buizer et al. 2015; Jansson et al. 2018; Tacconi 2011). Arnouts, van der Zouwen, and Arts (2012) described a continuum extending from hierarchical, government-led planning to self-governance, with co-governance arrangements in between. Terms like co-creation, co-production, or collective stewardship specify different forms of governance (see Appendix 1).

2.2. Themes for analysing changes in green space planning

For shedding light on the first research question, quantitative and qualitative findings on changes in a number of thematic clusters around green space planning and governance in the eleven cities were investigated. The selection of the themes was determined by the GREEN SURGE project, which gathered data on 20 European cities between 2013 and 2016 in order to identify the status quo in green space planning and governance (Pauleit et al. 2019). Assessing the characteristics of the national, regional and municipal planning system, instruments and themes in green spaces planning, and experiences with governance approaches had been at the core of these studies. These had been informed by interviews with municipal planners and complemented by document analyses for each

city for contextual information such as socio-economic statistics as well in-depth analysis of selected planning documents. Findings have been synthesized into 'case study portraits', structured narratives (Hansen et al. 2015) that provided a basis for our comparative analyses. In the current follow-up study, these portraits served as a reference point for comparison with the current situation and provided contextual information.

In correspondence with the prior approach, three thematic clusters were selected for the follow-up: (1) contextual factors, (2) planning approaches, and (3) governance and participation. Contextual factors included changes in the planning system, political conditions, or availability of resources that might influence the consideration of urban greening. Cluster 2 related to changes in government-led planning with attention to developments in stakeholder awareness of related themes, aimed at trickling down changes in planning approaches, i.e. implementation of new planning instruments. A number of the investigated themes were predetermined by the GREEN SURGE project as important urban issues, such as adaptation to climate change, but the follow-up also included open questions. Cluster 3 was aimed to assess changes in governmental approaches as well as in active citizenship. As a reaction to a disruptive event during the time of the interviews, a question on the impacts of the COVID 19-pandemic was included.

2.3. Evaluating urban transformations

For responding to the second research question, we evaluated our findings in the discussion based on transformation theory.[1] In transformation theory, transformative change is understood as intentional, actively pursued, radical and systemic and requires breaking through existing path-dependencies and challenging, changing, and/or replacing existing institutions, structures and practices (Haxeltine et al. 2017; Köhler et al. 2019). Planned transformations are complex, multi-actor processes where different (technological, social, environmental, and economic) forces interact (Grin 2010). Urban planning, including green space planning, is considered a forward-oriented approach of setting visions, goals and priorities for action, which involves multiple stakeholders (i.e. Albrechts, Healey, and Kunzmann 2003; Wolfram 2018). Municipal stakeholders such as politicians and administrative officials can shape and steer transformative processes with spatial and material implications (van der Jagt et al. 2019; Wolfram, Borgström, and Farrelly 2019). Despite that power, urban planning is often restricted by established planning paradigms, multi-level legal frameworks, siloed institutions, and routines as well as former investments in specific infrastructures and technologies (Malekpour, Brown, and Haan 2015; Wolfram 2018). Municipalities, therefore, have limited capacity to transform existing structures and often have insufficient resources or knowledge important to leveraging transformations (De Luca et al. 2021; van der Jagt et al. 2020; Wolfram, Borgström, and Farrelly 2019). Strengthening the role of urban green space planning requires dealing with complex conditions, while including cultural values (Dorst et al. 2021).

Analytical frameworks for evaluating (urban) transformations are manifold and emphasize the transformative capacity of urban stakeholders (Hölscher, Frantzeskaki, and Loorbach 2019; Wolfram 2016), leverage points (Abson et al. 2016; Dorninger et al. 2020) or concepts for embedding, accelerating or upscaling transformative

change (Ehnert et al. 2018; Loorbach et al. 2020). These analytical approaches are often not fully compatible with rationales dominant in urban planning that are rooted in stability and rational approaches to guide future land uses, even if the increased reliance on multi-actor, relational governance approaches is more in line with sustainability transformation theory (Wolfram 2018). The concept of urban transformative capacity by Wolfram (2016) and Wolfram, Borgström, and Farrelly (2019), with components such as sustainability foresight, systems thinking or community empowerment, has been used by various scholars to evaluate urban planning cases and revealed shortcomings of current planning practices in their transformation capacity (e.g. Castán Broto et al. 2019; Ziervogel 2019). However, so far little attention has been paid to the targeted outcomes of urban transformation processes, suggested by Wolfram, Borgström, and Farrelly (2019) to be:

- Innovation: developing approaches to create, nurture and anchor novelties,
- Exnovation: exposition and dismantling of path-dependencies,
- Co-governance (in the original 'collective stewardship'): enabling and aligning diverse actions,
- Social justice: finding ways to ensure diversity and contestation.

Following this framework any deliberate urban transformation has at least one of these four aspects as its goal. We used the goals to evaluate whether the observed changes can be considered intentional transformations towards urban sustainability, while being aware that a certain degree of radicalness is a fundamental principle of transformation theory. In urban transformation discourse, the first aspect – *innovation* is a prominent concept also related to urban greening (van der Jagt et al. 2020). Innovation concerns arrangements or actions that promote urban sustainability, driven by governmental or non-governmental stakeholders, resulting in new discourses, objects, and practices (Loorbach et al. 2020; van der Jagt et al. 2020). In regard to the second aspect – *exnovation*, Hölscher, Frantzeskaki, and Loorbach (2019, 794) define the term 'unlocking' as the 'ability to recognize and dismantle structural drivers of unsustainable path-dependencies and mal-adaptation'. The third aspect – *co-governance* is understood as coalitions of governmental and non-governmental actors with varying degrees of power diffusion, joint decision-making and levels of organization as described above. For achieving complex urban sustainability transformations, the involvement of 'a broad range of stakeholders across horizontal and vertical scales, and across different sectors, domains and disciplines' as well as networks and partnerships between them have been identified as important factors (van der Jagt et al. 2020, 207). The fourth aspect – *social justice*, relates to the political and ethical nature of urban planning and governance and related research warns that technocratic decisions often (unintentionally) reinforce inequities by further empowering certain social groups and disempowering others (i.e. Anguelovski et al. 2020; Avelino 2017). Pursuers of urban transformations face power imbalances and related social struggles and contestation. They can manage associated risks by including diverse perspectives early on i.e. based on age, gender, income, and education, across different spatial and temporal scales (Langemeyer and Connolly 2020). Empowering such voices requires governance approaches that foster a

redistribution of resources and decision-making power (Wolfram, Borgström, and Farrelly 2019; Ziervogel 2019).

3. Research design and methodology

3.1. Data collection

The study comprised structured expert interviews with both open and closed questions following the interview approach during the GREEN SURGE project to provide a longitudinal perspective. Due to a lack of funding, researchers needed to participate voluntarily and case selection had to be pragmatic. For eleven out of the 20 cities volunteers were found. Participating researchers had either been formerly involved in GREEN SURGE or in a similar research field. They were familiar with the local language and context in the studied cities to ensure that they could provide additional information when such was needed for interpreting the data.

As mentioned above, the interview questions concerned the same topics of green space planning and governance as in the original 2014 study, but the questions were adapted and focused on assessing and explaining changes that occurred since then (i.e. 'If you review the [green space planning] objectives, achievements and challenges from 2014, would you still consider these accurate?'; 'If objectives have changed, how did they change and why?') (see Appendix 2).

Seven of the eleven interviews were with the same persons as in 2014, i.e. a municipal official in a leading position in green space planning. In four cases, a different person in a similar position participated. In the following presentation of the results, when we refer to the cities, the information represents the viewpoint of the interviewee.

With delays due to the Covid-19 pandemic, the interviews took place from August 2020-March 2021. Two interviews took place face-to-face, three by telephone and six via virtual communication platforms, lasting 60–130 minutes.

3.2. Data analysis and interpretation

The data analysis and interpretation were conducted by a core team in three phases that built upon each other. The investigation of the first research question 'How have urban green space planning and governance changed and what influenced these changes?' started with an iterative analysis to obtain overview of the extent and areas of change across all cities, using mainly the closed and partly open responses on contextual factors, planning themes and instruments, and governance. Depending on the topic, focus was either on the increase, decrease or stagnation of specific aspects and/or on the evaluation of the developments by the interviewees (for details see Appendix 2).

In a second step, a more in-depth analysis focused on the most notable developments in green space planning and their drivers. We reviewed the open responses question by question, paraphrasing and summarizing key points and developing codes inductively. This approach was complemented by a case-by-case review and per case-comparison of the results with the 2014 portraits. That way, we identified continuation or novel developments. Through this iterative process, the comparison between cases and within cases

was condensed to four topics or trends that represented changes in several of the cities: – (1) global trends and disruptive events, (2) urban growth, (3) integrated planning, and (4) governance. To address potentially differing interpretations, the analysis results for each city were reviewed by the researchers who conducted the interviews.

Finally, to answer the research question 'What is the contribution of current urban green space planning and governance to urban transformations?', the results were discussed against the analytical framework, namely the four outcomes of transformation processes suggested by Wolfram, Borgström, and Farrelly (2019). The core team discussed examples from the in-depth analysis relating to Innovation, Exnovation, Co-governance or Social justice and selected those that illustrated most clearly how one these outcomes could be observed. Based on the definition of urban transformation and the analytical framework, the aim was to assess if steps towards urban sustainability were rather incremental or more radical and substantial, i.e. transformative and if they were linked to one of the four outcomes.

4. Case study cities

The 20 cities for the 2014 GREEN SURGE study were selected to represent cities in different European regions with different planning systems, socio-economic contexts, and city size. The cities were grouped into five clusters with similar planning systems:

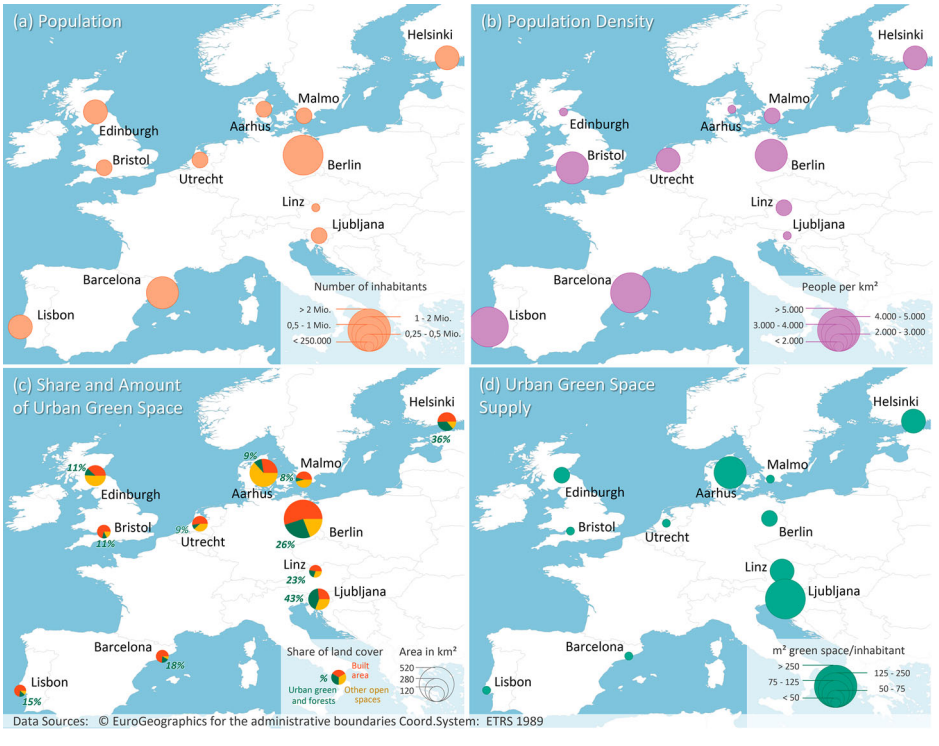

Figure 1. Overview of population size (a) and population density (b), green space structure (c) and supply (d) in the eleven studied cities (Statistic based on European Urban Audit and European Urban Atlas EEA 2018; Eurostat 2019).

Nordic, British, New Member States, Central, and Mediterranean (Davies et al. 2015). The cities in the follow-up study have at least one representative per cluster (Appendix 3).

The eleven cities vary in population size, area, and share of green space (Figure 1), ranging from about 200,000 citizens in Linz to more than 3.6 million citizens in Berlin. Four of these cities had been more directly involved in GREEN SURGE research activities, as so-called Urban Learning Labs. In recent European research, municipalities have had an active role as funded partners and at least eight of the eleven cities were engaged in EU Horizon 2020-projects (Appendix 3). It can, therefore, be assumed that representatives of these cities are aware of recent developments in research on urban greening. Several of them are recognized champions in sustainable urban development, i.e. previous winners of the European Green Capital Award or through their participation in other sustainability-oriented programmes such as those connected to the Global Sustainable Development Goals. Therefore, the eleven cities do not constitute a random sample of European cities. Instead, they are considered to be responding to sustainability challenges and, therefore, suitable cases for the study of orchestrated transformative change.

5. Results

The following section lays out the observed changes and influencing factors in order to elucidate the first research question, first in a semi-quantitative overview and secondly by focussing on broader trends that could be detected across cities as well as major discrepancies across cases.

5.1. Overview of changes across cities

5.1.1. Perception of change in contextual factors

Contextual factors include national and local political developments, resource availability and other developments or events since 2014 that respondents considered as significant. The interviewees were asked to assess the changes in one area (mostly positive, ambivalent, mostly negative – or unchanged) and describe what these changes entail.

Changes in the national political context affecting urban green spaces have been perceived as mostly positive (6 of 11 cases), while some respondents reported no changes (Table 1). The positive changes concern national planning laws and policies such as new environmental legislation and policies, integration of ecological issues in land use planning or national political leadership that enhanced attention for urban greening.

In terms of local planning systems and politics, perceived changes were assessed as mostly positive (6). New local planning instruments or policies were considered a supporting change for green space planning. For three cities, increased support was also related to changes in local political leadership, and for two to new local governmental structures. In one city, political support for urban green spaces had decreased, probably due to new political leadership.

Changes in resource availability with regards to staff, budget, knowledge, and other resources were evaluated as overall positive (3), ambivalent (3) or negative (2). The negative rankings were related to declining political support for green space planning, significant budget cuts or maintenance budgets not keeping up with an increase of green space.

Table 1. Changes in contextual factors relevant for green space planning. The coloured columns represent the overall rating of changes in the respective field as perceived by the respondents. In some cases, the impact of the changes was not rated. The crosses in the white columns indicate in which 'area of change' (since 2014) a major change was pointed out in the interviews.

	National political developments				Local political developments					Resources					Other contextual factors				
		Area of change				Area of change					Area of change					Area of change			
	Overall perception of change	Laws and policies	Political leadership	Other	Overall perception of change	Laws and policies	Political leadership	Governmental structures	Other	Overall perception of change	Human resources	Financial resources	Knowledge resources	Other	Overall perception of change	Social	Economic	Ecological	Other/multiple
Aarhus	+	X			+	X	X		X	+/-	X	X	X		+			X	X
Barcelona	+		X				X			+			X			X		X	X
Berlin							X			+	X	X						X	X
Bristol	+	X		X	+		X	X		-		X		X	+	X		X	X
Edinburgh	+	X			o					+/-		X			+/-				X
Helsinki	+	X			+	X		X		+/-	X	X	X		+/-			X	X
Linz	o				+	X							X						
Lisbon	+			X	o						X				+				X
Ljubljana		X			+/-				X				X		+				X
Malmo	o				-		X	X		-				X	+/-			X	X
Utrecht	o				+		X			+	X	X			+			X	X

Legend

+ Mostly positive; +/- ambivalent; - mostly negative; o no changes; not determined

Some cities reported a moderate increase in financial resources (3), others more or less stable budgets (5), and three a decline.

Other contextual factors concerned societal developments, i.e. awareness of certain issues or catastrophic events that influenced green space planning. Representatives of five cities reported positive changes in terms of greater awareness of climate change or more attention for the contribution of green spaces to health, well-being and/or social justice that are considered as supportive of urban greening. Three cities reported ambivalent effects that were related to tensions between urban greening and urban densification (see next section).

5.1.2. Changes in green space planning approaches

Regarding developments in green space planning, for most cities (8 of 11) the planning instruments perceived as most important in 2014 had not changed, as they were often statutory urban master plans or specific green space plans. Major green space plans and projects mentioned in 2014 had mostly been or still are being implemented, while

Table 2. Changes in relevance of different green space planning themes. The respondents rated changes in relevance of the eight themes compared to 2014. In some cases, no rating was provided.

	Biodiversity	Climate Adaption	Health	Social Cohesion	Cultural Diversity	Green Economy	Ecosystem Services	Urban Green Infrastructure
Aarhus	↑	↑	↑	↑	→	↑	↑	↑
Barcelona	↑	↑	↑	↓	↓		↑	↑
Berlin	↑	↑	↑	↑			→	↑
Bristol	↑	↑	↑	↑	↑	↑	↑	↑
Edinburgh	↑	↑	↑	→	→	↑	↑	↑
Helsinki	→	↑	↑	↑	→	↑	→	→
Linz	→	↑	→	→	→	→	→	→
Lisbon	↑	↑	↑	↑	↑	↑	↑	↑
Ljubljana	↑	→		↓	↓	↑	↑	↑
Malmo	→	↑	→	↑	→	→	→	→
Utrecht	↑	↑	↑	↑	→	↑	↑	→
Legend	increased		stayed the same		decreased		not determined/ not relevant	

a number of cities was in the process of updating plans or developing new ones, the latter often addressing new issues.

In the 2014 survey, eight planning themes were considered important for green space planning to address current societal challenges (see Table 2). Most of these topics were found to have increased in relevance in the 2020/2021 surveys, most notably climate change (10 cases), biodiversity (8) and human health (8). Adaptation to climate change has sparked most new policies, partly due to recent floods or heat waves. Concern for biodiversity loss has resulted in new biodiversity plans and policies in several cities. For the other themes, no new specific planning instruments or other tangible measures at the level of city-wide green space planning had been mentioned.

Over the years, awareness of the contribution of urban green spaces to social cohesion was considered to have increased (7). Few interviewees reported increased awareness of cultural diversity (2), while six felt that there was already a good awareness in 2014, even though some respondents thought that not enough action was taken. Seven cities also reported better awareness about the green economy, but only mentioned examples

with no or only implicit links to green space planning (i.e. fostering a circular economy and green businesses, recycling and more sustainability in the building sector, life cycle assessments in urban planning).

Cities had integrated the concept of ecosystem services in their planning instruments or were at least more aware of the concept and the options to utilize it in green space planning (7). Furthermore, awareness for urban green infrastructure had increased (7).

Regarding policies supporting the implementation of urban greening, progress was made in the development of action plans and programmes, especially tree planting programmes and strategies or manuals and guides, compared to 2014 (6 cases). Some cities mentioned an increase in funding for the implementation of projects (3) or advancements with maintenance (3), the latter referring to the consideration of biodiversity in maintenance activities. Two respondents mentioned increased use of monitoring tools, i.e. citizen surveys and green space provision per capita, and evaluation by means of green space indicators.

5.1.3. Changes in participation and co-governance

For governance, the overall evaluation of the situation compared to 2014 was mostly positive in 8 cases and ambivalent for one case (Table 3). Municipal efforts to support participation had increased in nine cities, while the remaining cities had seen no change. In eight cities, interest of non-governmental actors in green space governance was considered to have increased, and for three to have remained unchanged. For eight cities, the number of initiatives engaged in (co-)governance was perceived as being higher than before, for three as unchanged. Regarding cross-departmental cooperation, nine reported an increase and two to be at the same level as in 2014.

5.2. A deeper dive: trends and tensions in green space planning and governance

5.2.1. Planning responses to global developments and disruptive events

Overall, the cities seemed to constantly monitor if societal and environmental changes necessitate adaptation of green space planning, which in some cases has led to new plans and policies. Climate change and loss of biodiversity have spurred the development of new planning instruments and policies or the strengthening of pre-existing planning tools such as Barcelona's Green Infrastructure and Biodiversity Plan, including an ambitious proposal for developing green corridors. Planning tools that have been in place for longer have gained additional attention through support from new high-level policies and environmental laws in Helsinki and Lisbon, by the translation of the Sustainable Development Goals into the One City Plan in Bristol or as a direct response to local events, such as flooding in Aarhus.

Planning responses at the strategic level often concerned non-statutory planning, such as Climate Change Adaptation Strategies in Barcelona, Berlin, Lisbon, and Utrecht, Stormwater Management Strategies in Helsinki and Malmo, Green Roof Strategies in Aarhus, Helsinki, and Utrecht, a Bee Strategy in Berlin, or the declaration of Climate Emergency and/or of Ecological Emergency to halt biodiversity loss in Barcelona and Bristol. The need to adapt to a changing climate has also led to regulatory responses, such as the adoption of a Green Area Factor in Helsinki, which requires a sufficient

Table 3. Changes in green space governance with regard to participation, citizen-led initiatives and internal cooperation. The first column represents the interviewees' overall ratings of changes since 2014 (mostly positive or ambivalent; the rate 'mostly negative' and 'unchanged' was not provided; in some cases, the impact of the changes was not rated). The remaining columns refer to increased, unchanged or decreased aspects of governance ('decreased' was not mentioned).

	Overall perception of change in green space governance	Changes in different aspects: Efforts regarding participation	Interest in participation by non-governmental actors	Number of local (non-governmental) initiatives	Cross-departmental cooperation
Aarhus	+	↑	↑	↑	↑
Barcelona	+	↑	↑	↑	↑
Berlin		↑	→	↑	→
Bristol	+	↑	↑	↑	↑
Edinburgh	+	→	↑	↑	↑
Helsinki	+	↑	↑	→	↑
Linz	+	↑	→	→	↑
Lisbon	+	↑	↑	↑	↑
Ljubljana		→	→	→	→
Malmo	+/-	↑	↑	↑	↑
Utrecht	+	↑	↑	↑	↑

Legend

Overall evaluation of changes

+ Mostly positive; +/- ambivalent; not determined

Changes in different aspects

↑ increased; → stayed the same

provision of green space for ecosystem services within urban developments, and a directive in Linz for integrating more green elements in local development plans.

The Covid-19 pandemic has increased awareness and appreciation of the potential of urban green spaces to contribute to mental and physical health. In Edinburgh, the respondent observed the need for a better provision of local green spaces and connecting green corridors as a consequence. However, aside from an accelerated implementation of projects focused on reducing space for car traffic and enhancing walkability in Barcelona, none of the interviewees mentioned specific actions at the time of the interview. Barcelona, Bristol, and Utrecht reported enhanced awareness of social cohesion and justice issues in urban planning. Examples for promoting social cohesion included consideration of disadvantaged groups in urban development projects in Aarhus and Utrecht, in urban development policies in Bristol and Utrecht and campaigns in Berlin. The few examples specifically related to green space planning included participation in planning processes and redevelopment of deprived areas in Aarhus, Helsinki, and Utrecht. In Bristol, social cohesion and equality are at the heart of urban planning with multiple interventions and programmes. However, in regard to the administrative unit responsible for urban green spaces, the Park Service, the respondent expressed that more efforts are needed to reduce the unequal access to green spaces and to increase their overall number.

5.2.2. Ambiguous relationship between urban growth and green space development

Respondents from six cities reported the ambivalent impact of urban growth and other pressures on the housing market: densification and urban expansion strengthened green space planning and provided a part of the resources for its implementation. At the same time, cities experienced conflicts between the need for affordable housing and urban green space provision, especially when tourism added pressure to the housing market, as in Berlin or Barcelona. Urban development in Utrecht and increased housing prices in Barcelona contributed to perceived public pressure and demand for green spaces. In Helsinki and Malmo, respondents raised concerns about sufficient long-term funding to manage new green space. In Utrecht, the fastest growing city in the Netherlands, urban expansion and densification should currently be accompanied with also providing significant amounts of additional public green space. The Municipal Plan (2017) of Aarhus promoted dialogue between the city and developers resulting in 'exchange agreements' so that investors contribute to the common good in return for their economic gain, for example by creating new green spaces. These agreements allowed to gain more funding for green space planning and management. In other cities, such as Bristol and Edinburgh, assessments of open space needs and green space standards were considered important tools to balance urban growth and green space provision.

5.2.3. Steps toward integrated planning

Several cities have made a move towards integrated approaches combining urban growth, green space planning and new governance approaches. A similar move towards integration of different policy domains can be seen in relation to climate change adaptation measures, which have reinforced green structure policies and planning. While climate change adaptation was more frequently mentioned as a driver for green space planning,

in Berlin, the shift and the push towards sustainable mobility (bicycles, pedestrians) was also considered an important opportunity for the development of green infrastructure. In Utrecht, the complex impacts of climate change and other multi-level issues encouraged systems thinking. The interviewee described that in the past, green space planning was focused on parks and peri-urban landscapes. More recently, there has been a more integrated approach of considering connectivity as well as provision of, and access to, green spaces at the neighbourhood level, especially in areas with people of lower socio-economic status. In Edinburgh, policies and guidelines have been developed that stress the importance of multifunctional green infrastructure with positive effects for biodiversity, including a new Local Development Policy on designing for biodiversity, which was under preparation. In Barcelona, environmental aspects have been increasingly integrated into urban planning, first in selected neighbourhoods, then increasingly across neighbourhoods and the city as a whole. Overall, the concept of ecosystem services or urban green infrastructure was mentioned more often as having promoted systems thinking and consideration of the multiple benefits provided by urban green spaces in Aarhus, Berlin, Edinburgh, Lisbon, and Utrecht.

Steps toward more integrated planning were associated with better horizontal coordination between sectors and vertical coordination between planning levels within the city, e.g. Aarhus, Barcelona, Helsinki, Linz, Malmo, and Utrecht. In Helsinki, changes in institutional culture have led to closer collaboration between authorities, while cooperation between municipal sectors has improved by combining different sectors into one unit. For Barcelona, stronger collaborations have been developed between planners, researchers and community groups. For Utrecht, more interdisciplinary cooperation was described and 'guilds' (gildes) were created to bring different sectors together, e.g. urban development and green space planning in new housing developments. In Linz, three departments were reorganized into one city planning department to improve internal communication and cooperation. Linz has also implemented two instruments to promote integrated urban planning in earlier phases where modifications can be made more easily: From 2019, the urban planning commission included internal and external experts (urban planners, architects, traffic planners, green space planners) and drafted planning objectives for complex urban development projects. In cooperative planning procedures, stakeholders such as investors, politicians, architects and neighbours were involved in urban development from the very beginning to discuss planning options.

Berlin was an example of a city where a reorganization of the administration has led to the separation of urban planning and green space planning departments, including a 'physical separation' of the department structure as some groups were located in different buildings. The interviewee felt that the cooperation between the two departments remained good due to the long-standing working relationships, but saw the risk of this deteriorating in the future, e.g. when the current staff would retire.

In Malmo, stronger integration of green space planning expertise in other departments increased workloads, while also contributing to new competencies. Respondents in Aarhus, Bristol, and Edinburgh saw scale-crossing initiatives as a way to enhance funding. Integrated planning in Utrecht has also enabled access to additional funding by linking up with programmes from other departments. In

Aarhus, external funding was increased by charging private developers and crowd-funding for afforestation co-financed by the municipality. Bristol was the only city that referred to scale-crossing planning at the regional level and mentioned the increased connectivity between regional policies as a driver for urban green infrastructure planning.

5.2.4. Participation: between tokenism and co-governance

Enhanced planning coordination across scales was linked with new governance approaches. The cities adopted a variety of governance approaches, varying between legally mandated citizen consultation in government-led planning and co-governance approaches. In Ljubljana, NGOs and citizen-led initiatives have formed mainly to oppose specific municipal policies or construction projects, but were usually not involved in co-governance arrangements. In other cities, such as Berlin, Helsinki, and Lisbon, respondents were also more often participating in government-led planning rather than in co-governance approaches. At the same time, it was noted that citizens demanded more information (i.e. in Lisbon on the felling of trees), or exerted increasing pressure on local governments to implement their policies (Barcelona). For Bristol, the interviewee described the tensions between an increasing demand for participation and struggles by local green space authorities in meeting these demands due to a lack of resources for time-consuming interactions.

Increased efforts to consult citizens often involved the use of digital participation tools. In Berlin, the participatory process for the 'Charta Urban Green Berlin' was considered a success with a high level of participation in online dialogues and at public information desks in parks and green spaces. In Helsinki, the first participatory budgeting was carried out in 2020. The respondent felt that the budgeting improved the possibility of citizens to propose ideas and participate, including involvement in green space planning and maintenance. A similar shift towards greater emphasis on participation was observed in Barcelona when it came to green space implementation. Overall, participation was less focused on informing (generic) policy-making and more on the development of individual projects.

Aarhus, Bristol, Edinburgh, and Utrecht stood out as cities aiming to scale up participation and support co – and self-governance. A strong shift in co-governance and participation was reported for Aarhus. Partly as a result of being both the European Capital of Culture (2017) and of Citizenship (2018), many citizen-led and co-creation projects and processes were initiated and there was increased political attention and awareness about participation, inclusion and citizenship as important elements of 'being a city'. A new sub-department has been created dealing with citizenship, cultural/organizational change and concrete process consulting on public participation in projects across departments. These efforts had significantly impacted how and how often the citizens sought to collaborate in local projects. In addition, 28 community councils were described as central in public participation and citizen-led initiatives.

In Utrecht, continued support for participation and citizen initiatives in green space governance was reflected in the city slogan 'Together we make Utrecht'. Neighbourhood green planning has been a feature of the cities' green space governance for more than a decade and ten neighbourhood green plans have been implemented. Recently, however, these neighbourhoods have suffered from significant budget cuts. Examples of co-

governance arrangements included a coordination group for management and maintenance of urban green space (MAGIE) involving organized environmental activist groups, which were well informed about their options to influence policies.

Co-governance in cities from the UK was mainly related to Friends of Park groups, who volunteer in park maintenance. In Bristol, the parks unit had invested time to better engage these groups. In Edinburgh, the collaboration with Friends of Park groups has become more in focus since 2014. For example, the Friends of the Little France Parkland group was considered as instrumental in the governance, maintenance and improvement of an extensive park area. The municipality aimed to support the group by taking on jobs that the Friends group could not take on.

6. Discussion

In the following, innovation, exnovation, co-governance, and social justice are used as lenses to describe the contribution of changes observed in the eleven cities to sustainability transformations.

Many of the changes perceived as beneficial for green space planning were incremental and others were considered ambiguous in terms of their outcome, suggesting that at this time, these championing cases of sustainable urban development in Europe cannot be classified as radical urban transformations. The respondents reported several incremental advancements in areas that are notoriously difficult for green space planning such as occasions when other urban issues and competing spatial claims received priority over green spaces. A lack of local political support and resources was another frequently mentioned difficulty (Boulton et al. 2020; Davies and Lafortezza 2019). At the same time, improvements, such as higher resource availability, did not resolve concerns for long-term maintenance. The respondents experienced that the integration with other urban planning units brought more influence, new competencies and resources for green space planning. However, it has also led to trade-offs, such as increased workload or a lowered degree of strategic green space planning (Randrup et al. 2021).

Even the Covid-19 pandemic, a disruptive event which was considered to improve awareness for the value of urban green spaces, only resulted in short-term change, i.e. the acceleration of plan implementation, in one city.[2] The fact that the cities struggled to initiate transformations and use windows of opportunity in a short time-frame illustrates the powerful influence of structural conditions and path-dependencies in formalized systems such as public administrations (Dorst et al. 2022; Malekpour, Brown, and Haan 2015).

6.1. Innovations with new policies and systems thinking

Several examples showed how sustainability challenges, such as adaptation to climate change, biodiversity conservation, and urban densification, have inspired new planning strategies and offered windows of opportunity for transformative change. These new strategic planning tools and regulations represent innovations that have been successfully anchored in the cities, on the one hand. The fact that emerging sustainability challenges were addressed in new planning strategies might, on the other hand, also indicate inflexibility of established green space planning instruments, which have a focus on traditional

sectoral themes such as recreation, accessibility, and human usability of green spaces (Nordh and Olafsson 2020).

The new and potentially innovative planning strategies in the cities respond to complex systemic and scale-crossing sustainability issues. A turn towards systems thinking has been mentioned in some cities and is considered an important element of transformation capacity in the literature (Rauschmayer, Bauler, and Schäpke 2015). In this context, the concept of ecosystem services seems to be considered as supporting a more complex and integrated perspective on urban greening (Nordin, Hanson, and Alkan Olsson 2017). In other cases, the notion of systems was invoked to emphasize green spaces as a network, i.e. green infrastructure with multiple social and ecological functions. Embedding these concepts can be considered a policy innovation.

6.2. Exnovation by overcoming silos and organizational routines

Only few of the observed interventions qualified as deliberate exnovation, i.e. breaking established structures or path-dependencies. The new administrative unit for participation and cultural change in Aarhus was the most explicit case. This unit aimed to transform organizational routines and perspectives step by step, which can be regarded as change management. Organizational changes in other cities may be described as a path to exnovation of siloed administrations. These included more cooperation of green space units with urban planning, water and transport units, partly supported by new administrative structures. Overcoming the barrier of silos is seen as crucial for dealing with complex, cross-cutting issues such as climate change (Moser et al. 2019; Sussams, Sheate, and Eales 2015). Systemic challenges such as climate change adaptation or biodiversity protection supported the development of these new administrative units. New policies related to these challenges encouraged public and private stakeholders to share responsibilities or established new biodiversity-friendly green space management, activities that require exnovation of previous routines and practices.

6.3. Between consultation and co-governance of urban green spaces

We observed an increase of investment in participation and co-governance by the municipalities. Cities that already had a strong focus on co-governance, such as Aarhus, Bristol, Edinburgh, and Utrecht, deepened their collaborations with citizen-led and co-creation projects and processes. Other cities also invested in new participatory processes, such as participatory budgeting. However, the potential of participation and co-governance still seems underutilized, focussing mainly on lower tiers of citizen engagement, i.e. information and consultation. This could be partly due to a continuing lack of municipal capacity as well as a lack of organizational flexibility and support to facilitate citizen involvement, as shown in other cases (Wamsler et al. 2020).

In the cities that supported co-creation, this topic had been embedded in high-level city policies. These efforts were considered to have changed the perspectives and actions of citizens and city administrators and represented major steps towards co-governance. For the other cities, there is potential to become more engaged in co-governance and create opportunities for stakeholder networks and new partnerships, i.e. mosaic governance (Buijs et al. 2016).

The perceived increase in non-governmental groups interested in green spaces can be regarded as a positive signal for co-governance. Citizen groups might want to accelerate transformations but need support from municipalities or private investors (Buijs et al. 2019; Kronenberg, Bergier, and Maliszewska 2017; van der Jagt et al. 2021). Sharing power and resources between public administration and citizen groups can induce transformative experiments (Dignum et al. 2020; Frantzeskaki 2019).

6.4. Social justice as an underrepresented dimension

Even though awareness for social issues in the context of green spaces increased in the investigated cities, specific planning approaches or actions have been rare, i.e. focused on underprivileged districts. Even in the one case where new city policies focus on social cohesion and equality, these goals had not yet been taken up in green space planning, partly due to resource limitations. Compared to the wide range of planning responses dealing with ecological issues this lack of consideration of social issues in spatial planning is a considerable disparity.

Research has suggested ways to address social justice, ranging from dealing with power struggles to investing in green infrastructure in urban areas with the most vulnerable groups without fostering gentrification (Anguelovski, Connolly, and Brand 2018; Baró et al. 2019; Langemeyer et al. 2020; van der Jagt et al. 2021). Recent research also indicated that due to the complexity of urban greening and its impact on different stakeholders, contested perceptions need to be addressed (Kronenberg et al. 2021). While our respondents flagged some improvements in this respect, considerable work remains to be done, even when their approaches were otherwise pioneering.

7. Conclusion

Our longitudinal study of urban green space planning in eleven European cities provided a unique opportunity to analyse perceived changes in planning and governance in a period of increasing high-level policy support and public awareness for the benefits of urban green spaces and co-governance, combined with pressures to address social and ecological issues. It is promising to see greater attention for urban green space, also in relation to major societal challenges. Several cities are making progress in overcoming well-known path-dependencies, such as working in policy silos, and are co-creating green infrastructure with businesses and civil society. Meanwhile, other challenges remain, including long-term maintenance, securing sufficient funding and changing organizational culture towards joint decision-making and partnerships with non-governmental stakeholders. Furthermore, some challenges are poorly recognized, such as accounting for cultural diversity in green space planning and other aspects of social justice.

The examples of deliberate transformative change were implemented at high levels of local policy-making, for example by introducing new policies and organizational cultures for co-governance. In addition, several instances indicate the potential of observed incremental changes for future substantial transformations, such as interest of citizen groups to become engaged in green space governance, systems thinking, more integrated planning, and overcoming siloed approaches. The findings confirm the common challenges

faced by complex and formalized institutions, such as public administrations, in the context of transformations. Transformations are complex, and support is needed in, for example, change management and training on integrating social aspects in technical planning. Fundamentally, however, it is an issue of limited resource availability and staff capacities, which are caused by system-level structural conditions beyond the control of green space administrations or even municipalities. Policy frameworks are needed at multiple scales, which support nature-based innovation and the mainstreaming of, for example, new partnerships or new ways of horizontal and vertical planning integration that allow addressing complex planning issues. Incentives for the identification and exnovation of 'lock-in' practices are needed, i.e. by political or administrative leadership. Ecological challenges should be considered in concert with social issues, moving social and environmental justice to the heart of green space planning. New planning and governance approaches should jointly address societal challenges, from climate change to biodiversity loss, public health and justice, to overcome the shortcomings of technocratic solutions and avoid unintended and unjust planning outcomes.

The cases from this longitudinal study provide relevant practices that may contribute to urban transformation. Future research nonetheless needs to keep exploring new pathways that integrate urban green space planning and governance for urban sustainability transformations. Our study is based on the views of selected experts who were embedded in the administration of the case study cities. From their leading position, they might be either preservers of the status quo or proactive agents of change in their cities. Future research should elucidate their role and also integrate perspectives of additional urban stakeholders. In particular, groups of active citizens have shown their ability to exert pressure on official decision-makers and to act as effective agents of change. Including the diversity of urban stakeholders in research on green space governance would contribute to a better understanding of the complexity and multiple dimensions of urban transformations and could reveal potential for less piecemeal, more transformative approaches.

Notes

1. In this area, two research strands are present: one on transitions and another on transformations. Both concepts have nuanced differences but are also frequently used as synonyms. Both refer to radical, non-linear and structural change as discussed by Hölscher, Frantzeskaki, and Loorbach (2019). For the sake of consistency, we will use 'transformation', even when the original used 'transition'.
2. It should be noted that several of the interviews took place during the first year of the pandemic and that some cities have since implemented measures such as temporary or permanent bike paths or closing of streets.

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