Editorial

Greening Cities, Shaping Cities: Pinpointing Nature-Based Solutions in Cities between Shared Governance and Citizen Participation

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The topic of pinpointing Nature-Based Solutions (NBS) in the urban context has been cultivating interests lately from different scholars, urban planning practitioners and policymakers. This Special Issue originates from the Greening Cities Shaping Cities Symposium held at the Politecnico di Milano (12–13 October 2020), aiming at bridging the gap between the science and practice of implementing NBS in the built environment [1], as well as highlighting the importance of citizen participation in shared governance and policy making. The Special Issue was also made open to other contributions from outside the symposium in order to allow for contributions from a major scientific and practical audience wherever possible. Indeed, we have gathered contributions from Italy, Germany, the Netherlands, Turkey, Brazil, Portugal, Denmark, France, Bulgaria, Sweden, Hungary, Spain, the UAE, the UK, and the USA.

In particular, a specific focus in this Special Issue is given to investigations on how NBS and urban greening strategies are re-shaping the built environment and the whole imagery of cities, both from a spatial and a governance perspective [2,3]. The intended result is a set of contributions providing insights and food for thought to urban debates on design and planning theory, policy and practice around NBS. Nowadays, cities are making use of nature as a solution to many challenges, without radically and critically addressing the full potential of interpreting green planning as a powerful urban design instrument and governance feature [4]. For instance, how will vegetation infilling strategies affect planners’ toolkits and decision-making procedures? How can we get citizens involved in the design and management process around NBS?

Hence, within this Special Issue, an attentive selection of contributions mainly looked at addressing the procedural gaps in greening city strategies that are nowadays at the forefront of re-shaping many urban fabrics, specifically by investigating governance and citizen participation.

A strong emphasis on the viability NBS for implementation often encounters hindrances on the governance scale and lacks a strong functional governance model in order to “make it work”. A big tranche of this pitfall is due to the lack of capacities and communication between municipal departments, as well as the need to raise awareness on how NBS operate on a day-to-day activity. Hence, the capacity building and awareness activities result as one major need in cities’ decision-making processes to make the implementation of NBS more inclusive and their management shared among more stakeholders within a sustainable urban planning approach [5].
NBS are living and dynamic systems and require specific attention in design and maintenance. Hence, the engagement and the active role of citizens is crucial [6]. One important aspect of innovation in NBS implementation nowadays is its inclusivity and its relatedness to citizen-centred approaches for implementation in Urban Living Labs (ULLs). The notion is that ULLs allow a flexible structural pathway and include a variety of sleeve tools to bring everyone on board [7]. Lessons in this section would mainly address successful case studies from physical or digital ULLs experiences in implementing NBS in urban regeneration processes.

Lastly, some of the Special Issue’s contributions also address whether the embeddedness of NBS in cities tangibly affects urban morphologies and radically impacts our approach to urban planning, urban design strategies and, consequently, urban governance models [8]. Integrating nature-based greening plans and NBS seems to be happening more and more frequently in city strategic planning and city visions; however, a deep recognition of the role of greening in shaping the overall imagery of cities and renovating the role of green planning as a quintessential element of design and planning seems to be lacking a deeper and conscious debate.

In sum, in this Special Issue, we aimed to touch base on many aspects related to NBS conceptualization, public acceptance, implementation and upscaling in cities. The finality of our exploration is to find clues towards a critical understanding and interpretation of how greening cities is affecting urban shaping, both from morphological and governance point of views. Other related questions on biodiversity and citizens engagement [9] or more technical ones on climate change mitigation and adaptation using remote sensing methods and GIS were not alluring to the authors of this Special Issue; however, they remain a starting point for further scientific investigations.

Article 1: From Nature-Based to Nature-Driven: Landscape First for the Design of Moeder Zernike in Groningen.

In this first article, Roggema gives a fresh perspective on climate change adaptation using a nature-driven approach [10]. He methodologically applies a research-through-design process on a case study, namely, “Moeder Zernike campus in Groningen, Netherlands”. Roggema integrates food systems, coastal and water shortage dynamics as well as urban agriculture in one visionary future plan for the area using NBS. This research article looks at the tensions between short-term practices, adaptive climate change management relying only on data availability and, lastly, on a longer-term view working towards the unknown impact of future climate change. the main takeaway from this article is how embracing a nature-driven perspective to urban design increases the adaptive capacity, the ecological diversity and the range of healthy food grown on a university campus using a co-creative design-led approach as a way to take nature as the basis for urban transformation.

Article 2: Stakeholder Participation in the Planning and Design of Nature-Based Solutions. Insights from CLEVER Cities Project in Hamburg.

Arlati et al. [11] present reflections on the co-creation practices of NBS deployed in the frame of the Horizon 2020 project CLEVER Cities by analyzing and discussing the case study of Hamburg, Germany. The focus of the article is based on an analysis of the stakeholder engagement methods called to collaborate in the environment of Urban Living Labs (ULLs) for the co-creation of NBS and the role those stakeholders played along the process. The potential of NBS to foster participation and support sustainability transitions was recognized in the Hamburg case study under the circumstances granted by the Horizon 2020 Programme. The paper argues that the current governance mechanisms should undergo structural changes in order to allow a broader collaboration and steer the transition process.

Article 3: Valuing the Invaluable(?)—A Framework to Facilitate Stakeholder Engagement in the Planning of Nature-Based Solutions.

In this article, Mok et al. [12] present and discuss the logic of a framework aiming at facilitating stakeholder engagement in the planning of NBS from the project UNaLab—a Horizon 2020 Research and Innovation Action. They exploit the challenges and trade-offs
in approaches of NBS valuation with the goal of identifying key values and engaging beneficiaries from the public, private and civil society sectors in the development of NBS. Applied methods such as focus groups, interviews and surveys were used to assess different framework components and their interlinkages, as well as to test their applicability in urban planning. The authors develop a case for ‘softer’ approaches to NBS value assessment tools in order to encourage awareness-raising, stakeholder engagement and mobilize local actors around NBS to complement ‘harder’ valuation mechanisms. Through a survey with experts from the projects and several workshops, authors further developed their framework based on providing a structured approach, which can be used in multiple contexts to facilitate navigation through the complexity of a common understanding between actors from different backgrounds and thus support the formation of new alliances for NBS planning and implementation.

Article 4: Exploring Challenges and Opportunities of Biophilic Urban Design: Evidence from Research and Experimentation.

Andreucci et al. [13] explore how the benefits of nature are understood for different environments and multiple scales, ranging from a building (e.g., workplace) to the neighborhood (e.g., arts and conference complex) and up to the citywide scale. For this aim, the authors embrace biophilic design theory and make a case for the importance of deepening the understanding and application of this approach, which is often considered of secondary priority. The multi-scale examples of NBS implemented in both London and Chicago and articulated in the article reinforce the importance of a systems-thinking approach, as the authors also infer in the conclusions. Diverse are the perceptions, experiences and feelings that people may develop while interacting with NBS while in the Shard or at the Barbican; however, they are both components of the same city, in which people accomplish their micro-mundane routines and co-exist in different ways.

Article 5: Evaluating the Relationship between Park Features and Eco therapeutic Environment: A Comparative Study of Two Parks in Istanbul, Beylikdüzü.

Kara and Oruç [14] address the therapeutical benefits of (re-)establishing a connection with nature, especially in the urban environment. Informed by a literature review on eco-psychology and eco-therapy, as well as a case study carried out in a district of Istanbul, the authors explore how the physical attributes of the space affect the user experience of being in a park, the connection to nature and therefore the therapeutic benefits deriving from this. The results suggest that the experience of and connectedness to nature is complex, with several factors and determinants, as it may be sensible to expect for some. In our view, the main takeaway from the study is the importance of adopting a user-centered approach to landscape designing and policy making in order to unleash the potential psychological benefits that NBS can provide. This reflection may encourage stakeholders to reflect on how ready and equipped they are for this approach to be operationalized.

Article 6: Parque Augusta (São Paulo/Brazil): From the Struggles of a Social Movement to Its Appropriation in the Real Estate Market and the Right to Nature in the City.

In his article, Baumgartner [15] reports on the narratives of the implementation from Parque Augusta in the center of São Paulo, Brazil. After years of struggle with the city and the real estate developers carried out by an organized social movement and citizens to avoid building speculation on a precious green space, the collaborative co-design of an urban park, enriched by green solutions (NBS), has followed. However, during the park’s construction, the pressure of the properties surrounded by high-density buildings and the reduction in the implementation of the previously agreed-on green solutions opened reflections on urban greening processes, on appropriation dynamics of green areas and on the right to nature in the city. The natural elements play a key role and represent a powerful medium in activating citizens in safeguarding and enhancing left-over spaces in cities. The article proves how such an experience can inform local governments in deploying such civil society engagement around nature, to improve democracy and support decision-making processes and the planning of a city’s green space system.
Article 7: Nature-Based Solutions for Storm Water Management—Creation of a Green Infrastructure Suitability Map as a Tool for Land-Use Planning at the Municipal Level in the Province of Monza-Brianza (Italy).

Senes et al. [16] develop a methodology to define Green Infrastructure for stormwater management at the municipal level, with an application in the Province of Monza-Brianza, Italy. NBS diffused in the city, in combination with the sewer infrastructure, will help see improvements arising from reductions in stormwater quantity and reduced sewage overflows. The goal of this study is to support cities in setting up Green Infrastructure Suitability Maps as a tool for land-use planning. Hence, aiming at identifying non-urbanized areas where rainwater can potentially infiltrate, considering also site-specific soil characteristics, the proposed methodology is defined based on three phases, namely: the definition of the territorial information needed, the production of base maps and the production of a Suitability Map. The authors demonstrate how the spatial mapping of NBS proves to be an effective tool to support the decision-making process for spatial planning.

Article 8: Is Agent-Based Simulation a Valid Tool for Studying the Impact of Nature-Based Solutions on Local Economy? A Case Study of Four European Cities.

Koppelaar et al. [17] describe an agent-based model which reveals the potential inter-connection between the assessment of the wealth of the commercial urban fabric and the development of wide NBS (e.g., parks). The reflections are drawn from longitudinal case studies in three different countries. Despite the limitations of the work finely acknowledged in their discussion, the authors make the case for the added value of the model, which supports the decision-making process of urban developments by calculating the indirect financial benefit of implementing NBS. The article may also raise reflections for the reader about the wider system of places and practices that the NBS belong to and should be considered with in order to assess and foster the benefits associated to them.

Article 9: Multi-Level Perspective on Sustainability Transition towards Nature-Based Solutions and Co-Creation in Urban Planning of Belgrade, Serbia.

With this paper, Mićić-Radulović and Lalović [18] explore the challenge of achieving clear, coherent and ambitious urban greening strategies embedded in urban planning and developed in a co-creative, participatory and inclusive manner within the European context. The work, using the Multi-Level Perspective (MLP) on sustainability transitions, observes the urban planning system in Belgrade, Serbia, as a socio-technical regime with a focus on two recent urban development initiatives in Belgrade, the Capital of Serbia, as the specific context of analysis. In particular, the article examines informal urban planning instruments that can be implemented by the practitioners of niche innovations to engage constructively and appropriately in co-creation, supporting urban planners and NBS advocates in the Serbian and EU enlargement context.

Article 10: Setting the Social Monitoring Framework for Nature-Based Solutions Impact: Methodological Approach and Pre-Greening Measurements in the Case Study from CLEVER Cities Milan.

In this article, Mahmoud et al. [19] set a new methodological approach for monitoring the social impacts of NBS on human health and wellbeing, social cohesion and environmental justice, as well as citizens’ perception about safety and security related to the NBS implementation process. Their methodological approach relies on a co-creation process using several steps of scoping and gathering information based on the case study of the Milanese context from CLEVER Cities Horizon 2020 project. The authors examined the relevance of using NBS in addressing social co-benefits by analyzing data from questionnaires submitted to citizens and participants of activities during pre-greening interventions against a set of five major indicators: (1) place, use of space and relationship with nature; (2) perceived ownership and sense of belonging; (3) psychosocial issues, social interactions and social cohesion; (4) citizen perception about safety and security; and lastly, (5) knowledge about CLEVER interventions and NBS benefits in relation to the socio-demographics of the questionnaires’ respondents. Lastly, the results are cross-compared within the three areas of interventions of the project Urban Living Labs (so called CLEVER Action Labs).
The article hence pinpoints the importance of co-producing social monitoring methods with citizens to set the boundaries for NBS place-based interventions and accentuate citizens' perceptions about their wellbeing, general health and strong sense of neighborhood belonging. A wider interest is noted towards civic participation in co-management and becoming informed about NBS interventions in the Milanese context.

**Article 11: Municipal Practices for Integrated Planning of Nature-Based Solutions in Urban Development in the Stockholm Region.**

Brokking, Mörtberg and Balfors [20] explore how NBS are addressed in urban development processes. The authors propose a study of municipal planning practices related to NBS and their contribution to regional green infrastructures and social and ecological qualities. They run their analysis on three case studies in the Stockholm region of Sweden. They run a mixed method approach using focus groups, interviews and through the study of official documents. The results of their study highlight that, while the institutional conditions play a fundamental role in shaping the planning processes that can challenge the ability to enhance social and ecological qualities, the planning and the design of urban green spaces play a key role in the engagement of the communities. Co-creation sessions are fundamental for the development of specific competences for the development of innovative solutions on private and public green areas. Despite the differences between the different case studies, the paper concludes that a knowledge-driven and integrative planning process can foster the potential of NBS for green and sustainable cities.

**Article 12: Green and Compact: A Spatial Planning Model for Knowledge-Based Urban Development in Peri-Urban Areas.**

Sanches, Lemes de Oliveira and Celani [21] define a multi-scalar spatial planning model for peri-urban areas and urban voids able to reconcile medium-to-high building densities with the provision of ecosystem services. They employ a three-scale spatial planning model: micro, meso and macro. Subsequently, the model is applied to the case of the International Hub for Sustainable Development (HIDS) in Campinas, Brazil. An urban design proposal was developed during an international workshop in July 2020 and was secondly completed with experts' workshops and planning professionals. Lastly, in 2021, the model was evaluated and validated through a series of workshops looking at evidence-based solutions and the evaluation of their results in real-time. This research puts a mark on the practical application of modelling in design exercises towards reducing the gap between theory and practice, which is beneficial to the approach of NBS.

**Article 13: Guidelines for Citizen Engagement and the Co-Creation of Nature-Based Solutions: Living Knowledge in the URBiNAT Project.**

Nunes, Björner and Hilding-Hamann [22] focus on citizens’ participation within the context of urban regeneration projects. Their work aims to develop specific guidelines for the development of co-creation of NBS. The work was developed within the framework of the Horizon 2020 project URBiNAT that focuses on the regeneration of underserved urban districts. The article describes the processes followed within such a project: the collection of scientific and practical input from both researchers and practitioners first, followed by a deeper analysis of selected participants. The results highlight what the authors described as an ‘ecology of knowledges’ based on a ‘living’ framework, addressing the needs of a broad set of citizens and contexts. The paper includes a discussion on the implementation of co-creation practices in the development of NBS. The conclusions broaden the research context to include the refinement of the NBS approach, with participation being seen as both a means and an end to it.

**Article 14: How Do Nature-Based Solutions’ Color Tones Influence People’s Emotional Reaction? An Assessment via Virtual and Augmented Reality in a Participatory Process.**

Piga et al. [23] examine the effects of NBS on people’s emotions, focusing on the reliability of Augmented Reality (AR) and Virtual Reality (VR) simulations as means for engaging citizens in participatory processes. Their case studies explore the reaction to existing and designed NBS, showing that some color tones of NBS, namely green and lime, reduce the unpleasantness experienced while viewing the urban environment. Such effect
is confirmed both in AR and VR, suggesting that increasing urban greener can have a positive effect. The results of VR are fully consistent with the previous literature, whereas in AR, some variables show a different pattern. The authors suggest that available digital tools are a valuable support for envisioning sustainable urban transformations with diverse stakeholders, although further interdisciplinary studies are needed to tackle the technical and ethical implications of such technologies.

**Article 15: The Improvement of User Satisfaction for Two Urban Parks in 2 Dubai, UAE: Bay Avenue Park and Al Ittihad Park.**

Jung et al. [24] develop a conventional user satisfaction method and questionnaires for analyzing users’ satisfaction in two urban parks in Dubai, Bay Avenue Park and Al Ittihad Park. The authors, using a comparative analysis, expose different park users’ behavior, satisfaction level (based on park environment and accessibility) and users’ demographic information. Following a descriptive statistics and frequency method, the authors perform a multiple regression analysis to better understand the physical environment factors affecting each of the two parks’ satisfaction level. Both parks, being the green structures of neighborhoods and located within walking distances of residential areas, prove to be highly satisfying, in particular thanks to the presence of natural elements such as green spaces, trees and trails. This research can be used as basic data for improving the future planning of urban parks in Dubai, towards a more greening approach to urban planning, including governmental policy, vision and implementation. This could be possible in the future by conducting research on more diverse types of parks, other greening strategies and detailing accessibility-related environmental factors, such as health, community wellbeing and other physical characteristics, such as the width of sidewalks and types of pavement materials.

**Review Article 16: Green(er) Cities and Their Citizens: Insights from the Participatory Budget of Lisbon.**

In this article, Falanga, Verheij and Bina [25] examine the role of the Participatory Budget (PB) as a potential driver of urban sustainability. The experience of Lisbon, in Portugal, a city recognized internationally as a leader in participatory budgeting the early 2000s, is analyzed and discussed. The authors propose a multimethod approach in the analysis of data on PB calls in Lisbon, investigating emerging trends and variations in citizen proposals, projects, votes and public funding. Emerging key topics show links and trade-offs between locally embedded participation and the international discourse on urban sustainability. A growing interest of project proposals focusing on NBS, involving citizens and businesses, is emerging. Thoroughly analyzing PB data as an expression of citizens’ interests and priorities is key to enabling cities to better integrate them into urban planning strategies and—as argued by the authors—to counteract the dominant engineered approach towards sustainability, mainly focused on green growth and innovation.

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Sustainability 2021, 13, 2368. [CrossRef]
15. Baumgartner, W.H. Parque Augusta (São Paulo/Brazil): From the Struggles of a Social Movement to Its Appropriation in the Real Estate Market and the Right to Nature in the City. Sustainability 2021, 13, 5150. [CrossRef]
16. Senes, G.; Ferrario, P.S.; Cironi, G.; Fumagalli, N.; Frattini, P.; Sacchi, G.; Valé, G. Nature-Based Solutions for Storm Water Management—Creation of a Green Infrastructure Suitability Map as a Tool for Land-Use Planning at the Municipal Level in the Province of Monza-Brianza (Italy). Front. Sustain. Cities 2021, 13, 6124. [CrossRef]
17. Koppelaar, R.; Marvuglia, A.; Havinga, L.; Brajković, J.; Rugani, B. Is Agent-Based Simulation a Valid Tool for Studying the Impact of Nature-Based Solutions on Local Economy? A Case Study of Four European Cities. Sustainability 2021, 13, 7466. [CrossRef]
18. Mitić-Radulović, A.; Lalović, K. Multi-Level Perspective on Sustainability Transition towards Nature-Based Solutions and Co-Creation in Urban Planning of Belgrade, Serbia. Sustainability 2021, 13, 7576. [CrossRef]
19. Mahmoud, I.H.; Morello, E.; Vona, C.; Benciolini, M.; Sejdullahu, I.; Pascual, K.H. Setting the Social Monitoring Framework for Nature-Based Solutions: Seventeen Cases from Germany. Ambio 2021, 50, 1610–1627. [CrossRef] [PubMed]
20. Jung, C.; Al Qassimi, N.; Arar, M.; Awad, J. The Improvement of User Satisfaction for Two Urban Parks in Dubai, UAE: Bay Avenue Park and Al Ittihad Park. Sustainability 2022, 14, 3460. [CrossRef]
21. Sanches, P.; Lemes de Oliveira, F.; Celani, G. Green and Compact: A Spatial Planning Model for Knowledge-Based Urban Development in peri-Urban Areas. Sustainability 2021, 13, 13365. [CrossRef]
22. Nunes, N.; Björner, E.; Hilding-Hamann, K.E. Guidelines for Citizen Engagement and the Co-Creation of Nature-Based Solutions: Living Knowledge in the URBiNAT Project. Sustainability 2021, 13, 13378. [CrossRef]
23. Piga, B.E.A.; Stancato, G.; Rainisio, N.; Boffi, M. How Do Nature-Based Solutions’ Color Tones Influence People’s Emotional Reaction? An Assessment via Virtual and Augmented Reality in a Participatory Process. Sustainability 2021, 13, 13388. [CrossRef]
24. Falanga, R.; Verheij, J.; Bina, O. Green(Er) Cities and Their Citizens: Insights from the Participatory Budget of Lisbon. Sustainability 2021, 13, 8243. [CrossRef]