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Fabiano Lemes de Oliveira • Davide Geneletti
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Nature-based Solutions for Sustainable Urban Planning

Greening Cities, Shaping Cities

Springer

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For nature-based solutions, researchers, academics, and practitioners.
This book is for you.

-Israa, Eugenio, Fabiano, and Davide.

Foreword

This book discusses the hiccups of current urban planning practices for the delivery of nature-based solutions, such as the lack of alignment between the approaches to solve environmental and socio-economic urban challenges, siloed decision-making, and uncoordinated urban land-use dynamics, revealing the current barriers for NBS upscaling and impact assessment. The book gives insights on spatial planning approaches related to different NBS typologies considering various scales. Taking the reader through case studies, the authors reflect on land-use cover and space availability challenges for NBS implementation, providing insights on analytical methods such as quantitative performance criteria, impact assessment frameworks and monitoring software to foster NBS integration into the urban planning practice. Finally, the reader has the opportunity to dive into a set of cases highlighting collaborative governance experiences and experimental decision-making processes for NBS planning. It is a must-read for anyone who is interested in understanding and overcoming the current barriers and creating new opportunities and pathways to effectively mainstream NBS in urban planning practice and policies.

Senior Officer for Nature-Based Solutions and Biodiversity Daniela Rizzi
ICLEI Europe,
Freiburg, Germany

Preface

This edited book originates from the fruitful discussions during the Greening Cities Shaping Cities international research symposium[1] held in Milan, Italy, on October 12 and 13, 2020. In this collection of chapters, we deal with two important aspects of nature-based solutions (NBS) assessment and implementation in urban planning policies: (1) spatial challenges of NBS in practice and mainstreaming NBS in urban planning policies and decision-making processes; (2) shared governance, capacity building, and citizen engagement in urban greening processes and co-design experiences of NBS. We divided the book in two parts that collectively give results on spatial planning and case studies of NBS.

Research Context

When we launched the open call for the Greening Cities Shaping Cities symposium (hereafter GCSC), the aim was to address the following question: **How are urban greening strategies, policies, and measures re-shaping cities?** Here, "shaping" is intended in terms of (1) physical layout and urban morphology, and (2) governance approaches and practices within urban policies.

Answers to this question were provided from a range of disciplines (e.g., urban and environmental planning, urban design, architecture, and ecology), as well as from interdisciplinary research, which present an updated overview over a complex up-running process on the integration of greening solutions into the urban landscape. Recent experiences in practice (city wide and community-scale) and new scientific methods and approaches are discussed here.

In particular, after the European Commission launched the call in 2015 for promoting the concept of NBS in strict connection with inclusivity and shared governance approaches, we can now collect and show some ongoing results,

[1] https://www.greeningcities-shapingcities.polimi.it/

especially through the numerous Horizon 2020 projects that have been funded under this stream and whose seeds are bearing fruit. This volume includes results from some of these projects, in particular **URBINAT, Nature4cities, and CLEVER Cities,** the latter is the co-promoter and co-founder of the GCSC initiative together with Department of Architecture and Urban Studies (DAStU) Politecnico di Milano, Milan, Italy. The book also broadened out its scope and reach by including other scientific contributions from scholars working on other NBS projects worldwide.

In this book, we present a critical perspective of recent achievements and challenges related to urban planning and implementing NBS in cities, as well as a discussion on future directions in this field. In addition, the book showcases examples on how the NBS can be implemented in theory and practice to promote sustainable urban planning.

The book is structured into two parts, as illustrated below.

Part I

Planning NBS in Cities: Insights and Methods on Spatial Challenges

In this part, we tackle the spatial challenges related to NBS impact analysis and methods related to assessment of NBS potential in cities at different spatial scales. Since NBS have different typologies and spatial scales of implementation, this part addresses the questions of NBS types, physical and land-use change related to NBS implementation in practice. How are the greening cities strategies tangibly affecting urban morphologies and shaping our cities today? How consciously are cities addressing and envisioning the outcomes of greening measures?

The first subsection looks specifically to how we tackle the urban greening strategies related to physical and urban design of NBS, land-use cover, and land-use availability. Those greening strategies when put in place are strongly tied to urban and regional (macro and micro) spatial scales of implementation; nonetheless, the practice hand side emphasizes the lack of coordination between land-use planning and pressuring environmental planning strategies. This gap is often addressed in climate risk planning adaptation and mitigation measures for future scenarios but deficient on the urban planning resilience planning measures due to authorities' silos and mismatching urban governance mechanisms.

Chapter 1, by Frantzeskaki, Mahmoud and Morello, reflects on cities challenges, opportunities, and capacities to implement NBS based on the resilience discourse that arose on how the greening cities actions are influencing the urban planning policies and shaping cities by consequences.

Chapter 2, by Geneletti et al., presents a performance-based planning approach to mainstream nature-based solutions in cities through the analysis of ecosystem

services supply and demand. The approach is applied to the city of Trento (Italy), by simulating the implementation of a set of urban transformations included in the current Urban Plan.

The following subsection introduces case studies that have proven a possibility to assess performance-based planning approaches to integrate NBS into planning policies (by using quantitative performance criteria, impact assessment, authorization into building codes, etc.); moreover, we dive into the relationship between NBS impact on human comfort and climate resilience through analytical tools and software.

Chapter 3, by Ronchi and Salata, investigate the case of Settimo Milanese (Metropolitan area of Turin, Piedmont region, Northwest Italy) by testing a methodology for selecting urban green spaces with high performance in terms of biodiversity conservation, which can be involved in a Green Infrastructure (GI) strategy as a multifunctional structure that combines different Ecosystem Services (ES).

Chapter 4, by Lemes de Oliveira et al., present a framework for the identification of challenges, and the planning and implementation of NBS considering the complexities of environment-culture-technology nexus in cities from the developing world, in particular Brazil.

Part II

Implementing NBS in Cities: Case-Study Applications

In this part, we present case studies from different urban settings, which deal with local regeneration processes that changed cities' physical organization and enhancement of biodiversity, meanwhile looking at implementing NBS through performance-based planning instead of policy-based planning on the long term.

The first subsection focuses on answering the following questions: What are the hindrances and bottlenecks in implementing, maintaining, and up-scaling NBS in real-life cases implementation? Are the current decision-making mechanisms helping NBS getting in route to shape cities? Is there any binding policy in practice that promotes NBS?

Chapter 5, by Canto Moniz et al., report the experience from URBiNAT project by promoting an inclusive urban regeneration that includes citizens and stakeholders in all the stages of the co-creation process. The several living labs of the seven URBiNAT cities share their knowledge through a Community of Practice that is in dialogue with the cities and the wider world. Altogether, they aim to implement a cluster of NBS that are also human centered in order to constitute a Healthy Corridor that not only impacts the environment but also the well-being of the community.

Chapter 6, by Peluchetti et al., analyze the main barriers and opportunities for the exploitation of innovative green solutions from the experience of Nature4Cities project. Through a case study in Milan, a framework of NBS effectiveness

assessment approach is presented, as well as an analysis of the main stakeholders involved in the process to evaluate the main barriers.

In the second subsection, we look at how the pressing climate change challenges led cities, local governments, and urban alliances to work cooperatively to reduce the environmental risk and downscale the temperature increase effects. The chapters show that NBS still lack a binding policy to be majorly advanced in urban contexts mainstreaming. Furthermore, experimental decision-making mechanisms in cities paved the way to think on multilayered-stakeholder types and levels; we investigate whether this multiplicity helped the implementation pathway to spread out from small NBS actions towards wider urban-scale interventions in cities.

Chapter 7, by Neves et al., look at the NBS implementation in the Metropolitan Region of Campinas (São Paulo, Brazil). This chapter describes how the Municipality of Campinas and the 19 cities from its highly urbanized and industrialized regions have articulated the RECONECTA-RMC program, proposing a connectivity area that conjoins environmentally relevant areas of the region with the goal to protect fauna and flora, building environmental resilience and genetic flow between green areas.

Chapter 8, by Hosseinalizadeh, Mahmoud, and Morello, look at the experience of post-evaluation of an NBS case study by analyzing the safety and security perception in Biblioteca degli Alberi (BAM – Library of Trees) Park in Milan, Italy. The chapter is also situated as an actual case study that reflects on urban design elements that help NBS such as the BAM to thrive with relationship to socio-economic conditions and local community engagement.

Milan, Italy Israa H. Mahmoud

Milan, Italy Eugenio Morello

Milan, Italy Fabiano Lemes de Oliveira

Trento, Italy Davide Geneletti

About This Book and Outlook

From this book experience, numerous challenges on NBS planning, implementation, and subsequent stewardship were identified:

1. The **positioning of NBS** in relation to other concepts, such as Green and Blue Infrastructure (GBI), Ecosystem Services (ES) and Ecosystem-based Adaptation (EbA). We are used to follow trends, embed concepts that might appear as buzz words, if inappropriately used. Hence, a deeper critical understanding and examination of these concepts and mutual relationships and overlapping is needed.
2. **NBS** represent important, tangible design features; a physical matter requiring a physical space, with specific and numerous peculiarities. (1) Spatial occupation requires choosing among concurrent solutions (choosing green instead of other assets is not banal). (2) Nature is a constantly evolving dynamic system, which requires maintenance, hence has a cost.
3. NBS, since its original definition by ICUN and EC, **link social and ecological aspects**; under this opening to social domain, we can recognize several challenges: (1) **Democracy**, in terms of shared governance and decision-making; if NBS only work with multi-actor partnerships, inclusion has to be boosted from the very beginning of each pathway and process; hence, this book introduces approaches and methods to promote real inclusivity and collaboration in defining shared solutions. (2) **Value proposition** for assessing the effectiveness of green solutions, impacts, co-benefits, and evaluation approaches; all these are very complex challenges of NBS, and require a holistic approach beyond short-term economic gains, and exploring instead other criteria of value capture, including non-material benefits and beyond.

Finally, from the experiences collected in this book, **new questions and investigations related to urban greening are emerging**, even if not directly addressed.

From a very human-centered approach to NBS we will move to a nature-driven approach. In fact, emerging attention to biodiversity and nature rights are entering the domain of urban planning:

– **Biodiversity:** again, through the strong EC commitment with the launch of the new EU 2030 Biodiversity Strategy, which repositions nature on top of societal priorities, maybe even above climate change adaptation challenges; if the biosphere fails, all the other domains will collapse anyway.
– **Plant rights, nature rights, and plant ethics** remind us that nature cannot simply be intended and "used" as a solution, but must be reinterpreted as a partner, a stakeholder in the process, to sit at the table when it comes to decision-making. In other words, nature should be regarded as a city user and a stakeholder in the decision-making process, hence the need to be inclusive with nature.

Finally, **co-evolution of urban systems with nature** is the next frontier. This book does not only integrate NBS into the urban-scapes but approaches urban design and planning from the perspective that cities are places for man and nature simultaneously. In the near future, the design of the built environment will embed nature in a much deeper way, and this revolution has just started.

Highlights

- Includes analytical methods to support city-wide decision-making on the assessment and integration of NBS in urban regeneration processes
- Illustrates lessons learned on how to effectively mainstream NBS in urban planning practice and policies
- Reports experiences of co-creation processes of NBS in the urban context as attempts to promote shared governance in urban greening practices

Scientific Reviewers

The editors would like to thank all the following reviewers for providing critical insights and constructive feedback to the book chapters anonymously.

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Israa H. Mahmoud is an Architect and Urban Planner by education. She holds a Ph.D. in urban regeneration. Since 2018, she is a post-Doc research fellow at the Laboratorio di Simulazione Urbana Fausto Curti, Department of Architecture and Urban Studies (DAStU), at the Politecnico di Milano. Now she is the research team leader together with Prof. Eugenio Morello on Clever Cities, a European Commission – Horizon 2020 Funded Project, as an expert of co-creation guidance for cities to implement Nature-based solutions in socially inclusive urban regeneration processes. Between 2016 and 2017, she took part in a European Commission – MARIE-CURIE Action funded Horizon 2020 Project – MAPS-LED Project as an (ESR) early-stage researcher, and later as an experienced researcher (ER) at San Diego State University, CA, USA. At Politecnico di Milano, she also lectures about Nature-based solutions in the Master of Science in "Urban Planning and Policy Design", as well as in the Master of "Sustainable Aarchitecture and Landscape Design". Lately, she co-led the "Greening Cities, Shaping Cities" International Symposium at the Politecnico di Milano, in October 2020.

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