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Book review: Timon, McPhearson; Nadja, Kabisch; Niki, Frantzeskaki (eds.) (2023): Nature-based solutions for cities

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What are nature-based solutions (NbS)? The International Union for Conservation of Nature (2017) defines them as "actions to protect, sustainably manage, and restore nature or modified ecosystems, that address societal challenges effectively and adaptively, simultaneously providing human well-being and biodiversity benefits". For example, trees are a classical object of NbS that provides shade, cool down the temperatures, remove carbon dioxide, and can contribute to mental and psychological health. For cities to be prepared and recover from extreme weather conditions, it is crucial to understand the interplay between ecological, technical, and social systems. The editors of the open-access book "Nature-Based Solutions for Cities" (2023), Timon McPhearson, Nadja Kabisch, and Niki Frantzeskaki, define NbS as an "umbrella term" (p. 4), "bringing together knowledge and expertise developed over the years" (p. 4 f.). While not every literature on NbS covers the technology side or discusses the connection between society, technology, and the environment, the anthology provides a comprehensive framework by showing the interlinkages between social, ecological, and technological-infrastructural dimensions in urban settings, covering five key sub-themes:

1. NbS "for what and for whom?" (pp. 14–49)
2. The "nature" of NbS (pp. 50–105)
3. "The multiple benefits" of NbS (pp. 106–214)
4. NbS "governance, planning and value" (pp. 215–295)
5. "Engaging art and design for and with NbS" (pp. 296–375)

Following the announcement of presentation of "multi-disciplinary" (p. 4) approaches and projects, each chapter deals with a specific topic using inter- and transdisciplinary methods and illustrating global case studies to provide the state of the art in enhancing NbS in cities.

Co-existence and co-habitation

The editors explain the role of NbS in providing benefits including the well-being of mental and physical aspects of the public, and addressing environmental justice. The book highlights that NbS is unevenly distributed within urban settings and socio-economic backgrounds such as income, gender, and race influence people's access to the benefits of urban nature. Thus, disseminating and co-designing NbS with the public, and advocating a participatory decision-making process is necessary in order to address the unequal distribution of nature in the city.

Due to multi-disciplinary nature of the subject, the editors refrain from providing a single definition of the term 'nature'. Nonetheless, their perspectives and proposed solutions seem to align predominantly in a bio-ecological understanding by stating, that cities are "laboratories of the future where nature and people co-exist and co-habitate" (p. xii). A broader understanding of 'nature' beyond the content of the book could also include basic infrastructure like internet or transportation which can in turn correspond with two factors very important also for NbS: stakeholder engagement and public participation.

The fifth part of the book deals with "engaging art and design for and with nature-based solutions". While Brian McGrath et al. develop an "integrative notion of urban design as an array of small-scale practices [… for] regenerative social-natural processes" (p. 296), the editors share in their final chapter (16) an ambitious vision: a "just, equitable, resilient, and sustainable landscape of virtuous relations among people, nature, and infrastructure" (p. 364). To achieve this vision, McPhearson, Kabisch, and Frantzeskaki provide seven insights based on the synthesis of key findings throughout the book – among others: placing NbS at the forefront of urban climate change adaptation; prioritizing equity and justice in NbS design, planning, and management; implementation of NbS for human health im-

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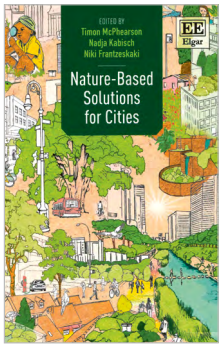

Timon, McPhearson; Nadja, Kabisch; Niki, Frantzeskaki (eds.) (2023):
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provement; adapting governance approaches in responds to local contexts. While those insights are sound and provide an overarching framework for how NbS should aim for, they remain broad and high level, catering primarily to the science policy community. However, they may not offer sufficient guidance for practitioners seeking more actionable approaches.

Society, technology, and the environment

The decline of biodiversity and ecosystem quality impacts all individuals, underscoring the indispensable role of nature in sustaining the world economy. According to Dasgupta (2023), there are three essential capitals: produced capital, such as buildings and roads; human capital, such as health and education; and natural capital, including ecosystems. As these factors show the interlinkages of nature, society, and economy, the book emphasizes aiming for sustainable, resilient, and equitable cities, and highlights the role of NbS in achieving these goals by working with the technical, social, and environmental sectors.

Within the multidimensional framework of the socio-ecological systems, social components encompass planning, management, policy, institutional capability, cultural perspectives, and societal standards. Ecological sides cover biodiversity, weather, climate, and ecosystem. In contrast, technological factors involve sensors and monitoring systems based on the Internet of Things, autonomous systems, and physical infrastructure such as dams, and basins. Collaborations are necessary to decide suitable NbS types for specific social challenges and locations. Moreover, incorporating public demands is crucial in the development and management of NbS which may vary across different demographic groups, even within the same city or country. Thus, understanding and accommodating this variance within various demographic backgrounds, such as gender, income, ethnicity, and education, is integral for distributive justice and accessible solutions for all, ensuring "positive rights to benefits" (p. 367).

Nature-based solutions and technology assessment

For the technology assessment (TA) community, it is important to note that NbS covers diverse topics that resonate with TA. These range from the assessment of the socio-ecological benefits to systemic solution development at the intersection of technology, and other sectors, including policy, governance, regulation, social innovation, finance, and business. On the one hand, the environmental impact of technology such as greenhouse emissions should be acknowledged to facilitate collaborative efforts across sectors to minimize trade-offs and increase synergies. On the other hand, it is important to acknowledge the application of technology in our interactions with nature. For example, urban and peri-urban forests, considered 'green infrastructure', can be systemically categorized using technological applications. Using platforms like GitHub, city tree registers with detailed information on tree locations and species can be accessible to the public. Employing software tools such as 'i-Tree' (USDA et al. 2023), may enable quantification and evaluation of ecosystem services and highlight the benefits provided by nature, including carbon sequestration and storage.

An example of citizen awareness is placing QR codes on trees to provide direct access to tree information and benefits, and simultaneously provide a platform for their participation in surveys and feedback (Son and Saha 2022). In addition, various citizen engagement platforms and online software such as 'Maptionnaire' (Kyttä et al. 2023) have been utilized in projects and research for including citizens' insights in the decision-making.

From global insights to local adaptation

Overall, the book suggests ways how NbS should be governed, and conceptualize cross-sectoral, multi-species, intergenerational, epistemic, and spatial inclusivity. Notably, the discussion addresses not only traditional methodologies but also unconventional practices, including art and storytelling. "Nature-Based Solutions for Cities" provides a comprehensive exploration of NbS with diverse global case studies; however, the book falls short in guiding readers on bridging the gap between theory and practice. The unique environmental characteristics of each location bring the need for NbS to be adapted to specific local settings, emphasizing the necessity of practical insights. While the global NbS cases can provide valuable insights, they are not sufficient in guiding readers on the adaptation and implementation of these solutions in their specific context. Nevertheless, the book remains a recommendable resource for those seeking a deeper understanding of NbS. As clear highlight and exception for scientific literature the colorful illustrations by Alyssa Dennis in coordination with the respective chapter contents are to be mentioned. As the field continues to evolve, future works might consider addressing the implementation gap to enhance the guidance available for local adaptation and practical implementation.

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