



# Editorial: Nature-Based Solutions in Urban Areas

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## Editorial on the Research Topic

### Nature-Based Solutions for Urban Areas

The urgency of finding nature-based solutions for urban areas is becoming ever more evident. Cities have been expanding rapidly and 60 percent of the world's population now live in cities and metropolitan areas. On the one hand, this concentration of human populations in compact spaces can be an asset. It concentrates the impact of human activity in urban communities and allows other areas to become compensatory spaces with more robust ecosystem service and the improved capacity of nature to process the emissions and waste streams emanating from human activity. At the same time, the loss of green space, permeable surfaces, and diverse ecosystems associated with the rise in urbanization, require ever more compensatory space to meet the resourcing and waste demands of cities. The question thus becomes how cities can themselves become more sustainable to reduce the demand for compensatory space and add much needed nature capacities to the urban space itself.

The central role cities themselves play in finding sustainable solutions is reflected in the fact that they have a Sustainable Development Goals all their own, namely SDG 11, sustainable cities and communities. Nature based and nature inclusive solutions for urban sustainability problems constitute a critical element in addressing SDG 11. As cities become more sustainable the pressures they assert on their surrounding areas and on global ecosystems and resources is reduced. In its 2021 brief, United Nations Environment Program (UNEP, 2022) writes that "climate change was recently added to the wide range of along social challenges stemming from urbanization. These challenges are becoming increasingly urgent to address. This is because cities are developing at the fastest pace. Nature-based solutions can be used to address certain social challenges in urban areas as they pertain to climate change and thus to improve the cities' resilience to climate change, quality of life of the city's dwellers, and to increase biodiversity in the city through the creation of green spaces."

Four of the nine articles in this research topic link directly to the UNEP brief and focus on the global aspects of nature-based solutions in urban areas. In "Scaling up of nature-based solutions to guide climate adaptation planning: Evidence from two case studies" Cilliers et al. offer a comparative analysis of case studies from South Africa and Netherlands that highlight the potential nature-based solutions offer for climate adaptation. Their study concludes that nature-based solutions can have global climate implications if they move beyond specific cases and consider the scalability of the approach.

Wu et al. also link potentially large-scale climate implications to small-scale nature-based urban initiative. Their paper "Estimating the Cooling Effect of Pocket Green Space in High Density Urban Areas in Shanghai, China" tests the impact of small pocket green spaces (PGS) on social and ecological services including urban heat mitigation. They use a set of cooling effect indicators to estimate the impact of PGS

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in general as well as specific landscape features of the PGSs. The results show that 90 percent of PGS areas are cooler than their surroundings with tree-shrub-grass cover proving especially effective.

An approach that links the surface temperature of cities to their surface cover of built and natural structures is introduced by Mitz et al. in their article “*Structure of Urban Landscape and Surface Temperature: A Case Study in Philadelphia, PA*”. The classification scheme uses a measure named STURLA, the Structure of Urban Landscape, to account for the complexity of urban landcover. The study compares case study results from Philadelphia, PA with findings from other cities including New York City, and Berlin Germany. The comparison highlights the structure-function relationship of physical, social and ecological factors in the urban scape.

French et al. explore the impact of a specific urban land cover, namely plant systems, in her article “*Designing Function-Specific Plant Systems for Sustainable Urban Development*”. French argues that the role plants play in building more sustainable cities can be augmented by integrating plant science, ecology, and urban design into a synthetic Function-Specific Plant Systems (FSPSs) which harnesses the genetic and metabolic diversity of plants to perform specific services that benefit society and the environment as a whole.

Snep et al. from Netherlands explore a specific benefit of nature-based solutions, namely the impact of vegetated green roofs and city trees on storm water management. Their article “*Nature Based Solutions for Urban Resilience: A Distinction Between No-Tech, Low-Tech and High-Tech Solutions*” argues that much information is still needed to scale promising nature-based water management solutions since knowledge about the effective capture, storage, and reuse of water remains limited. The group advocates for a distinction between no-tech, low-tech, and high-tech solutions ranging from traditional rain capture (no-tech) to green solutions that may outperform nature’s capacities (high-tech).

“*Blending Ecosystem Service and Resilience Perspectives in Planning of Natural Infrastructure*” by Hamel et al. explores the relevance of nature-based solutions to urban resilience goals by sharing lessons from the San Francisco Bay Area. The case study views ecosystem and resilience-based approaches to nature-based solutions as complementary and points to their common roots in social-ecological systems thinking. Both approaches can benefit from a better understanding of their strengths and limitations to address implementation gaps and connect research and practice more effectively.

Urban Design and the Role of Placemaking in Mainstreaming Nature-Based Solutions by Boros and Mahmoud describes the use of nature-based solutions as deliberate design interventions. The authors examine the Biblioteca degli Alberi park in Milan, which is one of the largest urban regeneration projects in Europe, from a human-centered and a nature-based perspectives and illustrate the multifunctional characteristics of urban ecosystems that call for approaches that “. . .infuse human-centeredness with nature-basedness.”

This raises questions about the representation of nature in the array of nature-based solutions and reminds us that even when

information about nature-based solutions is available, its valuation may differ based on the different perspectives various stakeholder groups may bring to the valuation process (see for example O’Hara et al., 2000). This shifts the focus from solutions that seek to mimic nature to those that seek to draw on the nature-based perspectives of diverse stakeholders.

The spatial planning method introduced by Verweij et al., for example, is decidedly participatory. Their model, QUICKScan, engages stakeholders in the review of spatial and spatio-statistical data through multi-stakeholder workshops to shape sustainable urban development decisions.

In their paper “*The Role of Urban Green Space in Promoting Inclusion: Experiences From the Netherlands*” De Haas et al. highlight the importance of equity considerations in accessing the benefits of nature-based assets like Urban Green Space (UGS). Their analysis of the social exclusion of marginalized groups like low-income residents, people with dementia, or mental health issues, indicates that successful inclusion strategies require an alignment between private initiatives and public actions.

Several of the conclusions offered by the contributions to this Research Topic confirm other research findings which highlight the importance of interdisciplinary collaboration and broad-based stakeholder engagement to advance successful nature-based solutions in urban areas. Frantzeskaki, for example, identifies seven lessons for nature-based solutions in urban communities (Frantzeskaki 2019):

- 1) They need to be aesthetically pleasing to urban residents, especially to those affected;
- 2) They must advance the creation of a new green urban commons;
- 3) They require trust in local governments and the willingness to try and try again;
- 4) They must engage diverse co-creators and learn from social innovation;
- 5) They require collaborative governance structures;
- 6) They must have an inclusive mission that can integrate many urban agendas;
- 7) They require a commitment to learning, adjustment and replication for the long run.

These lessons indicate that nature-based solutions require the engagement of multiple disciplines, the deliberate engagement of non-credentialed local experts and credentialed experts and the willingness to allow new institutions to form as new solutions emerge (see for example Raymond et al., 2019). The contributions to this Research Topic can attest to the fact that many of these lessons for nature-based solutions are relevant across NBS applications and scales.

## AUTHOR CONTRIBUTIONS

The author confirms being the sole contributor of this work and has approved it for publication.

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