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New Direction for Applying Urban Nature-Based Solutions

Researchers reframe current approach to valuing urban nature for the improved health and well-being of city-dwellers.

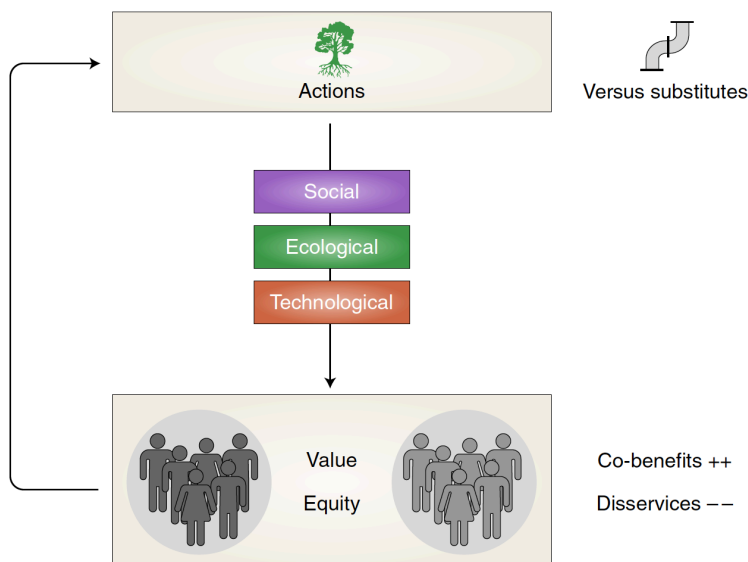
By Sarah Cafasso | January 11, 2019



Two out of every three people will live in urban areas by 2050. In a [new Nature Sustainability review article](#), a team of researchers explore how urban nature can affect the health and well-being of city-dwellers. Urban areas face complex challenges that require creative, cost-effective solutions. The benefits and services that nature provides to people can help solve many of these challenges, but only if city leaders have an understanding of their value. To rely on and invest in nature-based solutions, city planners need to know when urban nature can provide what benefits, and to whom. Additionally, they need to know how nature-based solutions compare to non-nature substitutes aimed at achieving similar goals.

With an emphasis on diversity and equity, the researchers consider the many social, ecological, and technological contexts that help determine the benefits of urban nature in cities worldwide. “When our team started reviewing past work on urban ecosystem services, we saw a real need to better understand where and when nature delivers benefits in cities. Nature-based solutions—urban trees, rain gardens, et cetera—are being deployed at an accelerating pace without recognition of the key contextual factors that affect the success of

these efforts,” said lead author Bonnie Keeler, University of Minnesota assistant professor and Natural Capital Project collaborator.



The wide-ranging review was catalyzed by the Natural Capital Project’s work on urban ecosystem services and features numerous authors from across the partnership, including those at the [University of Minnesota’s Institute on the Environment](#), [The Nature Conservancy](#), and at [Stanford University’s Woods Institute on the Environment](#), where the Natural Capital Project is centered.

The review focuses on ten key urban ecosystem services, including air quality, water supply, recreational opportunities, and mental health. Context is key: the same approach can have varying effects in different areas and with different groups of people. “For example, street trees can either improve or degrade local air quality in cities, depending on where they’re planted relative to sources of pollution. Rain gardens and stormwater retention devices work differently in cities with separated versus combined sewer systems,” Keeler explained.

Table 1 | Urban ecosystem services and nature-based solutions

Urban ecosystem services	Nature-based solutions						
	Street trees	Parks and open space	Engineered stormwater controls ^a	Green roofs	Waterways and wetlands	Coastal habitats ^b	Urban gardens
Urban air quality	X	X					
Carbon sequestration	X	X					
Coastal protection						X	
Urban heat and heat extremes mitigation	X	X		X			
Stormwater and wastewater management	X	X	X	X	X		
Urban water supply	X	X	X				
Riverine flood impact reduction		X	X		X		
Recreation opportunities		X			X	X	
Mental health	X	X					X
Urban agriculture		X					X

We reviewed literature pertaining to ten ecosystem services associated with seven nature-based solutions. Gaps in this matrix identify combinations where there was not sufficient literature to review the impact of a specific solution on a given service and/or the nature-based solution has been determined to be minimally effective with respect to a particular ecosystem service. ^aSuch as bioswales, rain gardens, retention ponds. ^bSuch as oyster reefs, mangroves, dunes, marshes.

Equity also plays a critical role in determining where to implement nature-based solutions. Nature’s benefits aren’t usually distributed equally across a city. “Historically, urban nature has been deployed in ways that privileges some residents over others—leading to big discrepancies in terms of who benefits from urban nature.” says Keeler. The authors emphasize the importance of considering social context, cultural preferences, and community voices in the prioritization and planning of urban nature.

This emphasis on a tailored, local approach that considers multiple factors is different from what’s been done in the past. Instead of focusing on single goals like mitigating air pollution or reducing carbon emissions, this synthesis suggests that city planners could benefit from investing in understanding the diverse contributions nature provides to people across all contexts in their particular city. The researchers also call for more urban ecosystem services studies be done in the Global South and in lower-income countries, to add essential contexts that are currently missing in the current body of research.

Anne Guerry, Stanford lead scientist at the [Natural Capital Project](#), sees this review as a driver of future urban ecosystem services work. “Spurred on in large part by what we’ve learned from this review, we’re developing a suite of tools called “Urban InVEST” that builds on our free, open-source [InVEST](#) (Integrated Valuation of Ecosystem Services and Tradeoffs) platform. Our new urban tools will help decision-makers identify when and where incorporating the value of nature into urban design can deliver better outcomes for people and nature.”

Bonnie Keeler is an assistant professor in the Science, Technology, and Environmental Policy (STEP)

area at the [Humphrey School of Public Affairs](#) and the former Program Director for the Natural Capital Project team at the University of Minnesota.

Several NatCap scientists contributed to this paper, including Perrine Hamel, Maike H. Hamann, Katie K. Arkema, Kelly A. Meza Prado, Kate Brauman, Anne Guerry, Justin A. Johnson, and Spencer A. Wood.

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