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Editorial: Supporting the “virtuous cycle” in urban ecosystems: how research can inform plans, policies, and projects that impact urban resilience

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Editorial on the Research Topic

[Supporting the “virtuous cycle” in urban ecosystems: how research can inform plans, policies, and projects that impact urban resilience](#)

Advancing urban resilience goals requires collaboration across sectors, jurisdictions, organizations, and disciplines. It also requires the ability to cultivate resilience across social and ecological scales. An integrated, collaborative approach presents a great opportunity to address complex problems, but also can present great challenges. This Research Topic aims to showcase projects connecting urban social-ecological research and practice, and provide examples of the process and potential benefits and barriers. We were inspired by the Virtuous Cycle Framework: “The aim is to create a virtuous cycle that will be the engine for continued accrual of the benefits to both people and nature, by mainstreaming conservation so it becomes a part of and product of business as usual” (Morrison, 2015, p. 14). Specifically, the Virtuous Cycle Framework envisions a system in which an intervention aimed to improve the diversity and resiliency of a given place catalyzes a positive feedback loop by providing benefits from nature (e.g., ecosystem services) to people, who are then mobilized to impact policies and/or practices to improve the place, which then produces increased benefits to both nature and people. This centering of the positive impacts of human actions contrasts with much of the past urban social-ecological systems literature that highlights the negative impacts of humans and anthropogenic change (Tidball and Stedman, 2013). This Research Topic includes papers illustrating the Virtuous Cycle Framework and the power of creating regenerative cycles in urban ecosystems.

Our Research Topic of 11 papers represents a range of urban social-ecological research areas incorporating the relationships between people, places, and nature. These relationships underpin the Virtuous Cycle Framework, which examines how conservation might be relevant to people, recognizing that conservation “depends on social, economic, political,

and cultural systems to sustain it” (Morrison, 2016, p. 9). For example, Bixler et al. introduce a framework for reflexive co-production of knowledge, applying that framework to assess three initiatives for urban greening and climate impact risk reduction in Austin, TX, USA. They emphasize three iterative phases for co-production: Recognize, Reflect, and Respond, and describe how that process, when effectively implemented, can serve as a virtuous cycle toward building urban resilience.

Three articles explore urban forestry and the harvesting and use of urban wood. Grove et al. apply the concept of regenerative cultures and ecologies to highlight the urban wood systems in Baltimore, Maryland, USA as a case study and model for virtuous cycles, arguing that virtuous cycles are most impactful, adaptive, and resilient when they include both positive and negative feedbacks and synergies. Through three interacting examples, they describe how a team-of-teams approach is critical for tackling complex, social-ecological problems, and boundary objects are useful tools to collaborate and eventually build consensus. de Guzman et al. evaluate the Tree Ambassador, or *Promotor Forestal*, program in Los Angeles, USA, which aims to address urban forest equity and wellbeing by training, supporting, and compensating residents to organize their communities. They use the results of the study to produce a “Socio-ecological model of community-based tree stewardship,” which can be applied across levels of social organization, and spatial and temporal dimensions. Treglia et al. introduce the concept of “practical” urban tree canopy analysis in New York, USA, which considers where additional canopy can fit within the existing constraints and opportunities of the landscape. They describe how practical canopy analysis can be the driver for conversations, stakeholder engagement, and actions toward urban forestry goal setting and implementation.

Many of the studies are from Los Angeles (L.A.), California, USA, illustrating how the virtuous cycle can operate in various realms, even within a single urban area. Wohldmann et al. explore how urban resilience can be furthered through efforts aimed at building soil health. They describe the Healthy Soils for Healthy Communities Initiative, which collected survey and focus group data to study attitudes, beliefs, and behaviors around land and soil. They explore strategies for deepening community engagement, addressing knowledge gaps, and shaping policies, and they describe how their data are being used to inform community-based interventions. Zellmer and Goto describe how wildlife corridors may be used to connect fragmented wildlife populations, despite challenges posed by the multitude of barriers, habitat patches, and property owners present in an urban context. Their case study demonstrates the value and importance of a collaborative approach that includes scientists, non-profits, government agencies, and communities. Cooper et al. describe conservation efforts in wildlands in and near L.A., cataloging information on more than 3,000 parcels of public open space to understand the history of how and when lands were conserved. They argue that the act of open space protection furthers advocacy efforts that promote conservation-benefiting land use policies and additional habitat conservation efforts, therefore constituting a virtuous cycle of conservation.

Four papers focus on urban form and highlight how the built and manicured environment can feed into the Virtuous

Cycle Framework by providing benefits for both people and nature. Katagi et al. detail ongoing restoration efforts along the L.A. River, a managed waterway that plays a crucial role in connectivity for wildlife and human communities as it bisects the city, crossing numerous municipalities. The paper discusses conservation of “iconic” species, such as the endangered steelhead trout (*Oncorhynchus mykiss*), that can build support for broader initiatives to promote urban biodiversity and recreational opportunities for city residents. Vasquez and Wood focus on how urban parks in “park poor” sections of L.A. likely provide important habitat for birds as there are few other green options in the surrounding cityscape. They detail the importance of parks to birds and also discuss park development in underserved communities as a straightforward “win” when considering the benefits to both wildlife and people. English et al. focus on unmanaged grasslands along an urban-to-rural gradient and how grasslands within the cityscape have lower diversity of plant species, which peaked in intermediate zones along this gradient. Conserving such “remnant” and unmanaged patches of habitat within cities may be key to providing important habitat for plant species. Lastly, Beninde et al. harness the power of iNaturalist observations to create species distribution models for 1,200 species based on climate and landscape variables across the entirety of Greater L.A.—from the natural areas to the urban core. The paper provides one of the largest species distribution modeling efforts in an urban area, providing wall-to-wall predictions for many plants and animals. The paper is an example of the benefits of community science initiatives that generate excitement, build community, and connect people to nature while providing critical data for urban conservation.

The studies in this Research Topic illustrate the Virtuous Cycle Framework by describing interventions that can produce benefits for both people and nature in a given location, and/or discussing datasets that can help to identify potential interventions and appropriate locations for them (e.g., using iNaturalist observations or camera trap data). While the Virtuous Cycle Framework offers a general model or heuristic for affecting positive outcomes, a clear challenge—and an opportunity—is in quantifying those outcomes to evaluate whether there are measurable benefits to biodiversity, people, and place. Ideally, when designing virtuous social-ecological cycles, resources can be directed toward assessing outcomes, which may include conducting surveys, interviews, and/or otherwise quantifying benefits to people. Strategic evaluation can then inform ongoing management such that the cycle can be optimized to achieve the desired benefits. Such evaluation efforts are likely to be helpful in ensuring that interventions are not top-down but are developed collaboratively with the relevant communities, further supporting the positive feedback loop envisioned by the Virtuous Cycle Framework.

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