Ecology with Cities

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For the inaugural year of *Urban Ecosystems*, Pickett et al. (1997) wrote an editorial that has had an enduring influence on the development of urban social-ecological science. They proposed the phrases ecology *in* and ecology *of* cities to differentiate two research themes. (In these phrases and the two described below, “cities” refers to all types of urbanized environments: city cores, towns, suburbs, exurbs and regional conurbations.) Through this simple but powerful language, Pickett et al. (1997) helped scientists, teachers, managers and others “see” two dimensions of urban places: relationships among variables *in* them and the emergent “wholes” *of* them. Thus, studying ecology *in* urban places informs understanding the ecology *of* them, and vice versa. When coupled, both approaches help generate integrated knowledge that can help improve human wellbeing and urban sustainability (Pickett et al. 2016).

Indeed, management and problem solving of urban environmental challenges were central motivations for much of the earliest urban ecology research in the mid-1900s, especially related to vegetation and wildlife (McDonnell 2011; Adams 2014; Kingsland 2019). As urbanization has only increased since then, the need for applied and actionable urban scientific knowledge has grown rapidly (Breuste et al. 2013; Zhou et al. 2019). Many urban ecologists have responded by conducting studies directly relevant to managing urban social-environmental conditions. This has led to a logical extension of Pickett et al.’s (1997) prepositional framework through the addition of a more explicitly applied perceptive: ecology *for* cities (Childers et al. 2015; Grove et al. 2016; Pickett et al. 2016; Schwarz and Herrmann 2016). This includes research about conserving and restoring biodiversity and ecosystem services explicitly *for* the goals of improving human health, urban resilience, economic prosperity, social equity and justice, and many other variables.

Descriptions of ecology *for* cities have emphasized the importance of collaboration among scientists, urban planners, managers, policymakers and others to achieve effective and desirable outcomes (see above references and McPhearson et al. 2016). Much of the focus to date has been on forming partnerships to support formal research, design and decision-making (governance) processes that aim to co-produce knowledge and stewardship plans through dialogue among diverse stakeholders. This paradigm is laudable and necessary for its emphasis on inclusive, community-based approaches for studying and improving urban places and societies. However, such approaches may not be relevant, feasible or appropriate in certain contexts. Ecologists may not be able to develop or participate in extensive, formal partnerships due to personal, professional and community-related concerns. Local stakeholders may not feel comfortable in formal academic and political settings or not be able to participate due to limitations of time, money, sociopolitical capital and other resources. As such, descriptions of ecology *for* cities to date represent an idealized vision for large-scale participatory projects that is likely out of reach for many individuals and communities. However, this should not deter ecologists from considering other ways to work with people to learn about and improve urban systems.

Engaging diverse audiences in urban ecology can take many forms. A broader array of approaches needs to be identified, developed and shared. This includes informal, more modest, narrowly-focused projects that don’t require time-intensive research, design and planning processes nor extensive stakeholder engagement. Ecologists can communicate with people individually; through classes, workshops and committees; and indirectly through diverse media outlets. The focus can be private yards, community gardens, neighborhood parks, school grounds, trees on a single street and more. (For example, I worked with my town’s conservation committee to create a brochure that encourages people to reduce lawn fertilizer applications.) This expanded view of themes and methods for fostering interactions and collaboration to achieve stewardship and sustainability goals points to a further addition to the urban ecology prepositional framework: ecology *with* cities.

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The phrase ecology *with* cities supports a more holistic view of transdisciplinary urban social-ecological scholarship that includes teaching, outreach and other forms of community engagement that might not fit well within ecology *for* cities' design-planning-governance emphasis. Though the two phrases overlap in motivation and some approaches, the word *with* explicitly emphasizes the goal of collaboration and, thus, consideration of others' perspectives and needs. Further, the *with* phrasing suggests seeing non-human urban organisms as partners working alongside humans to conserve and restore ecosystem services. Though urban biodiversity is not a stakeholder group that can contribute to decision making, such language can help audiences think more critically about problem solving via "teamwork" with other species and their habitats (also referred to as green, blue, turquoise and brown infrastructure). Such communication strategies exemplify the spirit of ecology *with* cities: engaging people *with* ideas that help them see and respond to urban environments in new, more sustainable ways.

Examples of the philosophical underpinnings and practices that reflect ecology *with* cities already exist (including in the literature), so the concept is not new per se. However, articulation of the phrase will hopefully bring more attention to the subject and encourage further development, dissemination and even debate about how ecology *with* cities can be done better and more often. To this end, *Urban Ecosystems* is introducing a new category of peer-reviewed manuscripts to provide an outlet for short articles describing perspectives, methods, projects and general case studies relevant to ecology *with* cities, including personal narratives and reflections about success, failure and lessons learned. The aim is to share insightful and inspiring information about how to more effectively collaborate and communicate with people in ways that advance urban ecological science and its application in diverse contexts.

Following the scope of the journal, these articles will focus on topics related to urban social-ecological science, including the management, conservation and restoration of biodiversity and ecosystem services in diverse habitats (lawns, gardens, parks, native habitat remnants, water bodies, etc.); nature-based solutions for climate change mitigation, adaptation and resilience; and the ecological dimensions of pollution, human health and environmental justice. Additionally, authors can present creative ideas for how to connect these topics with the daily lives and interests of urban residents, students and other audiences. Further, the umbrella-like scope of ecology *with* cities provides an opportunity for contributions to explore diverse conceptual underpinnings and approaches to engaging with people. Some of these, which complement and overlap with each other, are identified below along with more general topics that are appropriate foci for *Ecology-with-Cities* manuscripts:

- Communication strategies for helping people understand ecological concepts and data through face-to-face and other outreach methods and media;
- Summaries of community and citizen science projects that describe successes, challenges and recommendations for future projects;
- Translational (Enquist et al. 2017) and action ecology (White et al. 2015) which generate information needed to make decisions about urban environmental problems;
- How to conduct participatory action research (Chevalier and Buckles 2019) that involves stakeholders in co-producing questions, results, conclusions and applications;
- Democratization of urban science (McHale et al. 2018) to facilitate participation in research and decision-making by a wider diversity of people, especially those who are too often marginalized and excluded from such processes;
- Urban designed experiments (Felson et al. 2013) and transitional ecology projects (Kay et al. 2019) that integrate research, planning and aesthetic/artistic outcomes in public places;
- Lessons for engaging in urban planning, governance and policymaking processes;
- Approaches to forming partnerships and collaborative projects with stakeholder groups, including for adaptive co-management of urban places (Armitage et al. 2009);
- Civic ecology and earth stewardship (Krasny and Tidball 2012) in residential, institutional, commercial, industrial and public landscapes;
- Use of ecological landscaping practices (Byrne and Grewal 2008) such as integrated pest management, suitable plant choice, sustainable soil management, etc.;
- Perspectives and lessons for urban environmental education in which teachers work *with* students to help them learn, as exemplified by easy-to-adopt learner-centered teaching activities (Byrne 2016) that will help teachers educate future urban ecologists and ecology-with-cities practitioners.

These topics and approaches sketch the scope of *Ecology-with-Cities* manuscripts but are certainly not exhaustive. Just as the prepositional framework has been expanded and refined, the scope of ecology *with* cities will change alongside developments in the knowledge, theory, and methods of urban social-ecological science and its application. As such, submission guidelines for authors on the journal's website will be updated with an evolving list of suitable topics for manuscripts alongside other instructions (including specific requirements for submissions that describe teaching activities).

To launch this venture (which is now a topical collection on the journal's webpage), five exemplary and exciting articles are presented in this issue as the inaugural set of *Ecology with Cities* articles. They reflect the concept's emphasis on collaboration (e.g., to co-produce knowledge;

Pickett et al. 2022), integrating research and stewardship (e.g., to design and implement gardens; Tan et al. 2022), community engagement (e.g., through urban biodiversity research; Roger and Motion 2022), and learning through group work and environmental problem solving (e.g., to restore ecosystem services and design habitats for insects; Hane and Korfmacher 2022a, b). Part of the vision for creating a new *Ecology-with-Cities* manuscript category in *Urban Ecosystems* is that, by publishing these and future articles alongside data-centered ones, the pursuit of ecology with cities will become as equally valued and integral to the field of urban ecology as traditional basic and applied research.

Because the idea of urban ecology's prepositional framework was first described in this journal, it is fitting that another addition to it is described here also. As such, *Urban Ecosystems* is continuing its role as a leading and innovative publication for urban social-ecological scholarship. Hopefully, *Ecology with Cities* articles will attract a new set of readers who are working "on the ground" to teach, design, manage and make policy (among many other possible actions) regarding urban environments. In this context, articulating the "with" approach reminds us that the word "cities" in all four prepositional phrases is shorthand for people—and other organisms—that live in these communities. More than ever, all of these people must help each other improve urban systems, a goal that *Urban Ecosystems* seeks to catalyze by publishing a full range of scholarship needed for understanding and doing ecology in, of, for and with cities. I hope that *Ecology with Cities* manuscripts will successfully cultivate new developments, spark constructive debate, and inspire the urban ecology community to engage in the research, education, and collaboration needed to improve the social and ecological conditions and sustainability of urban places everywhere.

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