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Afterword: Transdisciplinary Urban Ecosystem Research, Education and Stewardship

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Abstract

Collaborative, transdisciplinary examination of urban sustainability is a clear motivation for the present volume. In this modest afterword, I offer three reflections about the volume's value for inspiring future work to integrate diverse audiences, perspectives and bodies of scholarship to better understand how to improve urban places. First, as suggested by the book's title, "ecosystem" is a useful umbrella term to encompass social and ecological variables that interact to form the structure and dynamics of cities and all types of urban places. The value of such unifying terms relates to my second insight: more explicit and expansive effort is needed among scholars and other stakeholders to integrate the social and ecological dimensions of the study and pursuit of urban sustainability. This includes encouraging and prioritizing pursuit of community-based, sustainability projects and new forms of urban environmental education, which is my third insight. In conclusion, the book's diverse chapters lead us to the concept of social-ecological stewardship which emphasize that caring for people and the environment are coupled endeavors that cannot be separated: helping people necessitates improving the environment; helping the environment requires helping people, including those that will live in the future. In this context, I propose that urban ecosystem stewardship can serve as a unifying, transdisciplinary focus for urban environmental education, and conversations and collaborations among diverse scholars and community stakeholders. As reflected by this volume, fostering such partnerships and education leads to valuable insights and outcomes that can help make urban ecosystems more sustainable and resilient.

In ecology, the concept of the ecosystem has a long history (Golley 1993, Pickett and Cadenasso 2004). Though it has sometimes been contested (e.g., O'Neill 2001), its utility as a multidimensional term to help frame and organize the study of organism-environment interactions gives it staying power (Pickett and Cadenasso 2004). This power is reflected by the existence of similar paradigms among diverse cultures as part of their traditional ecological knowledge (Berkes et al. 1998) and adoption of the word by non-ecologists to describe diverse entities (e.g., media ecosystems, business ecosystems, learning ecosystems, to name just a few that can be found online). Such widespread use risks turning the word into an abused cliché without clear meaning: everything is an ecosystem! On the other hand, when a word like ecosystem has such widespread resonance, it has value as a unifying starting point to help bring together diverse audiences, perspectives and bodies of scholarship to examine important issues, especially ultra-complex ones that require transdisciplinary knowledge and problem-solving approaches. In the Anthropocene, few complex issues are as important as creating more sustainable urban ecosystems and societies.

This desire for collaborative examination of the complex topic of urban sustainability is a clear motivation for the present volume. Its breadth of included topics is impressive: history, health, philosophy, biodiversity, economics, ethics, justice, education, sociology, energy infrastructure, and more. All these variables interact to form urban ecosystems and, thus, all must be considered to fully understand urban patterns and dynamics, and resulting levels of sustainability. As such, readers will benefit from reviewing all the chapters rather than just focusing on the ones most closely related to the subjects they already know. Advancing urban sustainability through research and new philosophical perspectives—and their application to urban design and management—requires that we step outside our scholarly and epistemological comfort zones to engage with diverse ways of seeing and responding to urban ecosystems. Such transdisciplinary thinking is catalyzed by volumes like this one.

In terms of transdisciplinarity, I suggest that, as a collection, the book's diverse chapters point to three emergent reflections. Certainly, these are not the only three, and they are admittedly biased by my personal outlook as an ecologist and educator. Nonetheless, I offer them in this modest afterword to inspire others to consider the broader implications of this volume for the holistic study of urban places, including cities, suburbs, exurbs and other urbanized landscapes.

My first reflection builds on the preceding introductory comments about the word "ecosystem." This book's title is a direct, bold, declaration: *The City is an Ecosystem*. However, from an ecologist's view, its contents include lots of topics that do not appear, at first glance, to fit within the traditional purview of ecosystem science's focus on non-human organisms, soils, biogeochemical cycles and other basic ecological variables like sunlight and precipitation. Thus, the book's title prompts revisiting basic questions about the definition of ecosystems and whether urban places—for which "city" is often used as a stand-in word—are something other, or more, than ecosystems. In large part, these questions are attributable to the current norms among ecologists for using more descriptive terms for urban places, including human ecosystems, social-ecological systems, and, more recently, social-ecological-technological systems (Zhou et al. 2021). Assumedly, such phrases are preferred because they highlight the anthropogenic variables that comprise a large part of urban systems; this emphasis makes sense given that ecologists intentionally ignored humans for most of the history of the discipline (i.e., humans are not part of ecosystems). Thus, is it appropriate to refer to urban places simply as "ecosystems"? Is this perspective missing something, misleading, or an abuse of ecological science vocabulary? Does the word ecosystem alone allow for integrating humans and their actions into the fold?

Two lines of thinking support the assertion that urban places can properly be called ecosystems without sacrificing the fuller transdisciplinary view of such places. The first is through an analysis of the writings of Arthur Tansley who coined the word ecosystem. After reviewing his work, Pickett and Grove (2009) observed that Tansley explicitly noted that humans are ecological variables, and they concluded that "the contemporary definition of the ecosystem can be expanded—without violating either the letter or the spirit of Tansley's precedent—to incorporate humans, their institutions and economies, their buildings and engineered networks of transport and communication" (6). Second, in Eugene Odum's (1971) classic textbook, which is often credited with popularizing the ecosystem concept (Golley 1993), he discussed ecological variables explicitly in context of cities. Such references indicate that he saw them as ecosystems alongside others like forests. Further, he explicitly called for integration of ecological and social variables to improve urban land use planning. Given these two historical precedents (among others that could surely be found), it is reasonable to conclude that urban places can indeed be referred to simply as ecosystems, thus justifying this book's title. Although the use of the

more descriptive phrases noted above will surely continue, perhaps this book points to the value of simplified language and being comfortable with "ecosystem" as a transdisciplinary term that encompasses a fuller range of anthropocentric topics, including all those covered by this volume's diverse chapters.

A second reflection inspired by this book is the need to more explicitly and expansively link the social and ecological dimensions of the study and pursuit of urban sustainability. On the academic side, this means pursuing a fuller integration of variables, methods, and theory from the social and natural sciences and humanities. On the practical, applied side, this includes wider efforts to help people connect directly with the outdoor ecosystems around them. As emphasized by many chapters, such explicit connections lead to deeper understanding about the characteristics of urban ecosystems and help people engage directly in the work needed to improve them, such as creating and managing greenspace. In particular, making such linkages means engaging diverse stakeholders in research (e.g., citizen and community science) and its interpretation and translation into decisions and actions. Such work necessitates different type of projects (i.e., transdisciplinary research and community-based, collaborative efforts) than academic scholars have traditionally pursued but which are common in other contexts (e.g., community organizations, government agencies, architecture and planning firms). Notably, pursuing partnerships and dialogue to promote urban sustainability—especially regarding issues of health, equity, justice and resilience—is a theme woven throughout the book, both explicitly and implicitly. Such an emphasis echoes that of many others (e.g., Zhou et al. 2021), especially advocates for the views of civic ecology (Krasny and Tidball 2012) and "ecology with cities" (e.g., Byrne 2022 and references therein; also see Chapter 19, this volume). This book advances this conversation with exemplary work about both the academic and applied sides of understanding and working in urban ecosystems.

Though the value of transdisciplinary scholarship and community-based projects is clear, pursuit of them is not easy, especially for those in higher education institutions. One of the many challenges to such work is the current structure of educational systems, including curricula and reward criteria for faculty (especially regarding tenure and promotion), which too often hinder holistic, integrated learning and applied projects. Though paradigms have been shifting toward transdisciplinarity and addressing communities' needs, additional, more expansive changes are needed to encourage professors and students to embrace transdisciplinary urban studies and help lead projects aimed at transforming urban ecosystems for improved environmental quality and human wellbeing. This third reflection is inspired by the insightful chapters in this volume that provide excellent examples of the positive outcomes—for communities, students and disciplines—that can arise when new models of research, teaching and learning are pursued. As highlighted above, more intentional linking of ecological and social aspects of urban ecosystems is central to innovative pedagogical models. Helping students and community stakeholders explore such connections can facilitate development of more holistic views of complex interrelationships among environments, people, diverse cultural issues and sustainability. To this end, many chapters in this volume build on a small but expanding body of literature that provides a solid foundation for future work in urban environmental education (e.g., Russ 2015, Peterson 2018, Maharramli et al. 2021).

I readily admit that these three reflections are not new to me; many others—too many to cite in a brief afterword—have written deeper analyses about all these issues than I can offer here. Nonetheless, this book's emphasis on transdisciplinarity—its motivating ethos of synthesizing diverse

disciplinary perspectives and methods—points to the continued need to pursue unifying concepts and perspectives that help diverse stakeholders collaborate for integrated research, education, and urban sustainability practices and projects. As noted above, “ecosystem” may provide such a transdisciplinary focus because it enables linking humans, urban infrastructure and ecological variables together in a common framework. However, I suggest that the ecosystem view implies objects of study: ecosystems are entities to be described and evaluated over space and time. This is a necessary start but feels insufficient; something more is needed to achieve urban sustainability, something that helps people better recognize and embrace their role in that pursuit.

This desire for something else leads me to the idea of stewardship for urban ecosystems. Stewardship has long been used as theme for examining sustainable human-environment relationships, and it is increasingly being used in context of urban places (e.g., Andersson et al. 2014, Bennett et al. 2018, Romolini et al. 2018). In particular, the phrase social-ecological stewardship (Cockburn et al. 2018) has been articulated to emphasize that caring for people and the environment are coupled endeavors that cannot be separated. This linkage is especially true in urban places where social and ecological conditions are tightly interconnected: helping people necessitates improving the environment; helping the environment requires helping people, including those that will live in the future. In this context, I propose that urban ecosystem stewardship can serve as a unifying, transdisciplinary focus for urban environmental education, and conversations and collaborations among diverse scholars and community stakeholders. As reflected by this volume, fostering such partnerships and education leads to valuable insights and outcomes that can help make urban ecosystems more sustainable and resilient. Given that increasing numbers of people around the world live in cities and other types of urban ecosystems, the valuable information in this book is sure to have a positive impact on the study and practices of urban sustainability and stewardship for a long time to come.

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