3-1-2018

Response to Kabisch and Colleagues

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Recommended Citation

Rieb JT, Chaplin-Kramer R, Daily GC, Armsworth PR, Böhning-Gaese K, Bonn A, Cumming GS, Eigenbrod F, Grimm V, Jackson BM, Marques A. Response to Kabisch and Colleagues. BioScience. 2018 Mar 1;68(3):167-8.

Response to Kabisch and Colleagues

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Kabisch and colleagues (2017) have reviewed our call for advances in ecosystem service (ES) decision-support tools from an urban perspective and explored how the three research frontiers we identified should be considered in cities. We appreciate how they build on our original ideas and welcome this as a good example of how the general principles we developed in the original article can be applied and adapted to specific contexts. In fact, we believe that similar points about the importance of adapting our general principles for specific social–ecological systems could be made for many other systems, such as marine ecosystems or managed forestry systems. The specific characteristics of these different systems also provide opportunities to expand on current ES knowledge and improve ES management tools. For example, as Kabisch and colleagues (2017) point out, cities are unique because of their relatively small area and high population density, which may make them more ideal than other systems for understanding certain aspects of the links between humans and nature and for implementing this understanding in management tools. We take the opportunity to respond to the ideas presented by Kabisch and colleagues and thus continue the conversation around urban ES.

Kabisch and colleagues suggest that remote sensing is less useful in urban areas. However, remote sensing has been used very effectively in cities to model heat regulation (Schwarz et al. 2011), carbon storage (Tigges et al. 2017), and flood regulation (Wirion et al. 2017), among other ecosystem services. The small scale and contained nature of cities may allow for additional methods to be used in conjunction with remote sensing, such as participatory mapping (Plieninger et al. 2013), or direct measurements, such as tree inventories (Nielsen et al. 2014). Using multiple methods may provide more complete information than remote sensing alone (Cord et al 2017), leading to a more comprehensive understanding. Building tools that can use multiple knowledge sources and produce diverse types of information would allow urban areas to leverage these alternative data sources to improve ES management.

Kabisch and colleagues (2017) also call for simplification of ES models and tools to make them accessible to a broad range of stakeholders, many of whom are underrepresented in current environmental decision-making processes. Although we support efforts to make ES decision-support tools more democratic, we argue that a renewed focus on land-cover-based tools, which have a number of disadvantages, as we laid out in our original article, is counterproductive. Instead, we suggest shifting the focus of simple ES decision-support tools away from land use and land cover and toward the ecosystems and environmental processes that actually produce ES, as well as the interactions between people and nature that support the coproduction of ES in highly human-influenced landscapes such as cities. (Luck et al. 2009, Ziter 2016). We also suggest that models be developed to provide metrics that support different types of decision-making, including problem scoping and definition, assessment of alternatives, implementation planning, and evaluation of previous management actions. Such an approach could still be tangible to diverse stakeholders, including those without scientific backgrounds, while providing a more accurate assessment of ES and supporting a broader range of decision contexts. Where urban areas are a focus, the small spatial scale of cities and other human settlements would facilitate the collection of the detailed ecological data necessary to build and apply these types of tools.

As Kabisch and colleagues (2017) point out, and as we highlight as one of our core frontier areas, it is crucial to integrate beneficiaries into ES tools and to acknowledge how different populations access (or lack access to) ES. Kabisch and colleagues' suggestion of a "multimethod approach" is one promising way to address these issues. We also highlight the importance of working closely with stakeholders, not only when using tools to design management strategies but also through codesign of the tools themselves and through citizen-science approaches (Schröter et al. 2017). This allows the integration of diverse perspectives through the ES modeling process (Jacobs et al. 2016). Although we believe that this is important in all types of ES assessments, cities, with their defined boundaries and existing structures for social organization, offer excellent opportunities to pilot and test some of these strategies.

Although we expect social processes and telecouplings to play important roles in many systems, they exert an outsized influence on the provision of urban ES (Yang et al. 2016). Because of this, the development of tools that account for these processes is crucial to understanding the provision of ES in urban areas. The high dependence within cities on technology and reliance on flows of services from other locations offer advantages for understanding the integrated role of social and ecological processes in ES provision and use. For example, it might be easier to determine the limits of technology and telecouplings' abilities to substitute for local natural capital in ES provision in cities than in other locations.

Kabisch and colleagues' (2017) Viewpoint serves as a useful companion to our original article. However, we urge caution around their call for redrawing the focus of our ES modeling frontiers toward cities. Cities contain a large and increasing proportion of the Earth's population, and urban ecosystems may play a disproportionate role in providing certain ES, such as temperature regulation, air purification, or aesthetic benefits, because of their proximity to people. However, urban areas still only contain a very small proportion of the Earth's land area. Other nonurban types of land use cover the vast majority of the Earth's surface and provide important ES to people living in both urban and rural areas, including climate regulation; water purification; and the provision of food, water, and raw materials. Therefore, we encourage even urban-focused ES studies to recognize the diverse types of social–ecological systems, both within and outside of cities, that support human well-being through ES provision.

All social–ecological systems that produce ES are complex in unique ways, which complicates the task of building generalized tools that can be used across different contexts. However, each system also provides opportunities to expand our understanding of the different aspects of ES that are necessary for building such generalized tools. We welcome work such as that by Kabisch and colleagues (2017) that explores our frontiers from the perspective of a particular system, and we hope that such work will push us closer to achieving the advances we called for in our original article.

Acknowledgments

This article is a joint effort of the sES-MOD—Next-Generation Models for Ecosystem Services and Biodiversity working group and an outcome of a workshop kindly supported by the Synthesis Centre (sDiv) of the German Centre for Integrative Biodiversity Research (iDiv) Halle-Jena-Leipzig (no. DFG FZT 118).

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doi:10.1093/biosci/bix154