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update

Emerging research opportunities in global urban ecology

Biogeographers have examined how human activities have affected patterns of biological diversity from a variety of perspectives, with special attention often given to oceanic islands. With the current accelerating pace of environmental change, these effects are increasingly evident at global scales. Human industry, commerce, agriculture and transportation all have the potential now to affect natural systems globally through an assortment of drivers; primary among these are land-use change, species introductions and climate change.

Human activities and their consequences come to a unique focus in urban areas, an expanding form of land use that is attracting increasing research attention from ecologists (Grimm et al. 2008). Urban areas contain similar environmental conditions worldwide and act as a focal point for species introductions and extinctions. These human-dominated environments offer unique opportunities to investigate the broad-scale dynamics of human-mediated biotic interchange (La Sorte et al. 2007), its consequences for β diversity (La Sorte et al. 2008) and the regional factors and biological traits associated with native species extinctions (Hahs et al. 2009, Duncan et al. 2011).

Urban areas typically contain spatially heterogeneous collections of native and non-native species (McKinney 2008); these unique assemblages can be examined based on their compositional (Niemelä et al. 2002) and phylogenetic structures (Ricotta et al. 2009). Three nested sampling approaches are currently used to investigate urban systems at broad spatial scales: urban plots or transects, the entire urban matrix and the urban matrix embedded within a regional context (Werner 2011). Each sampling approach provides a unique inferential basis, although the third allows for more refined interpretation, controlling for regional differences.

A recent study in *Global Ecology and Biogeography* adopts a novel perspective and examines how avian assemblages sampled within plots of intact vegetation in urban and semi-natural areas differ based on several common macroecological relationships. Pautasso et al. (2011) compiled data on species composition and abundance from all around the globe, although the majority of the samples are from Europe and North America. A primary finding of the study was a lack of evidence for differences in the species–area, species–abundance or species–biomass rela-

tionships between urban and semi-natural localities. The number of exotic bird species in urban areas is low, suggesting that these relationships are defined primarily by native species in both environments. These findings highlight the importance of maintaining intact vegetation within urban landscapes and the role of urban diversity as a tool for promoting conservation initiatives and biological awareness, as emphasized in many urban-ecology studies. Nevertheless, the findings from Pautasso et al. (2011) contrast with current expectations on how urbanization affects patterns of diversity, and should be a motivating factor in promoting further research. The increasing prevalence and quality of global data sources provides an exciting basis to examine the structure and determinants of these macroecological relationships across more refined temporal, spatial and anthropogenic gradients.

By taking a global perspective, novel insights can be gained on the unique position urban areas have, both as a source for global change and as regions capable of maintaining important aspects of biological diversity. Global comparative studies also have the potential to bolster and refine current recommendations about how to maintain biological diversity within human-dominated landscapes. Specifically, the preservation or restoration of patches of intact vegetation within urban areas is as valuable in maintaining basic macroecological patterns of avian diversity as conducting these activities outside urban areas. Importantly, this work takes the focus away from Europe and North America, where the vast majority of the research has been conducted, allowing for a more inclusive set of inferences and recommendations. Urban data are becoming increasingly available through remote sensing activities, citizen science initiatives and broader collaborative efforts. Exploring how anthropogenic activities are impacting natural systems globally is critical in supporting a truly comprehensive understanding of the current dynamics and long-term consequences of global environmental change.

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