

Are ecologists divided? Reconciling conflicting views in spatial modelling

Pedro R. Peres-Neto

Département des sciences biologiques
Canada Research Chair in Spatial Modelling and Biodiversity
Université du Québec à Montréal, Québec, Canada
peres-neto.pedro@uqam.ca

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Organisms, along with their environments, present remarkable patterns of variation across space. Unravelling the multiple mechanisms behind the myriad, yet complex patterns that dominate in nature is one of the most important intellectual challenges in the science of ecology. Much as astronomers cannot perform planetary experiments, ecologists cannot easily manipulate most biodiversity patterns because these patterns occur at many different scales. Therefore, ecologists often need to use spatial analytical frameworks (models) to understand the processes that structure biodiversity patterns at large scales such as species distributions, species richness, and species co-occurrence across communities. Although spatial models can provide great insights into these processes, ecologists tend to see spatial autocorrelation as a nuisance that needs to be filtered out of data rather than an interesting property to be studied. Beyond the standard nuisance viewpoint, an alternative and less acknowledged perspective is that the spatial legacy of ecological data can help us challenge heuristic interpretation about ecological processes and improve our understanding of ecological phenomena. While these views can be reconciled, we need to understand well what are the implications of considering spatial structure on different modelling and analytical strategies. To reconcile these two views, I will present study cases and simulations showing how spatial models can be improved by considering spatial variation explicitly. As ecologists commonly, if not always, deal with autocorrelated data, we should see spatial complexity as an opportunity rather than the view in which modelling of spatial data provide difficult challenges. With this view in mind, I will present a number of guidelines and a new spatial framework that should be helpful in understanding and reconciling the two views.