Exploring the relationship between ecological communities and ecosystem services diversity in Europe: are common bird and butterfly functional traits good proxies?

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Abstract

Links between biodiversity and ecosystem functioning is complex, and uncertainty remains about how results 'scale up' to whole landscapes and regions. Recently, effort has been focused on understanding trade-offs and synergies between ecosystem services and biodiversity. However, these trade-offs analyses still reduce biodiversity to species richness or other simplified indicators that do not completely cover the complex biodiversity concept. Here, we aim at (1) understanding the relationship between common bird communities and ecosystem services diversity in Europe (2) determining whether or not functional traits of species can be used as proxies for the different types of ES. Relying on abundance data from the Pan-European bird and butterfly monitoring schemes, we develop a set of integrative multiple-species indicators for both taxa (e.g., community specialization index, community trophic index). We consider a set of 10 proxies for regulating, provisioning and cultural services. We then explore how these ES proxies are related to the community functional indices. Finally, we compare the values of these ecological indicators across the different types of ES bundles to reveal which bird community indicators are the best "predictors" of the ES bundles. Our main hypothesis predicts that regions with a healthy ecosystem state will be characterized by high species diversity and/or a balanced trophic community. Conversely, we expect that regions with degraded ecosystem states will harbor simplified bird communities.

Keywords: ecosystem services, ecological diversity, functional traits, common bird, common butterfly, long, term monitoring, citizen science

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