Land-use impacts on species, functional and phylogenetic diversity of bee communities in Europe

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Abstract

Agricultural intensification and urbanisation are important drivers of biodiversity change in Europe, as elsewhere. The impact of these changes on bee communities has been of particular concern for researchers and policy makers alike: bees can be adversely impacted by human-dominated land uses, such as intensively-managed cropland, and can potentially indicate wider ecosystem health. Different facets of community diversity – species, functional and phylogenetic – may be more or less sensitive to these pressures, however, as well as making different contributions to ecosystem service provision. To obtain a comprehensive understanding of human impacts on biodiversity, it is therefore important to assess multiple, complementary indices of diversity to capture these different aspects. We have used data from 1446 sites and 337 species to model statistically how species, functional and phylogenetic diversity of European bee communities vary with a variety of human pressures including land-use class, land-use intensity, human population density and proximity to roads. We combine the resulting models with pressure data to estimate the 'intactness' of bee communities for the whole of the EU27 region-that is, how much diversity has been lost relative to a natural or semi-natural baseline-and to map the fine-scale (1km2 resolution) spatial patterns of bee community intactness, highlighting spatial mismatches between different aspects of diversity.

Keywords: pollination, phylogenetic diversity, functional diversity, biodiversity loss, human impacts

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