

Does increasing human environmental footprint lead to biotic homogenization of forest bird communities in northern USA?

Eric Le Tortorec¹, Matti Häkkilä¹, Edmund Zlonis², Gerald Niemi³, and Mikko Mönkkönen¹

¹University of Jyväskylä Faculty of Mathematics and Science

²University of Minnesota Duluth Natural Resources Research Institute

³Natural Resources Research Institute

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Abstract

Studies have shown negative impacts of increased human pressures on biodiversity at local (alpha-diversity) and regional (gamma-diversity) scales. However, the diversity between local sites (beta-diversity) has received less attention. This is an important shortcoming since beta-diversity acts as a linkage between trends at the local and regional scales. Decreased beta-diversity means that local sites lose their distinctiveness, becoming more similar to each other. This process, known as biotic homogenization, is predicted to arise through the replacement of native specialists with native and non-native generalists. However, the mechanisms causing biotic homogenization have not been fully studied nor its impacts on different facets of biodiversity. We examined if land-use change due to human actions causes biotic homogenization of taxonomic, functional and phylogenetic diversity in bird communities of forested habitats in the state of Minnesota, USA. Our aim was to study if increased human pressure, which included human population density, land transformation, transport infrastructure, and electrical power infrastructure, was associated with increased similarity among bird point count sites. Our results showed that elevated human pressure was not related with increased biotic homogenization in this study region. Interestingly, increased human pressure appeared to increase the between-site functional diversity of bird communities. This association was driven by a decrease in local diversity, which, due to the nature of beta-diversity, led to an increase in between-site diversity. We highlight the importance of considering multiple facets of biodiversity and the use of beta-diversity in a conservation setting.

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