

Effects of habitat heterogeneity on the elevational distribution of bird diversity in a typical modern montane

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February 25, 2021

Abstract

The biodiversity in montane ecosystems is high but is threatened by rapid environmental change. Urbanization and other anthropogenic activities in the mountains surrounding cities can affect changes in land use and habitat heterogeneity. Moreover, patterns of habitat heterogeneity are closely related to elevation and have a major effect on montane biodiversity. The aim of this study was to analyze the effects of habitat heterogeneity on the vertical distribution pattern of bird diversity by characterizing the structure of the bird community, biodiversity, and landscape factors at different altitudes. Continuous monitoring of the breeding birds at Mount Tai from 2016 to 2019 revealed that forest reduced the diversity and abundance of birds and favored montane birds. Habitat composition varied at different altitudes. In the high-mountain belt and the middle-mountain belt, the habitat was primarily composed of forest. In contrast, artificial habitat was more common in the low-mountain belt. Bird abundance, species richness, and the Shannon-Wiener index decreased as the altitude increased, and the structure of the bird community significantly differed in the different belts. Some rare species tended to only occupy specific belts. Road density, number of habitat patches, patch density, and the percentage of forest significantly affected bird diversity. The effect of patch density was higher compared with other landscape factors. The “habitat amount hypothesis” was more suitable for explaining the elevational distribution pattern of bird diversity at Mount Tai. Sufficient habitat and more patches in the low-mountain belt supported higher bird diversity. The middle-mountain belt and high-mountain belt showed contrasting patterns. Our results highlight the effects of ongoing urbanization and human activities on montane biodiversity and emphasize the need for artificial habitats in the mountains surrounding cities to be managed.

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