

Anthropogenic land-use change shapes bird diversity along the eastern Himalayan altitudinal gradient

Globally, the conversion of natural forest into agricultural land and human settlement has altered avian diversity and structure often leading to functional and/or phylogenetic homogenisation. While the effects of land-use change on avian functional and phylogenetic diversity is well studied in the tropics, it is poorly understood and scarcely studied in the Himalayas let alone in eastern Himalayan bird communities.

Using data from replicated transect surveys, we investigated the effects of land-use change (agriculture, settlement, and forest) on the community diversity and structure of 336 bird species while accounting for imperfect detection across 679-point count locations along an elevational gradient in the eastern Himalayan biodiversity hotspot of Bhutan.

The main findings of our study are 1) bird community occupancy along the elevational gradient is negatively associated with human land use (agriculture and settlement), 2) bird assemblages at higher elevations were functionally and phylogenetically clustered, and 3) agriculture and settlement harboured disproportionately higher functional and phylogenetic diversity whereas forest had phylogenetically diverse communities within functionally convergent traits.

Synthesis and applications. Our findings suggest that high functional diversity in agriculture and settlement offers an opportunity for a broad range of ecosystem services such as pollination, insect- and rodent-pest control. Agricultural practices that protect and improve bird-friendly habitats (particularly for insectivores) should be promoted. To facilitate coexistence, educational programmes on the importance of the functional roles of birds should be implemented to raise farmers' awareness of the importance of farmland biodiversity. Management interventions should seek to integrate bird conservation and farm production. Safeguarding edge habitats and forests abutting human settlements would be key to promoting phylogenetically diverse assemblages and ecological functions in Himalayan working landscapes.