

Land-use change alters the mechanisms assembling rainforest mammal communities in Borneo

ABSTRACT

1. The assembly of species communities at local scales is thought to be driven by environmental filtering, species interactions and spatial processes such as dispersal limitation. Little is known about how the relative balance of these drivers of community assembly changes along environmental gradients, especially manmade environmental gradients associated with land-use change. 2. Using concurrent camera- and live-trapping, we investigated the local-scale assembly of mammal communities along a gradient of land-use intensity (old-growth forest, logged forest and oil palm plantations) in Borneo. We hypothesised that increasing land-use intensity would lead to an increasing dominance of environmental control over spatial processes in community assembly. Additionally, we hypothesised that competitive interactions among species might reduce in concert with declines in α -diversity (previously documented) along the land-use gradient. 3. To test our first hypothesis, we partitioned community variance into the fractions explained by environmental and spatial variables. To test our second hypothesis, we used probabilistic models of expected species co-occurrence patterns, in particular focussing on the prevalence of spatial avoidance between species. Spatial avoidance might indicate competition, but might also be due to divergent habitat preferences. 4. We found patterns that are consistent with a shift in the fundamental mechanics governing local community assembly. In support of our first hypothesis, the importance of spatial processes (dispersal limitation and fine-scale patterns of home-ranging) appeared to decrease from low to high intensity land-uses, whilst environmental control increased in importance (in particular due to fine-scale habitat structure). Support for our second hypothesis was weak: whilst we found that the prevalence of spatial avoidance decreased along the land-use gradient, in particular between congeneric species pairs most likely to be in competition, few instances of spatial avoidance were detected in any land-use, and most were likely due to divergent habitat preferences. 5. The widespread changes in land-use occurring in the tropics might be altering not just the biodiversity found in landscapes, but also the fundamental mechanics governing the local assembly of communities. A better understanding of these mechanics, for a range of taxa, could underpin more effective conservation and management of threatened tropical landscapes.