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Habitat Degradation Shapes Biodiversity Patterns of Plants and Ants in Southwestern Madagascar

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Abstract

The Mahafaly plateau in southwestern Madagascar is part of a semi-arid region, characterised by a high level of local endemism in plants and animals (*e.g.* > 90% of the woody species are endemic). The natural vegetation of the area would be deciduous spiny forests. However, poverty and the fast population growth lead to an increased exploitation of the natural resources by the local population. The present extensive but non-sustainable land use practices for subsistence caused habitat degradation of forests (*e.g.* due to overgrazing, collection of firewood, logging and charcoal production) and the conversion of natural forests to cultural land (*e.g.* non-fertilised crop fields, hedges). Apparently, the land use type and land use intensity have pronounced impacts on biodiversity patterns of the natural assemblages, even in this remote area and even in the local National Park Tsimanampetsotse. The exact patterns of the biodiversity are, however, unknown.

Analysing composition of assemblages of plants and ants, we show that the effects of habitat degradation on natural communities differed among taxa. In $n=137$ plant communities, increasing habitat degradation lead to (1) decreasing local species richness, (2) increasing number of herbaceous neophytes and (3) decreasing species richness in woody species. Patterns of plant species occurrence were nested. In contrast, species richness in ant assemblages did not respond to habitat degradation. However we found considerable species turn-over along the degradation gradient. In both lineages we found a homogenisation of the assemblages with increasing degradation.

We conclude that, although the ecologic mechanisms differ among groups, a substantial part of the natural communities are highly sensitive to habitat degradation. Thus, our findings emphasise the need for forests effectively protected and the establishment of sustainable land use practices within our study area.

Keywords: Beta diversity, community composition, land use, Madagascar, nestedness