Biodiversity of leaf-litter ants in fragmented tropical rainforests of Borneo: The value of publically and privately managed forest fragments

Abstract

In view of the rapid rate of expansion of agriculture in tropical regions, attention has focused on the potential for privately-managed rainforest patches within agricultural land to contribute to biodiversity conservation. However, these sites generally differ in their history of forest disturbance and management compared with other forest fragments, and more information is required on the biodiversity value of these privately-managed sites, particularly in oil-palm dominated landscapes of SE Asia. Here we address this issue, using tropical leaf-litter ants in rainforest fragments surrounded by mature oil palm plantations in Sabah, Borneo as a model system. We compare the species richness and composition of ant assemblages in privately-managed forest fragments ('high conservation value' fragments; HCVs) with those in publically-managed fragments of forest (virgin jungle reserves; VJRs) and control sites in extensive tracts of primary forest. In this way, we test the hypothesis that privately-managed and publically-managed forest fragments differ in their species richness and composition as a result of differences in history and management and hence in habitat quality. In support of this hypothesis, we found that HCVs had much poorer habitat quality than VJRs, including lower sizes and densities of trees, less canopy cover, fewer dipterocarp trees and shallower leaf litter. Consequently, HCVs supported only half the species richness of ants in VJRs, which in turn supported 70 % of the species richness of control sites, with vegetation structure and composition explaining 77 % of the variation among forest fragments in ant species richness. HCVs were also much smaller than VJRs but there was only a weak relationship between fragment size and habitat quality, and species richness was not related to fragment size. VJRs supported 78 % of the 156 species found in extensive tracts of forest whereas HCVs supported only 22 %, which was only slightly higher than the proportion previously recorded in oil palm (19 %). These data support previous findings that publically-managed VJR fragments can make an important contribution to biodiversity conservation within agricultural

landscapes. However, we suggest that for these HCVs to be effective as reservoirs of biodiversity, management is required to restore vegetation structure and habitat quality, for instance through enrichment planting with native tree species.