

Does logging and forest conversion to oil palm agriculture alter functional diversity in a biodiversity hotspot?

Abstract

Forests in Southeast Asia are rapidly being logged and converted to oil palm. These changes in land-use are known to affect species diversity but consequences for the functional diversity of species assemblages are poorly understood. Environmental filtering of species with similar traits could lead to disproportionate reductions in trait diversity in degraded habitats. Here, we focus on dung beetles, which play a key role in ecosystem processes such as nutrient recycling and seed dispersal. We use morphological and behavioural traits to calculate a variety of functional diversity measures across a gradient of disturbance from primary forest through intensively logged forest to oil palm. Logging caused significant shifts in community composition but had very little effect on functional diversity, even after a repeated timber harvest. These data provide evidence for functional redundancy of dung beetles within primary forest and emphasize the high value of logged forests as refugia for biodiversity. In contrast, conversion of forest to oil palm greatly reduced taxonomic and functional diversity, with a marked decrease in the abundance of nocturnal foragers, a higher proportion of species with small body sizes and the complete loss of telecoprid species (dung-rollers), all indicating a decrease in the functional capacity of dung beetles within plantations. These changes also highlight the vulnerability of community functioning within logged forests in the event of further environmental degradation.