

Quantifying the Biodiversity Value of Repeatedly Logged Rainforests: Gradient and Comparative Approaches from Borneo

Abstract

There is substantial variation in the reported effects of logging on tropical forest fauna. In addition to inherent variation in disturbance sensitivity among taxa, another contributing factor is that most studies use comparative analyses of unlogged versus logged forests, which cannot fully account for heterogeneity in disturbance as well as underlying environmental gradients. To better understand how logging affects biodiversity, we examined changes in bat assemblages across a disturbance gradient ranging from old growth to forest logged several times. In one of the first evaluations of repeatedly logged forest, we use both comparative and gradient analyses to reveal substantial signals in assemblage change in response to habitat alteration. Despite multiple rounds of extraction in the most degraded forest, neither approach revealed a definitive effect of logging on site-based richness. However, each approach generated insight into assemblage compositional responses to forest degradation. Structural differences were evident between old-growth and repeatedly logged forest, and depauperate assemblages characterised degraded sites with low, open canopy. Ordinations identified species that best contributed to the signal of assemblage change, and also key associated forest-structure variables. Models of trap-based abundance confirmed not only the importance of forest height in determining assemblage change but also the role of tree-cavity availability in supporting forest specialists, indicating that efforts to supplement this resource could aid restoration. While highlighting the ecological importance of unlogged stands, we show that heavily degraded forests even those that have been repeatedly logged still hold some potential value for tropical biota and could have a role in conservation.