

The effects of rainforest canopy loss on arboreal dung beetles in Borneo: Implications for the measurement of biodiversity in derived tropical ecosystems

Abstract

We examine the effect of selective timber extraction, and corresponding forest canopy loss, on arboreal dung beetles in the tropical rainforests of Sabah, Malaysian Borneo. Changes in vertical distribution of beetles are measured through differences in the abundance of beetles in ground-based pitfall traps in primary, logged and plantation forest. Previous research has demonstrated that arboreal dung beetles are not generally collected in pitfall traps in primary forest, but are present in large numbers above the ground in canopy vegetation: the presence of arboreal beetles in pitfalls in areas of reduced or modified canopy cover may therefore reflect a response to the absence or modification of their usual habitat, and the proliferation of these beetles nearer to the ground. In this paper, statistically significant differences are found in the abundance of beetles in ground pitfall traps from logged forest compared to primary forest. Results show that virtually no arboreal dung beetles are recorded in primary forest traps, with an increased abundance of arboreal dung beetles in traps from logged and plantation forest, with 1.72% of the total number of arboreal beetles recorded from primary forest, 22.32% from logged forest, and 75.96% from plantation forest. The presence of arboreal dung beetles in plantations demonstrates that arboreal dung beetles can survive outside their normal habitat, and we relate these observations to adaptations to upper rainforest canopy conditions, and proliferation of these microclimatic conditions in man-made habitats. Results are also discussed in terms of their relevance to the measurement of species richness and diversity in logged and other derived ecosystems, where mixing of the ground-based and arboreal faunas occurs.