

Life in the Canopy: Using Camera-Traps to Inventory Arboreal Rainforest Mammals in Borneo

ABSTRACT

Arboreal mammals form a diverse group providing ecologically important functions such as predation, pollination and seed dispersal. However, their cryptic and elusive nature, and the heights at which they live, makes studying these species challenging. Consequently, our knowledge of rainforest mammals is heavily biased towards terrestrial species, limiting our understanding of overall community structure and the possible impacts of human-induced disturbance. We undertook the first in-depth appraisal of an arboreal mammal community in Southeast Asia, using camera-traps set in unlogged and logged tropical rainforest in Sabah, Borneo. Using paired canopy and terrestrial camera-traps at 50 locations (25 in unlogged forest, 25 in logged), we assessed the effectiveness of camera-trapping at characterising the arboreal versus terrestrial community, and tested the influence of strata and forest type on community structure and composition. The paired design detected 55 mammal species across 15,817 camera-trap nights (CTNs), and additional canopy sampling in a subset of trees added a further two arboreal species to the inventory. In total, thirty species were detected exclusively by terrestrial camera-traps, eighteen exclusively by canopy camera-traps, and nine by units set at both heights, demonstrating significant differences between arboreal and terrestrial communities. This pattern was strongest in unlogged forest, reflecting greater structural diversity of this habitat, but held in logged forest as well. Species accumulation curves revealed that canopy camera-trapping significantly boosted species inventories compared to terrestrial-only sampling, and was particularly effective at detecting gliding mammals, rodents and primates. Canopy inventories took longer to reach an asymptote, suggesting that a greater sampling effort is required when deploying canopy camera-traps compared to those set on the ground. We demonstrate that arboreal mammals in Borneo's rainforest form a diverse and distinct community, and can be sampled effectively using canopy camera-traps. However, the additional costs incurred by sampling in the canopy can be substantial. We provide recommendations to maximise sampling effectiveness, while bringing down costs, to help encourage further study into one of the last frontiers of tropical forest research.