Stratified activity: Vertical partitioning of the diel cycle by rainforest mammals in Borneo

ABSTRACT

Animal activity is driven by the environmental conditions and physical structure of a habitat, and the need to interact with, or avoid, other animals. Knowledge of the proportion of the 24-hour cycle spent active (activity level), and the time/s of day in which activity is concentrated (activity pattern), informs our understanding of species' ecology and community dynamics. In multidimensional habitats such as tropical rainforests, arboreal (canopy-dwelling) taxa comprise up to three-quarters of vertebrate assemblages; yet, wildlife surveys are typically limited to ground level. Terrestrial-only sampling can result in activity metrics that do not take account of species' full use of horizontal and vertical habitat space. We paired ground- and canopy-level camera traps to characterize mammal activity across vertical strata in Borneo. Additionally, we sampled unlogged and recovering-logged rainforest to evaluate whether this activity was impacted by logging. Activity across vertical strata varied substantially among 37 species. Arboreal mammals were predominantly nocturnal or diurnal but never cathemeral, terrestrial mammals were mostly nocturnal or cathemeral, and semi-arboreal mammals appeared to fill the temporal niches under-utilized by other groups. Differences in activity between unlogged and recovering-logged forest were minimal, with 92% of species found in both forest types retaining the same activity pattern. Our study demonstrates that the inclusion of canopy-based sampling provides much greater insights into overall rainforest mammal activity than terrestrial sampling alone. Our results suggest that the varying opportunities and constraints of each stratum act in concert to influence the diel patterns of tropical mammals. Abstract in Malay is available with online material.