Drivers of Bornean orangutan distribution across a multiple-use tropical landscape

ABSTRACT

Logging and conversion of tropical forests in Southeast Asia have resulted in the expansion of landscapes containing a mosaic of habitats that may vary in their ability to sustain local biodiversity. However, the complexity of these landscapes makes it difficult to assess abundance and distribution of some species using ground-based surveys alone. Here, we deployed a combination of ground-transects and aerial surveys to determine drivers of the critically endangered Bornean Orangutan (Pongo pygmaeus morio) distribution across a large multiple-use landscape in Sabah, Malaysian Borneo. Ground-transects and aerial surveys using drones were conducted for orangutan nests and hemi-epiphytic strangler fig trees (Ficus spp.) (an important food resource) in 48 survey areas across 76 km^2, within a study landscape of 261 km^2 . Orangutan nest count data were fitted to models accounting for variation in land use, above-ground carbon density (ACD, a surrogate for forest quality), strangler fig density, and elevation (between 117 and 675 m). Orangutan nest counts were significantly higher in all land uses possessing natural forest cover, regardless of degradation status, than in monoculture plantations. Within these natural forests, nest counts increased with higher ACD and strangler fig density, but not with elevation. In logged forest (ACD 14–150 Mg ha^{-1}), strangler fig density had a significant, positive relationship with orangutan nest counts, but this relationship disappeared in a forest with higher carbon content (ACD 150–209 Mg ha^{-1}). Based on an area-to-area comparison, orangutan nest counts from ground transects were higher than from counts derived from aerial surveys, but this did not constitute a statistically significant difference. Although the difference in nest counts was not significantly different, this analysis indicates that both methods under-sample the total number of nests present within a given area. Aerial surveys are, therefore, a useful method for assessing the orangutan habitat use over large areas. However, the under-estimation of nest counts by both methods suggests that a small number of ground surveys should be retained in future surveys using this technique, particularly in areas with dense understory vegetation. This study shows that even highly degraded forests may be a suitable orangutan habitat as long as strangler fig trees remain intact after areas of forest are logged. Enrichment planting of strangler figs may, therefore, be a valuable tool for orangutan conservation in these landscapes.