

Movement behavior of native and invasive small mammals shows logging may facilitate invasion in a tropical rain forest

Abstract

Invasive species pose one of the greatest threats to biodiversity. This study investigates the extent to which human disturbance to natural ecosystems facilitates the spread of non-native species, focusing on a small mammal community in selectively logged rain forest, Sabah, Borneo. The microhabitat preferences of the invasive *Rattus rattus* and three native species of small mammal were examined in three-dimensional space by combining the spool-and-line technique with a novel method for quantifying fine-scale habitat selection. These methods allowed the detection of significant differences for each species between the microhabitats used compared with alternative, available microhabitats that were avoided. *Rattus rattus* showed the greatest preference for heavily disturbed habitats, and in contrast to two native small mammals of the genus *Maxomys*, *R. rattus* showed high levels of arboreal behavior, frequently leaving the forest floor and traveling through the understory and midstory forest strata. This behavior may enable *R. rattus* to effectively utilize the complex three-dimensional space of the lower strata in degraded forests, which is characterized by dense vegetation. The behavioral flexibility of *R. rattus* to operate in both terrestrial and arboreal space may facilitate its invasion into degraded forests. Human activities that generate heavily disturbed habitats preferred by *R. rattus* may promote the establishment of this invasive species in tropical forests in Borneo, and possibly elsewhere. We present this as an example of a synergistic effect, whereby forest disturbance directly threatens biodiversity and indirectly increases the threat posed by invasive species, creating habitat conditions that facilitate the establishment of non-native fauna.