

Barriers to dispersal of rainforest butterflies in tropical agricultural landscapes

ABSTRACT

Fragmentation of natural habitats can be detrimental for species if individuals fail to cross habitat boundaries to reach new locations, thereby reducing functional connectivity. Connectivity is crucial for species shifting their ranges under climate change, making it important to understand factors that might prevent movement through human-modified landscapes. In tropical regions, rain forests are being fragmented by agricultural expansion, potentially isolating populations of highly diverse forest-dependent species. The likelihood of crossing habitat boundaries is an important determinant of species dispersal through fragmented landscapes, and so we examined movement across rain forest-oil palm plantation boundaries on Borneo by using relatively mobile nymphalid butterflies as our model study taxon. We marked 1666 individuals from 65 species, and 19 percent (100/527) of recaptured individuals crossed the boundary. Boundary crossing was relatively frequent in some species, and net movement of individuals was from forest into plantation. However, boundary crossing from forest into plantation was detected in less than 50 percent (12/28) of recaptured species and was dominated by small-sized butterfly species whose larval host plants occurred within plantations. Thus, while oil palm plantations may be relatively permeable to some species, they may act as barriers to the movement of forest-dependent species (i.e., species that require rain forest habitat to breed), highlighting the importance of maintaining forest connectivity for conserving rain forest species.