

# **Effects of in situ habitat quality and landscape characteristics in the oil palm agricultural matrix on tropical understory birds, fruit bats and butterflies**

## **ABSTRACT**

The expansion of commercial oil palm crop has modified much of the natural landscape, subsequently leading to biodiversity loss in Southeast Asia. Aside from large-scale oil palm monoculture plantations, self-managed oil palm smallholdings are also becoming common in palm oil producing countries, but less is known about how management of the smallholdings affects faunal biodiversity. We argue that it is critically important to understand the role of habitat complexity at the local and landscape scales for maintaining faunal biodiversity in oil palm smallholdings. We used passive sampling methods to survey understory birds, fruit bats, and butterflies in oil palm smallholdings on the west coast of Peninsular Malaysia. We quantified the diversity in each taxon and measured in situ habitat quality and landscape metrics. We found that oil palm smallholdings located near rice fields supported fewer bird species. Proximity to roads can give rise to bird and fruit bat richness. Bird and fruit bat richness declined at sites with high crop density. Fruit bat richness declined, but butterfly richness increased, with the height of oil palm stands. Butterfly richness declined with distance from riparian habitats. Decreased coverage and height of ground vegetation also negatively affected butterfly species richness. We also found that the number of farm houses is positively related to bird, fruit bat, and butterfly species richness. Of the three taxa, only butterfly richness was positively influenced by crop diversity. We found that habitat complexity enables smallholdings to support a diverse community of birds and butterflies, but not fruit bats. These findings imply that oil palm smallholdings can be managed in a conservation agricultural matrix, as the smallholdings were able to maintain farmland biodiversity.

**Keyword:** Agricultural matrix; Biodiversity; Conservation; Habitat complexity; Oil palm; Smallholdings