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Biodiversity conservation value of swidden agroforestry systems vs. RSPO oil palm in West Kalimantan, Indonesia

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The loss of biodiversity following forest conversion into monoculture plantations is well documented in SE Asia. The effectiveness of land sparing or integrating “wildlife-friendly” management into agricultural landscapes to maintain biodiversity is still a matter of debate. This study examines biodiversity conservation value of forest fragments in two types of land management: monoculture oil palm plantation under RSPO scheme, and agroforestry systems within swidden landscapes in the last forest frontier of West Kalimantan province. The area is a mixture of forested and agricultural lands dominated by swidden traditional practices, while oil palm plantations are expanding.

We studied three sites representing different intensities of forest fragmentation at various distances from the contiguous forest. We surveyed swidden landscapes featuring natural forest, old and young fallows, smallholder jungle rubber plantations and forest remnants patches (mixed dipterocarp, peat swamp, and Kerangas forests) in oil palm concession. At each site, trees, birds and soil arthropods were sampled. Plots were laid for tree measurements (60 plots; 20 m x 20 m), bird recorded using timed point-counts and mist nets (120 points; 2087 mist-net hour), and litter-soil sample (140 trays) collected for soil arthropods identification. We used ordination, indicator species analysis, and statistical tests to assess the biodiversity conservation value of forest fragments.

As expected, trees and birds species diversity were highest in natural and old secondary forest, but swidden agroforestry systems were also considerably biodiversity-rich largely outperforming oil palm forest fragments and rubber monocultures in terms of bird species richness. Natural forest and old fallows sustained a higher number of endangered bird species compared to young fallows and monoculture plantations. The species richness of soil arthropods -as ecosystem engineers- was also significantly highest in natural and old secondary forest, with Acari, Hymenoptera, Collembola, and Coleoptera being the most abundant.

Traditional agroforestry systems should be maintained and managed to support forest successional stages and high biodiversity at the landscape level. Agroforestry patches in swidden landscape significantly harbored more diverse species composition than forest fragment remnants in oil palm concession and were even comparable in term of species richness to natural forests. Oil palm concession in our study site still contained high conservation value forest patches, but these particular patches were considerably larger (c. 500-1000 ha) than the one ha blocks preconized by the RSPO scheme. The question remains if these forest patches will remain resilient in the long run since connectivity with the contiguous forest has been lost.

Keywords: Biodiversity, Swidden, Agroforestry, Oil palm, RSPO.