# A Revisit on Sustainable Practices in Oil Palm Plantation

Various environmentally friendly practices are customarily adopted to enhance the sustainability of oil palm plantations in Malaysia and Indonesia. Most companies in their agricultural policies to ensure implementation of sustainable agriculture on the ground have already accepted many of the major practices. These include planting of leguminous cover crops, retention of palm wastes within the field, such as palm biomass after felling during replanting, palm fronds, recycling of palm oil mill by-products such as land application of treated palm oil mill effluent, mulching with empty fruit bunches and decanter solids. Integrated pest management by planting of beneficial plants to promote natural predators of leaf-eating pest, breeding of barn owls for rodent control and other cultural practices such as zero-burning are examples of some other widely used sustainable agriculture practices. Efforts to enrich biodiversity include planting of fast-growing timber species on steep slopes, leaving buffer zones along banks of rivers and land too difficult to work. These include dissected valleys, very steep slopes and waterlogged swamps which are allowed to revert to natural vegetation. Natural ecosystems such as *Nipah* palms, *Pakau* swamps, natural forests as well as orchards and smallholder crops surrounding the estates also help to enrich biodiversity on a broader landscape.

Active stewardship in terms of environmental responsibility and conservation of natural resources and biodiversity has become more apparent in many oil palm plantations since the introduction of the Roundtable on Sustainable Palm Oil (RSPO) sustainable standards in 2004 (http://www.rspo.org/). Implementation of biodiversity-friendly management practices includes identifying and preserving habitats of high conservation value to minimise losses in natural habitats and biodiversity. Such measures have become an integral part of oil palm plantation operations. These are in addition to the sustainable agronomic practices that have been implemented over the last many decades.

In a monitoring exercise between 2008 and 2018 in an oil palm plantation in Riau, ninety-nine bird species, ten small mammal species, seven reptile species, have been recorded. Similarly, in another oil palm plantation in Central Kalimantan, a diverse community of seventy-six bird species, twenty small mammal species, twenty-one reptile species, has been recorded between 2013 and 2018. Casual monitoring along roadside and oil palm fields recorded eighteen and thirty-six butterfly species respectively in these two plantations. Fish species counts from local communities' fish catches showed there were nineteen and twelve fish species respectively in the rivers in these plantations. In North Sumatra, twenty-nine species of birds have been recorded. Other anecdotal studies have also revealed that oil palm plantations can support a community of organisms including ants, birds, mammals and reptiles. Eighty-three species of birds, nine species of mammals and six species of reptiles have been reported from an oil palm plantation in Selangor and twenty-two species of birds

from a plantation in Johore. In East Sabah, thirty-five species of birds, seven mammalian species and thirty butterfly species were recorded from studies in fifteen oil palm plantations. Higher cover of ground vegetation in plantations has been shown to marginally increase diversity of butterflies. The prevalence of epiphytes on palm trees and amount of ground vegetation cover have positive effects on the diversity of birds in oil palm plantations.

Biodiversity in oil palm plantation can further be enhanced by preservation of natural habitats in the oil palm ecosystem. A study in 2007 in a set-aside area consisting of a small forest reserve (75 ha) within the oil palm plantation in the state of Selangor have shown that such ecosystem harboured six species of primates, seven frugivorous animals, one insectivore, four squirrels and five predators. The study also reported that regenerated secondary jungle on a hilly terrain, riparian reserves and fresh water swampland has similarly been found to contain numerous species of flowering plants, birds, bats and other small mammals. In a separate collaborative study on aquatic biodiversity in an oil palm plantation in Central Kalimantan in 2013, it was shown that retaining natural vegetation (e.g. natural forests and forests that have been logged and regenerated or altered by humans) next to streams greatly helps conserve fishes in oil palm dominated landscapes. Aquatic organisms rely upon the diversity of habitats and resources for food, materials, and breeding grounds.

Research findings in 2008 and 2010 have shown that proximity to forest or other habitat types plays a big role in determining diversity. The diversity of birds and butterflies within plantations is highest near adjacent forest, though these responses vary strongly among species. In a 2014 research report, forest proximity was the main determinant of mammal richness and occurrence. Effective corridor design aims to have large strips of forest within oil palms, through which animals can travel and enhance their mobility.

Although obviously not as biologically diverse as pristine habitats, such as tropical rain forests, the plantation ecosystem does harbour a variety of wildlife with preservation of natural habitats in the oil palm ecosystem. Also, habitat connectivity is a critical issue when dealing with oil palm expansion.

A research study in 2008 involving bird exclosure experiment showed that bird exclusion significantly increased herbivory damage to oil palms, and that the magnitude of this effect increased with the density of insectivorous birds. This study compared the rate at which oil palm seedlings were damaged by insect pests (herbivory rate) between seedlings that were in treatments where birds were excluded (caged and inaccessible to birds) and seedlings that were in control treatments (exposed and accessible to birds). Many birds feed on insects. Some of these species could potentially be providing beneficial pest control services for oil palm agriculture. Some of the bird species recorded from oil palm plantations are carnivorous hovering above oil palm fields and foraging for small vertebrates such as rats. In another anecdotal report, three species of snakes and monitor lizard are carnivorous and feed mainly on rats. These reptile species could be important in limiting rat populations in oil palm plantation.

Many stakeholders believe that being a monoculture, oil palm plantations in Malaysia and Indonesia are 'biodiversity desert' devoid of wildlife. Although obviously not as biologically diverse as tropical rain forests, the

plantation ecosystem does harbour a variety of wildlife and plants. Wildlife that is present in oil palm plantations can be maintained and be enhanced by preservation of natural habitats in an artificial oil palm ecosystem. The biodiversity that exists in oil palm estates is economically important for oil palm agriculture.

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*Author's note:*

*This review is a collation of numerous past research findings and the references are too long to be mentioned in this editorial. The author wishes to express his gratitude and thanks to the authors and researchers of these scientific publications.*