

# **Applying Paludiculture to Enhance Sustainable Peatland Management**

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# THE COLLECTIVE EFFORTS OF RESTORING PEATLAND AREA

With over 15 million ha of peatlands, Indonesia has the most extensive tropical peatland in the world (Miles et al., 2017). More than 12% of its forest land spreading across islands of Sumatra, Kalimantan, Sulawesi and Papua. Peatlands in tropical regions are highly critical to prevent greenhouse gasses (GHG) emission as it home to more than 30% of carbon stored in soil worldwide (Ministry of Environment, 2018). Unfortunately, many agriculture companies and smallholder farmers have insufficient technical skill and capability to cultivate the peatland effectively. Since peat contains a high level of water, many of them performed excessive land drainage, which caused irreversible drying. Drained peatland is highly flammable and vulnerable to spreading forest fires as happened in 2015 when Indonesia experienced the largest forest fire in modern human history, with more than 2.5 million hectares of tropical landscape burning (Ensia, 2017).

In attempt to deliver a significant improvement, the government has been enforcing policies for peatland restoration. Ranging from the establishment of Peatland Restoration Agency, implementation of Regulation No. 15 of 2017 that guides the measurement of the water table at the peat ecosystem management sites, to the Regulation No. 16 of 2017 which guides the improvement efforts to protecting vulnerable peat ecosystems (Ministry of Environment, 2018). The President even planned to restore peatlands which located in the production forest and to revoke the company's Business License for Forest Utilization (CNN, 2017). The current trend shows a raising awareness among agriculture companies to utilize sustainable water management-through canalization, dam, and water table control. However, a recent study revealed that applying those efforts only is not enough to prevent subsidence and will therefore eventually result in frequent and prolonged flooding of such drained peatlands. This process threatens to gradually change entire peatland dominated lowlands in large parts of Southeast Asia from economically productive landscapes into socio-economic disaster areas (Wetlands International Report, 2016).

## INTRODUCING PALUDICULTURE

Upon restoration, the government is targeting revegetation as the next step. It aims to maintain a vegetation cover on peat which increases humidity in the soil and air, slows peat decomposition and decreases fire risks (Giesen & Nirmala, 2018). Leading environmental organizations such as Center for International Forestry Research (CIFOR), World Resource Institute (WRI), and Food and Agriculture Organization (FAO) have been imposing paludiculture, a native plants cultivation technique that does not require land drainage. The method enables sustainable peat swamp forest cultivation that protects the ecosystem through peat rehabilitation, blocking the water channel, and planting the native species (Joosten et al., 2012). This practice is expected to produce biomass (the biological materials in plants) that will support peat formation in the long run.

Peat ecosystem in Southeast Asia is endowed with abundant biodiversity. There are at least 1,463 plant native species living in the peat swamp to which only 40% has been identified with use value (Giesen & Nirmala, 2018). Besides the native ones, other particular plants can also be modified and adapted to grow in the peatland but not considered as paludiculture. These include dragon fruit, coconut, coffee, rice, vegetables, corn, cocoa, cempedak, duku, durian, orange, banana, pepper, red ginger, rubber, liberica coffee, and watermelon (Nirmala et al., 2018).

Wetland International and the Research Development and Innovation Agency (FORDA) of the Indonesian Ministry of Environment and Forestry had listed various kinds of native peatland species that contain use-value as seen in Table 1.

## PALUDICULTURE IN PRACTICE: TANJUNG JABUNG BARAT DISTRICT, JAMBI

As revegetation effort is increasingly taking place, paludiculture remains as an effective method to restore the peatland in Indonesia. Among others, one of the notable initiatives is the 15,965 ha swamp forest rehabilitation in Sungai Bram Itam, Tanjung Jabung Barat District, Jambi Province (Tata & Susmianto, 2016). In 2009, this site was designated as a Protected Peat Forest (Hutan Lindung Gambut) area as it provides a water source for Tanjabar community. The transmigrants from Riau, Bugis, Banjar and Java, have occupied most of the area. They used to clear the land with the slash-and-burn method and built canals to grow palm oil and other commodities including coconut, palm, coffee, corn, banana, chilli, laos, and cassava.

The government had been working with the World Agroforestry Center to rewet the land and block the canals. The activities were followed by establishing farmer groups to attain forest management rights through the Community Forest Scheme (*Skema Hutan Kemasyarakatan Hutan*). This scheme required the local farmers to plant jelutung seeds (*Dyera polyphylla*) among palm oil trees in their plantation. The government and the farmers had come into agreement that palm oil is only allowed to grow until one harvest

| No | Use-Value  | Species (In Indonesian and Latin)  |
|----|--|--|
| 1  | Food products (including fruit,<br>carbohydrate, protein, spices and<br>fat/oil) | Sagu (Metroxylon spp.), asam kandis (Garcinia xanthochymus), kerantungan (Durio<br>oxleyanus), pepaken (Durio kutejensis), mangga kasturi (Mangifera casturi), mangga<br>kueni (Mangifera odorata), rambutan (Nephelium spp.), nipah (Nypa fruticans), kelakai<br>(Stenochlaena palustris), tengkawang (Shorea stenoptera, S. macrophylla) |
| 2  | Fiber (as substitution for pulp and paper materials)                             | Geronggang (Cratoxylum arborescens), terentang (auriculatum), gelam (Melaleuca<br>cajuputi)  |
| 3  | Bio-energy sources (used as materials for wood pellet bracket, bio-ethanol)      | Gelam (Malaleuca cajuputi), sagu (Metroxylon sago), nipah (Nypa fruticans)   |
| 4  | Latex  | Jelutung (Dyera polyphylla), nyatoh (Palaquium leiocarpum), sundi (Payena spp.,<br>Madhuca spp.)   |
| 5  | Herbal sources   | Akar kuning (Coscinium fenestratum), pulai (Alstonia pneumatophora)  |
| 6  | Other forest products  | Gaharu (Aquilaria sp.), gemor (Alseodaphne sp.), purun tikus (Elaeocharis dulcis),<br>rotan irit (Calamus trachycoleus)  |
| 7  | Timber with conservation value   | Ramin (Gonystylus bancanus), meranti merah (Shorea macrantha, Shorea balangeran)   |

Table 1. Use-Value of Paludiculture Plants (Tata & Susmianto, 2016).

cycle. At the end of the cycle, the farmers shall obtain the management rights for jelutung. The rehabilitation has reached 500 ha of jelutung with intercropping method next to palm oil plantation.

In 2012, the initiative's development was somewhat stagnant as it faced several challenges. For instance, there was a different perception among the local farmers in Bram Itam Kanan Village and Bram Itam Kiri Village over the forest status. The first was more cooperative since they acknowledge the forest status as Protected Peat Forest area, while the later against it. Some of them even claimed that their crop fields were not part of the peatland; hence, they should be exempted from any regulation. The Forestry Bureau was initially planned to double the jelutung crops in Bram Itam Kiri Village, alas, the communities declined the proposal and refused to grant the permission to plant jelutung seeds in their area (Agung et al., 2012)

The land ownership was obtained through land market process in which it led to a series of disputes between the farmers and the Forestry Bureau. The farmers had purchased the lands before the protected peat forest status was designated. It made them believed that they have legal rights to manage the lands, primarily to sustain their palm oil plantation. In addition, the grass-root level institution as the major component to run the Community Forest Scheme had not established yet. The existing local groups were limited to organizing religious and social events (e.g. gotong royong). Ideally, the community should form a farmers group that able to accommodate the people's needs, the scheme operation, as well as bridging the partnership with government the and nongovernmental organizations (NGOs).

Other than in Tanjung Jabung Barat, more projects to promote paludiculture have been implemented such as in Muara Merang Village, Musi Banyuasin District, South Sumatera; Sebangau National Park, Central Kalimantan; Ex- One Million Hectares Peatland Project, Central Kalimantan; and Sago Forest, Jayapura, Papua (Ministry of Environment, 2018). This development indicates that this method has been increasingly adopted to address Indonesia's peatland degradation.

#### CONCLUSIONS

Paludiculture is a relatively novel method to peatland conservation and agricultural practice in Indonesia.

Although it evidently has a promising approach for sustainable peatland agriculture, further research and experiment are needed to identify the most feasible way in linking the method to the innovative scheme which able to benefit the communities socially and economically. For now, shifting the farmers' paradigm on the importance of peat ecosystem, the low valuation of paludiculture plants compared to commodities such as palm oil, and the absence of a robust grass-roots institution remain as the significant constraints to make the method viable.

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# ABOUT TJF

Tay Juhana Foundation (TJF) is a nonprofit organization dedicated to promote the advocacy of the conversion and cultivation of suboptimal lands into productive lands, through the most environmentally, economically, and socially sustainable manner.

## CONTACT US

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