

Paludiculture in Indonesia : current practise and its relevance on the strategy of peatland restoration

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Renewable Resources from Wet and Rewetted Peatlands
Greifswald, Germany, 26-28 September 2017

The importance of peatland ecosystem



Multifunctionality of Peatland Ecosystem



Providing Ecosystem Services: water storage, water regulation, carbon storage, biodiversity resources



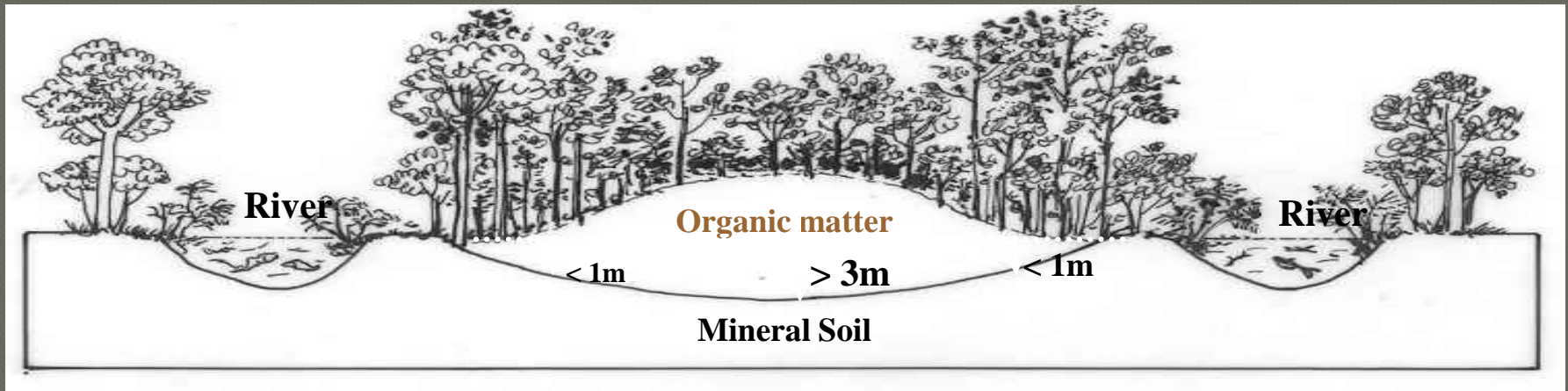
Sources of income and livelihood



The balance of both functions has to be maintained through wise management in order to get sustainable benefits.

Protection and Productive Functions in Peatland hydrological unit (PHU)

Peatland Hydrological Unit → peatland as a landscape



- In natural condition, it contains water 13 x of its biomass.
- High acidity, low nutrient content.
- Depth varied: 1 - >10 m
- Total peat carbon store in Indonesia within: 13.6 GtC to 40.5 GtC (Warren et al., 2017).

Peat Hydrological Unit Map

Number of PHU= 673
Area = 26,477,720 ha

Pulau	Jumlah KHG	Lintas Batas Administrasi			Luas	
		Kabupaten /Kota	Lintas Kabupaten /Kota	Lintas Provinsi	Ha	%
Sumatera	210	4.110.405	5.438.624	97.431	9.646.459	36,43
Kalimantan	155	3.225.647	5.412.096	148.266	8.786.009	33,18
Sulawesi	8	39.727	8.488	0	48.214	0,18
Papua	300	804.093	7.192.944	0	7.997.038	30,20
Luas Total	673	3.225.647	5.412.096	148.266	26.477.720	100,00

Sources: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroX, Swisstopo, AerialGrid, IGN, IGP, swisstopo, and the GIS User Community

PETA KESATUAN HIDROLOGI GAMBUT (PROVINSI, KABUPATEN/KOTA) INDONESIA



Skala 1:13.200.000

Proyeksi : Transverse Mercator
Sistem Grid : Grid Geografis dan Universal Transverse Mercator,
Datum horizontal : WGS 1984

Legenda

- Batas Negara
- Batas Provinsi
- Batas Kabupaten/Kota

Kesatuan Hidrologi Gambut :

- ✂ KHG Lintas Provinsi
- ✂ KHG Lintas Kabupaten/Kota
- ✂ KHG Kabupaten/Kota

Kerjasama :



Kementerian Lingkungan Hidup dan Kehutanan



Badan Informasi Geospasial Republik Indonesia

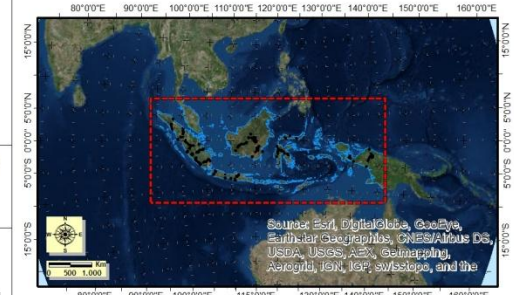


Kementerian Pertanian Republik Indonesia

Direktorat Pengendalian Kerusakan Gambut
Direktorat Jenderal Pengendalian Pencemaran dan Kerusakan Lingkungan

Sumber: 1. Interpretasi Citra Landsat-8 OLI (Tahun 2014/2015)
2. Data Revisi Peta KHG Pulau Sumatera, Tahun 2015
3. Data Landsystem, ReProTI, Tahun 1990
4. Peta Dasar (Seamless) N81, skala 1:250.000, Tahun 2014

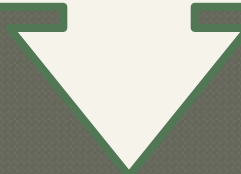
Catatan: Peta ini bukan referensi resmi mengenai garis-garis batas administrasi nasional & internasional



Sources: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroX, Swisstopo, AerialGrid, IGN, IGP, swisstopo, and the GIS User Community

Mis-management of peatlands:

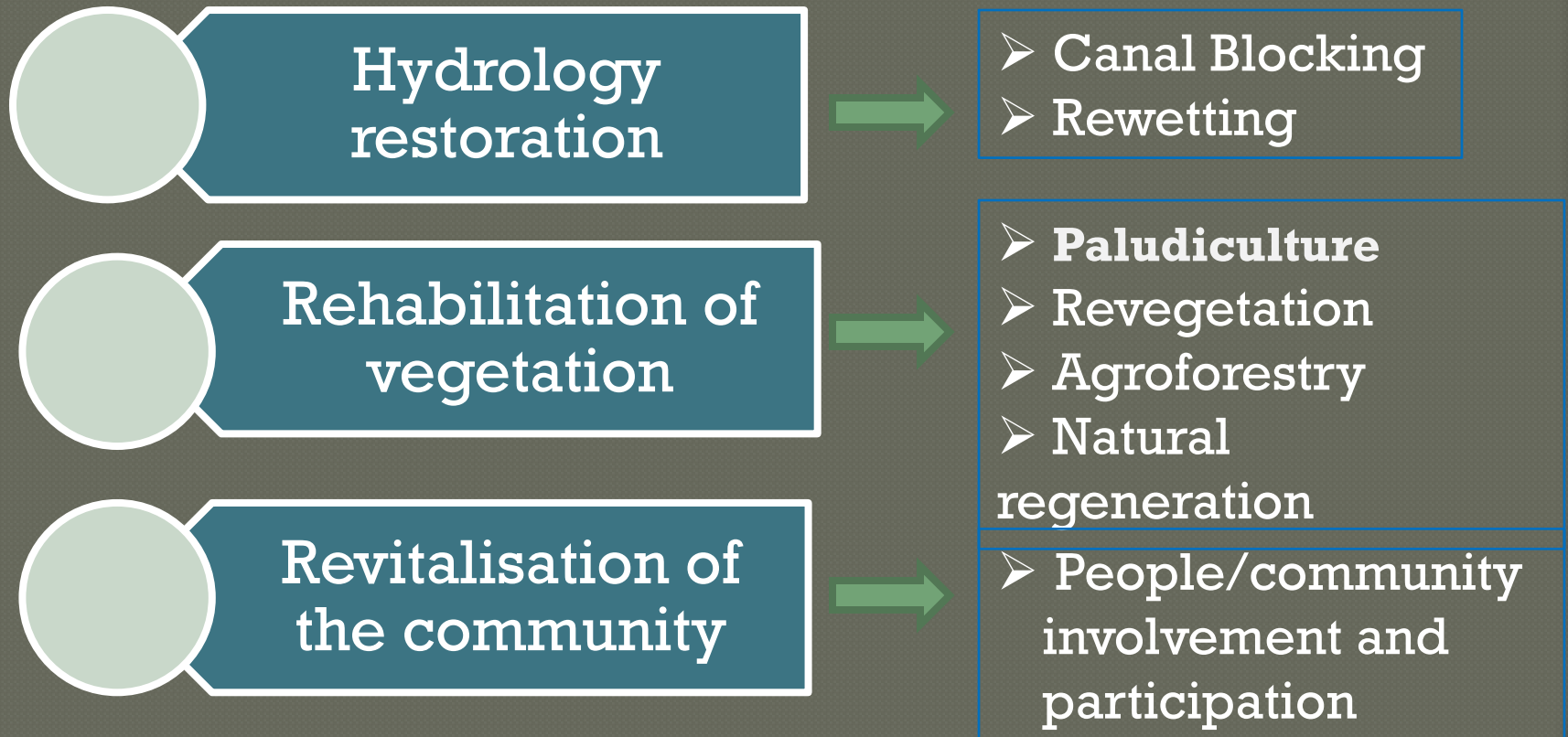
- Prescribe burning
- Illegal logging
- Extent drainage and/or channels
- Peat compacting
- Over-use chemicals (fertilizer and pesticide)



- GHG (CO_2 , CH_4 , N_2O) emission increase
- Water over-drained → irreversible drying and fire
 - Subsidence → flood risk increase
- Toxic compounds may release into water and atmosphere

Peatland Restoration

The degraded peatlands have to be restored through restoration, rehabilitation, or other relevant and new methods.



Restoration Peatland Ecosystem

- In accordance with the International Agenda:
 - a. Bonn *challenge* – *The Forest Landscape Restoration*
→ restoration target: 150 million ha of deforested and degraded area up to 2020, and 350 million ha by 2030.
 - b. Adaptation & mitigation on climate change (UNFCCC), COP22 di Marakesh → “The Peatlands Global Initiative”.
 - c. Aichi Target of the Convention on Biological Diversity.
 - d. The sustainable development goals (SDG).

In accordance with national agenda:

- President's Regulation No.1/2016 about National Restoration Agency, targeted 2.4 million ha to be restored by 2019.
- The Strategic Planning of the MoEF
- National target in 2019:
 - GHG emission is reduced by 26% and people adaptation to climate change increase
 - Management of peatlands is improved.
 - 5% of PHUs in Indonesia (about 32 PHUs) are restored.

What can be offered by Paludiculture?

- Numbers of vegetations that naturally grow on peat-swamp (1467) has been identified, but only 40% has been known provide benefit for human (Giesen, 2015).
- Species selection in restoration consider some principles:
 - 1) Technologically practice
 - 2) Ecologically friendly
 - 3) Socially acceptable
 - 4) Economically benefit

Prospek Paludikultur Ekosistem Gambut Indonesia

Hesi Lestari Tana
Adi Susmianto



Penerbit:
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BOGOR, 2016

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The book can be accessed at: www.forda-mof.org

Paludiculture practises in Indonesia



Some alternative species and their uses

No.	Benefit / Use	Species
1.	Food (fruits, carbohydrate, protein, spice)	Sago (<i>Metroxylon sago</i>), Kerantungan (<i>Durio oxyelanus</i>), Pepaken (<i>Durio kutejensis</i>), Mangga Kesturi (<i>Mangifera casturi</i>), Kweni (<i>Mangifera ofodara</i>), Nipah (<i>Nypa fruticans</i>), Durian (<i>Nephelium</i> spp.), asam kandis (<i>Garcinia xanthoxymus</i>)
2.	Fiber	Geronggang (<i>Cratoxylum arborensceus</i>), Terentang (<i>Camptosperma auriculatum</i>), gelam (<i>Melaleuca cajuput</i>)
3.	Bio-energy	Gelam (<i>Melaleuca cajuput</i>), sago, nipah
4.	Latex	Jelutung (<i>Dyera polyphylla</i>), nyatoh (<i>Palaquium leiocarpum</i>), sundi (<i>Payena</i> spp. <i>Madhuca</i> spp.)
5.	Medicine	Akar kuning (<i>Coscinium fenestratum</i>), pulai (<i>Alstonia penumatophora</i>)
6.	Others (Non-timber)	Gemor (<i>Alseodaphne</i> sp.; <i>Notaphoebe</i> sp.), purun (<i>Elaeocharis dulcis</i>), rattan (<i>Calamus tracycoleus</i>), gaharu
7.	Conservation-value	Ramin (<i>Gonystylus bancanus</i>), <i>Shorea</i> spp.

Paludiculture in Jambi

Tipology: Ombrogen

Peat depth: shallow – moderate (50-250 cm)

Maturity: hemic - sapric



Jelutung, coffee, bettlenu
t in Jambi



Coffea liberica

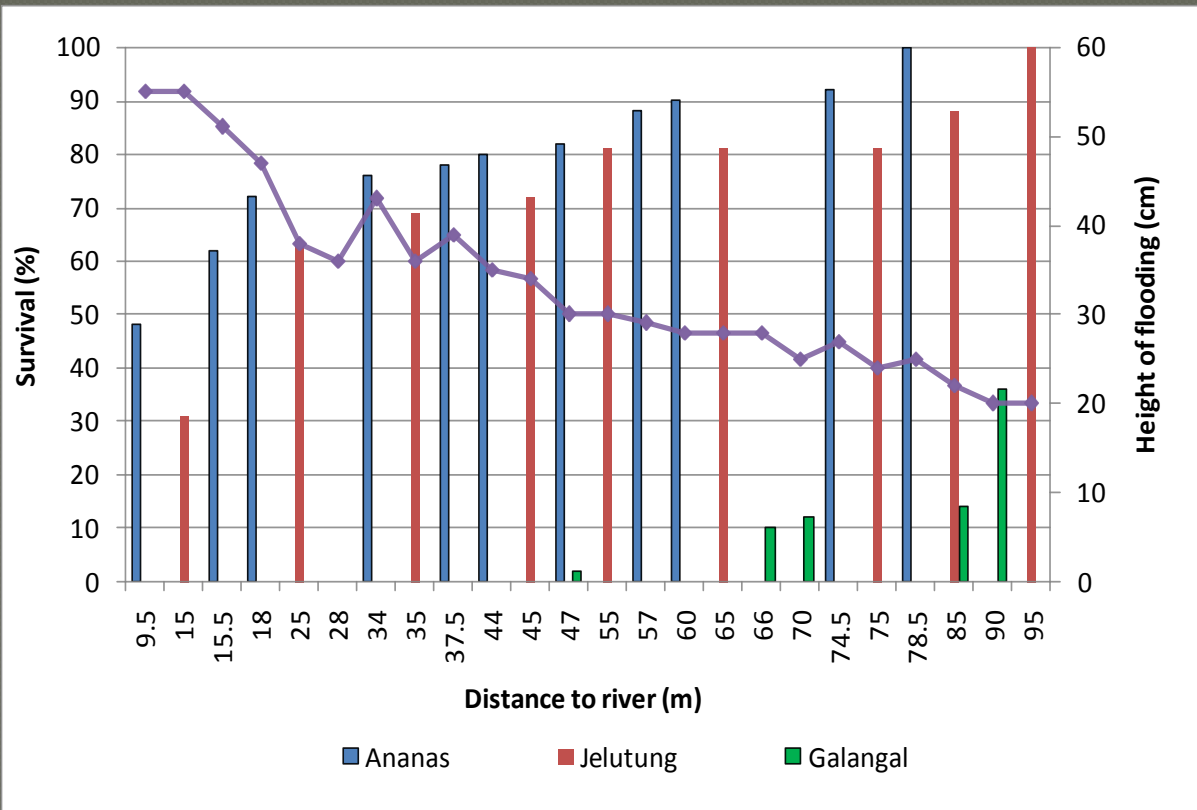


Jelutung & oil palm
in Bram Itam, Jambi



Bettlenut & pineapple

Flooded effects on survival of cash-crops



(Bastoni et al., 2015; PFRM report)



JELUTUNG RAWA

Teknik Budidaya
dan Prospek Ekonominya

Penulis

Hesti L. Tata, Bastoni, M. Sofiyuddin,
Elok Mulyoutami, Aulia Perdana, dan Janudianto



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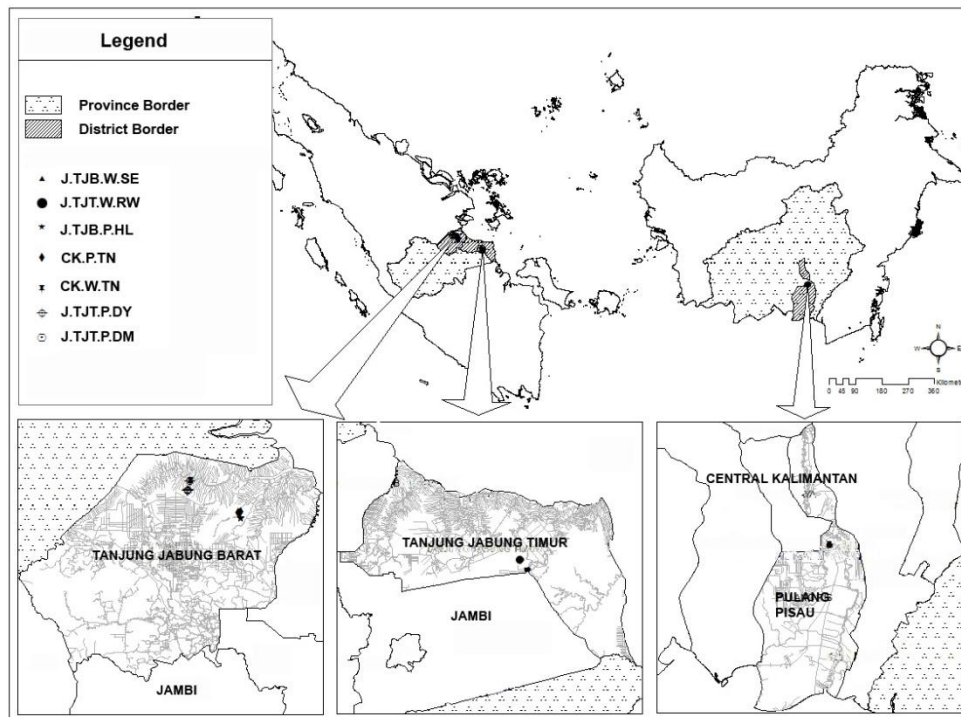
Domestication of *Dyera polyphylla* (Miq.) Steenis in peatland agroforestry systems in Jambi, Indonesia

Hesti L. Tata · Meine van Noordwijk · Jasnari ·
Atiek Widayati

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Abstract As part of a broader pattern of recovery after decline called forest transition, tree cover and carbon stocks have increased through agroforestry systems in many parts of Indonesia. The associated tree diversity transition implies that only the most useful parts of local tree flora are promoted. Swamp-land jelutong, *Dyera polyphylla*, has been domesticated in peat areas Jambi province, Indonesia. We discuss jelutong domestication in two coastal districts.

Planted jelutong with good farm management showed diameter growth rates of 1.3 to 1.9 cm year⁻¹. On-farm trials showed that dolomite as soil ameliorant did not affect diameter growth, but had some effect on height. Jelutong planted between young oil palm had the best performance, while jelutong that was underplanted in mature rubber gardens grew slowly. Slow market revival currently constrains further tree domestication of jelutong.



“Genetic diversity of *Dyera polyphylla* (Miq.) Steenis populations used in tropical peatland restoration in Indonesia” – under review process

Paludiculture in Ogan Komering Ilir, South Sumatra

Tipology: Ombrogen, sulfidic acid

Peat depth: moderate – deep (250->800 cm)

Maturity: sapric - fibric



Conservation plot of native tree species



Purun (*Elaeocharis dulcis*)



Mat from
'purun'



Agro-silvofishery in S. Sumatra: jelutung, fish pond



Water buffalo - 'Kerbau rawa amuntai' (benyaminlakitan.com)



(tribunnews.com)

Paludiculture in Kuburaya, W. Kalimantan



Typology:
Ombrogen
Deep: shallow
to moderate
(<3 m)
Maturity:
Hemic -
sapric



Paludiculture in Pulang Pisau, Central Kalimantan



- Jelutung and horticulture in Jabiren, Central Kalimantan
- Deep peat



Jelutung planted

- Buffalo water in deep peat.
- *Elaeocharis dulcis* ('Purun') is widely used



- Surjan system of rubber tree & paddy in C. Kalimantan
- Moderate depth



Potential for development

- 1) In the national agenda, 12.7 million ha forest area is allocated for social forestry program.
- 2) Restoration target: 2.4 million ha up to 2019.
- 3) Community's interest in practising paludiculture is improved, as long as there is an economic benefit.
- 4) Community nurseries are available in some villages

Challenges:

A. Gap of Research & Development:

- ◉ Productivity study and optimalization model of peatland use
- ◉ Permanent sampe plots and regular monitoring on environment aspects of peatland uses, such as regular monitoring on water level, subsidence, emission, etc.
- ◉ Trade off between economic value and ecologycal benefit

Challenges (cont.):

B. Socialization and policy strengthening:

- ◉ Communication strategy on the development of paludiculture products
- ◉ Reward mechanism: compensation and/or subsidies, for rewetting project.
- ◉ Regulations support on marketing paludiculture products.

Challenges (cont.):

C. Market and marketing:

- Non wood products, such as jelutung latex, 'gemor' (*Alseodaphne* spp.), rattan, and 'purun', are currently less valued compare with edible products.
- Value chain analysis for paludiculture products.
- Market development from raw materials to processed product.
- Public-private partnership mechanism, for developing paludiculture products, including scheme of '*green economy*', '*green label*', '*green price*'.

Melaleuca woods



Bark of 'gemor'



Jelutung's latex



Rattan



Way forward

- ◉ Scaling up research findings into pilot project
- ◉ Developing mechanism public-private partnership
- ◉ Improving awareness on the renewable resources from peatlands, and improving capacity building for the communities.
- ◉ Government and Policy support

Thank you
Danke