



# Living Lab Peat Rehabilitation Indonesia

International Conference Sustainability of Wetlands  
PHLB ULM Webinar Series #1 on Wetlands  
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# Introduction - Living Labs Indonesia

Indonesian and Netherlands researchers have initiated a number of so-called Living Labs to address the local and regional water related challenges

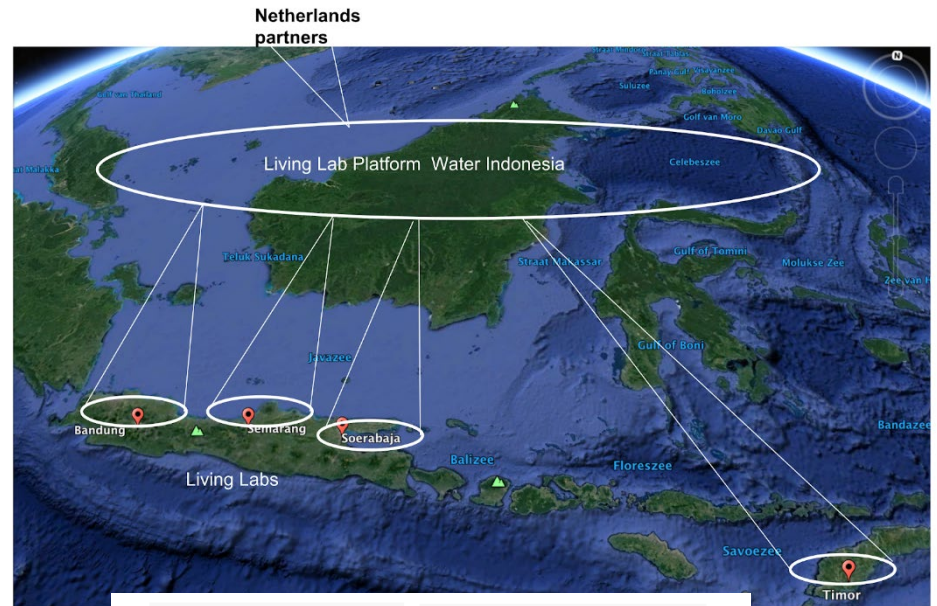


Universitas  
Gadjah Mada



## Living Lab Platform

KONINKLIJKE NEDERLANDSE  
AKADEMIE VAN WETENSCHAPPEN



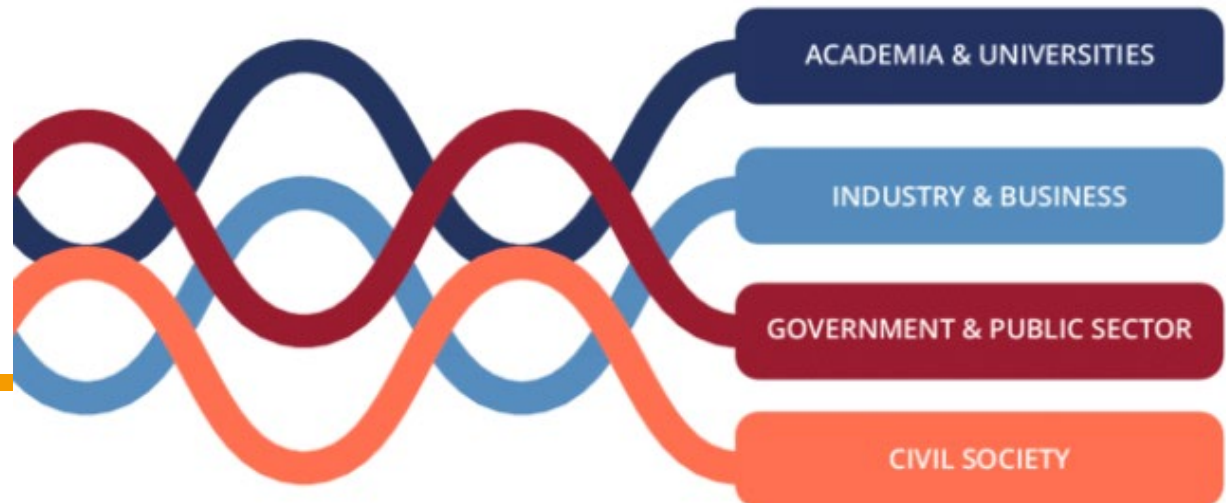
Radboud University  
Nijmegen, the Netherlands



# Living Lab approach

Definition: “physical regions or virtual realities where stakeholders form a public-private-people-partnership of firms, public agencies, universities, institutes and users, all collaborating for creation, prototyping validating, and testing of new technologies, services, products and systems in real-life contexts” (Westerlund & Leminen 2011)

Quadruple helix





# Living Lab **Water** Indonesia – workshop 2019

*Workshop on July 11 2019, UGM, Yogyakarta:*

- To transfer ownership of the Living Lab(s) to Indonesia and the involved LLAB partners.
- Initiate /continue individual projects with local (water related) themes with a solution based approach

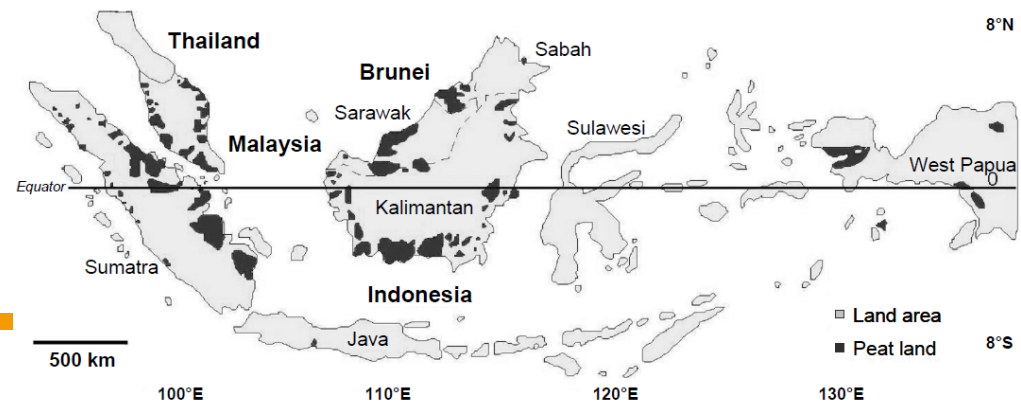
## **Living Lab Indonesia VHL initiatives:**

- Bandung – Sustainable River Mngt
- Yogyakarta - Agroforestry
- West Timor – Climate Smart Agriculture
- Kalimantan – Peat & Paludiculture
- Sulawesi – Digital Farmer Fieldschool

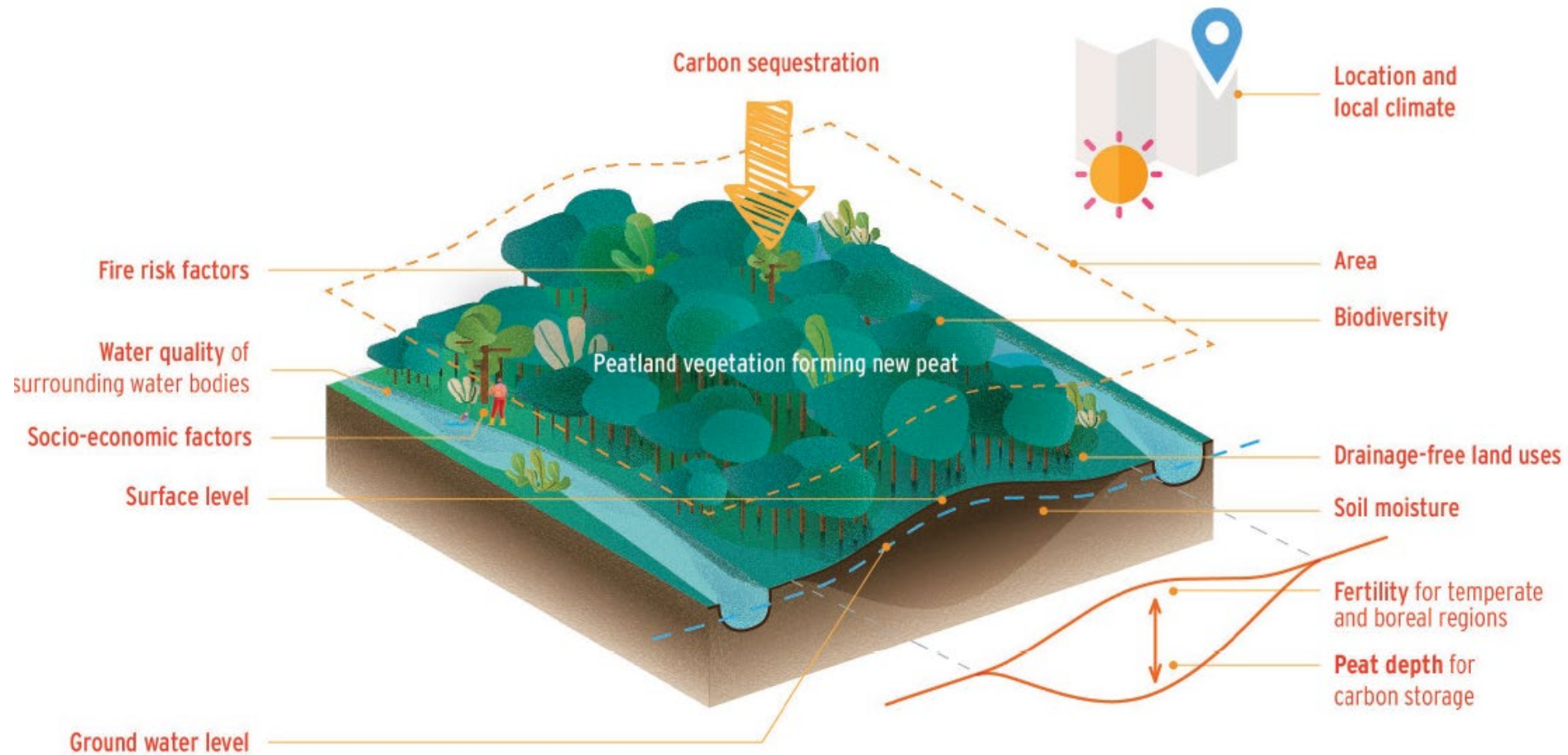


# Peatlands and Ecosystems Services: oil palm and alternatives

- Large areas of peat forest in Indonesia have been drained and cleared for the cultivation of palm oil and other agricultural crops;
- Has caused several important problems (climate change, haze, subsidence, biodiversity loss);
- Challenge -> more sustainable systems reducing the trade-off effect between economic and environmental benefits;



# Undisturbed Peat Forest

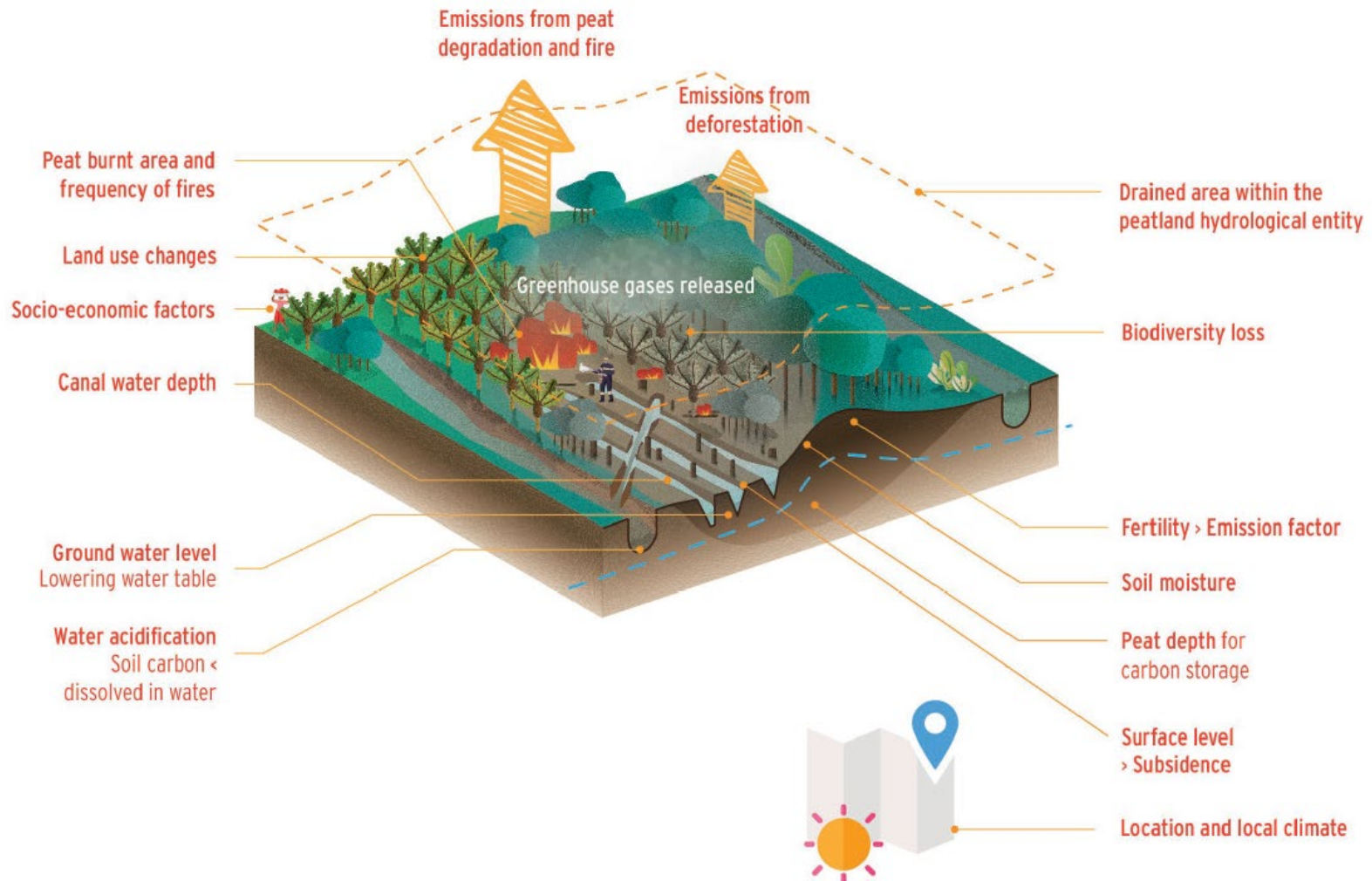


From FAO 2020 (Peatland Mapping & Monitoring)





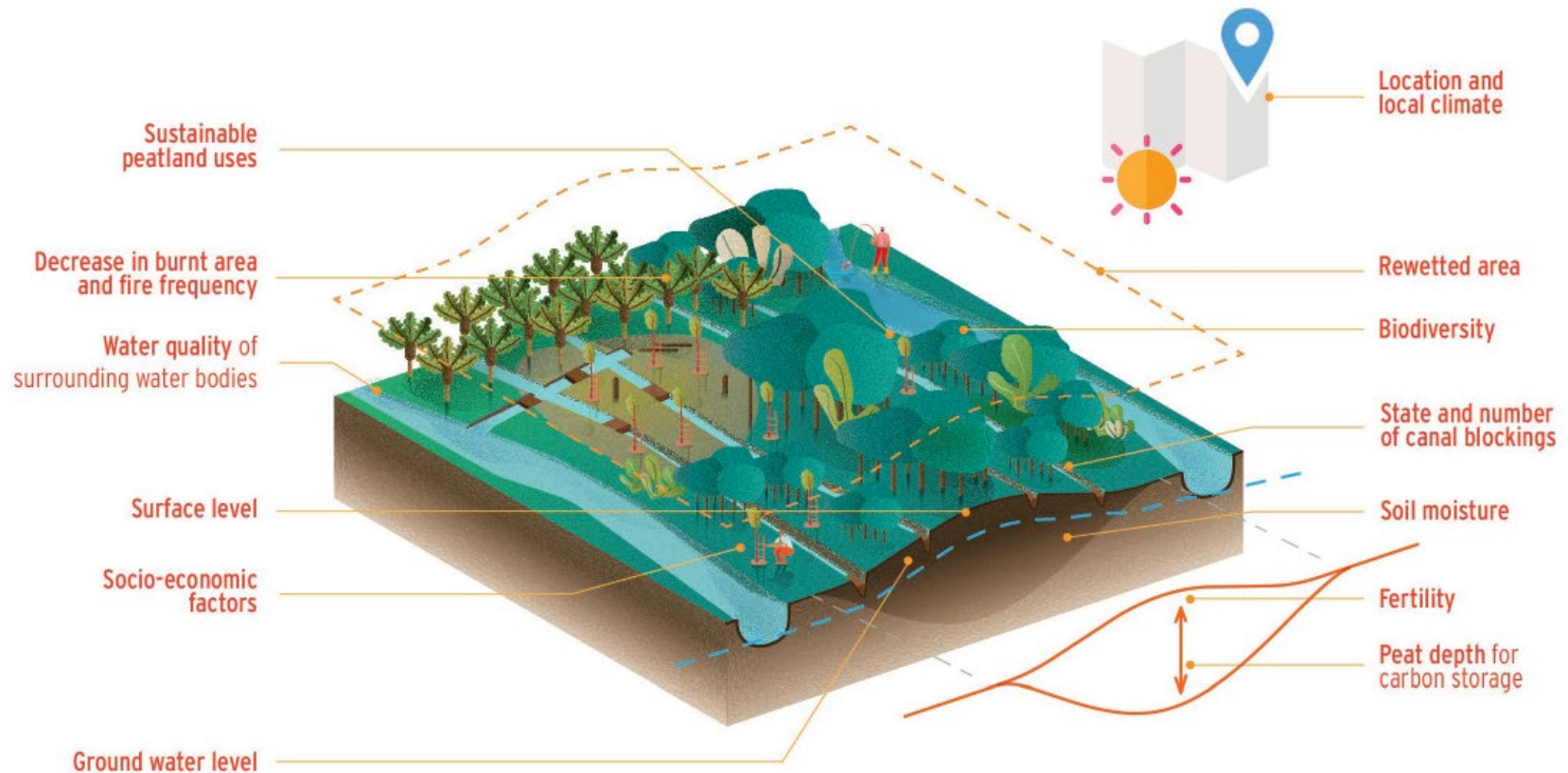
# Drained Peat Forest



From FAO 2020 (Peatland Mapping & Monitoring)



# Peat area Restoration



From FAO 2020 (Peatland Mapping & Monitoring)





# Ecosystem services analysis *(Middelberg et al 2019)*

To assess the opportunity for alternative land use systems using non-drainage species, which could eventually phase out or partly replace oil palm plantations on undrainable peat

- Species selection
- Ecosystem services
- Stakeholders interviews



Photo Maik Jerusalem

# Meta-analysis of species growing in undrained peat

## *Shortlist species cultivated by smallholders (n=37)*

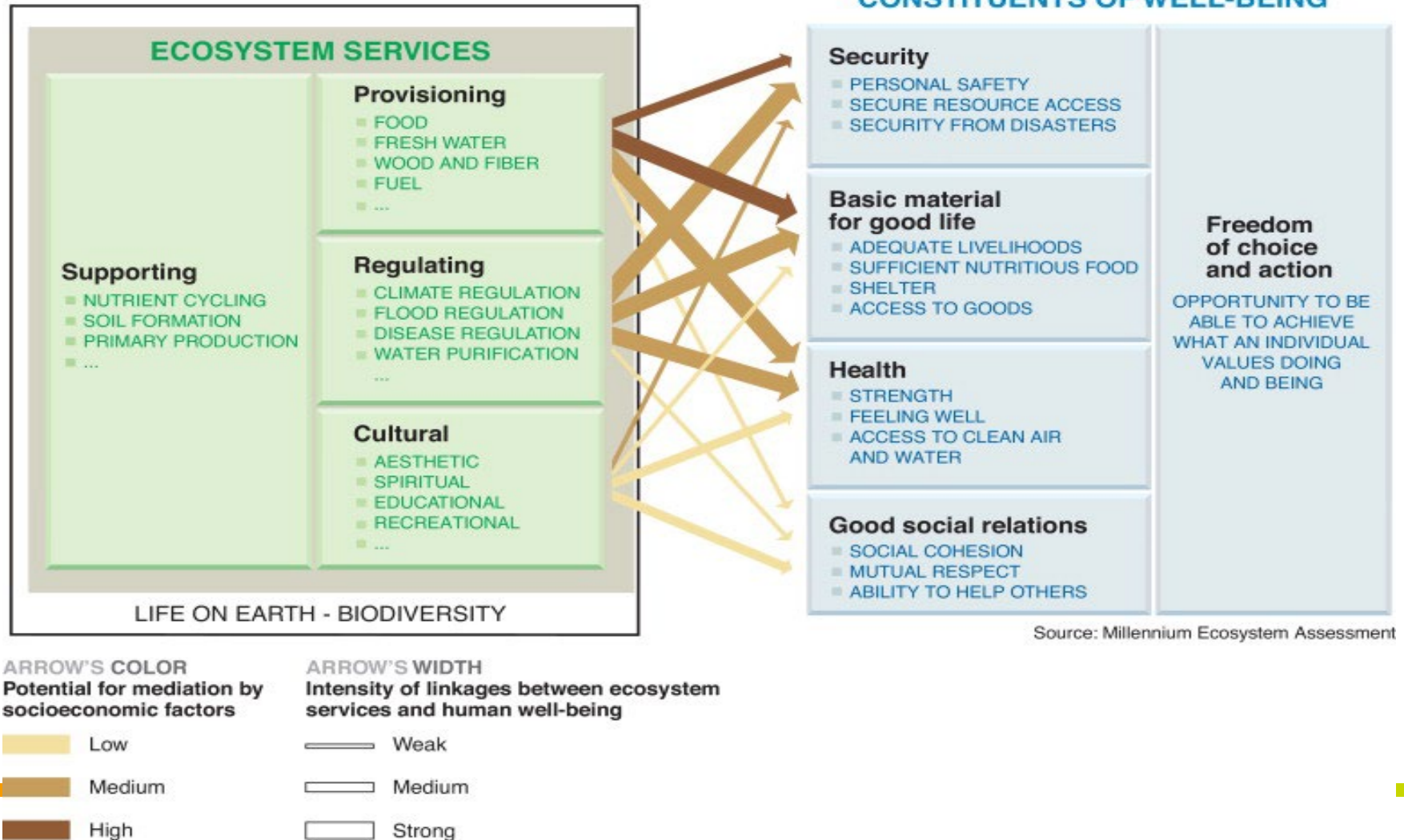
Scientific name	Vernacular and local names
<i>Aleurites moluccana</i>	Candle nut / Bua keras
<i>Syzgium aqueum</i>	Water apple, Jambu air
<i>Ipomea aquatica</i>	Kangkong
<i>Garcinia mangostana</i>	Mangosteen / Manggis
<i>Dimocarpus longan</i>	Longan / Mata kucing
<i>Nephilium lappaceum</i>	Rambutan
<i>Chloranthus erectus</i>	Keras tulang
<i>Metroxylon sago</i>	Sago / Sagu
<i>Dyera polyphylla</i>	Jelutung

## **Species short list**

- Multi criteria analysis
- 32 species
- Mostly NTFP species



# Ecosystem Services



(Fisher et al., 2013)





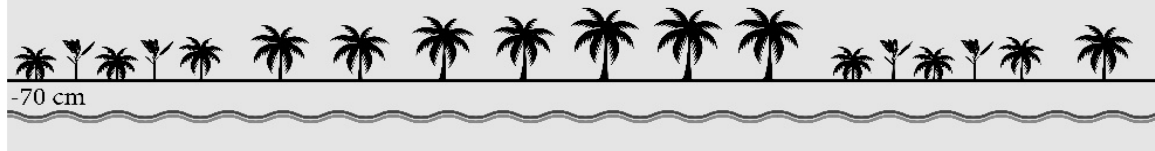
# Ecosystem Services in Oil Palm Landscapes

Ecosystem Group	Services	Indicators	Methods	Source(s)
Provisioning		Palm oil yield, crop yield, revenue	Semi-structured interviews, yield/revenue calculations	<i>Teuscher et al., 2015; Lee et al., 2014</i>
Regulating		Carbon sequestration	Vegetation measurements and allometric equations, Remote Sensing	<i>Labata et al., 2012; Morel et al., 2011; Anaya et al., 2009; Foody et al., 2008; Chave et al., 2005</i>
Supporting		Pest control, pollination, biodiversity	Measure foliar herbivory, species abundance, maximum entropy models	<i>Sumarga, 2015; Lucey et al., 2014; Luskin &amp; Potts, 2011; Fayle et al., 2010; Koh, 2008</i>

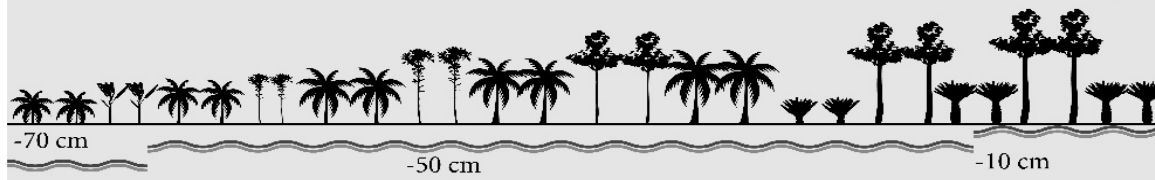


# Rewetting scenarios for phasing out Oil Palm

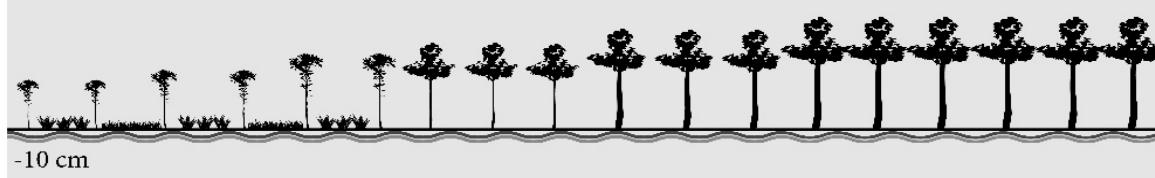
## 1. Base-line scenario oil palm



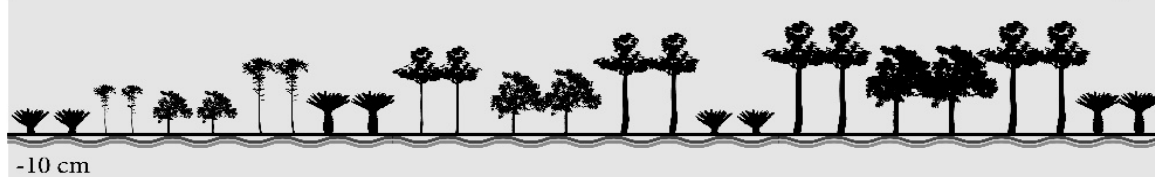
## 2. Transition from oil palm to mixed paludiculture system



## 3. Immediate change to monoculture paludiculture system



## 4. Immediate change to mixed paludiculture system



0 5 10 15 20 25 30  
Years

# Performance assessment of selected ecosystem services for 4 rewetting scenarios in peat

Ecosystem services		Scoring	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Carbon emission (conservation)	>15	1	18			
	10-15	2		13		
	5-10	3				
		4			3	3
Base-line scenario OP			1	2	4	4
Transition to mixed paludiculture						
Immediate change to mono-paludiculture						
Immediate change to mixed paludiculture						
Overall performance	38 %	69%	75%	81%		
Assessment score						
Provisioning	Level of income	0-1				
Indicator assessment:	>1 commodity diversification of income	0-1	0	1	0	
	Regular harvest	0-1	1	1	0,5	0,5
	Steady market	0-1	1	0,5	0	0
Assessment score			3	3	1	2
Total assessment scores ( $\sum ni$ )			6	11	12	13
Performance Assessment (%)			38%	69%	75%	81%





# Conclusion ecosystem services and peat rehabilitation

1. Alternative paludiculture systems can potentially yield more ecosystem services than oil palm plantations on peat;
2. The willingness of stakeholders for sustainable use of peatlands is present;
3. However, replacing oil palm (both plantations and smallholder) with alternative systems like paludiculture may not yet be realistic because of:
  - Economics : value chain, markets, economic return;
  - Technical: mixed versus mono-culture, access of water-logged land;
  - Governance: incentives, land tenure

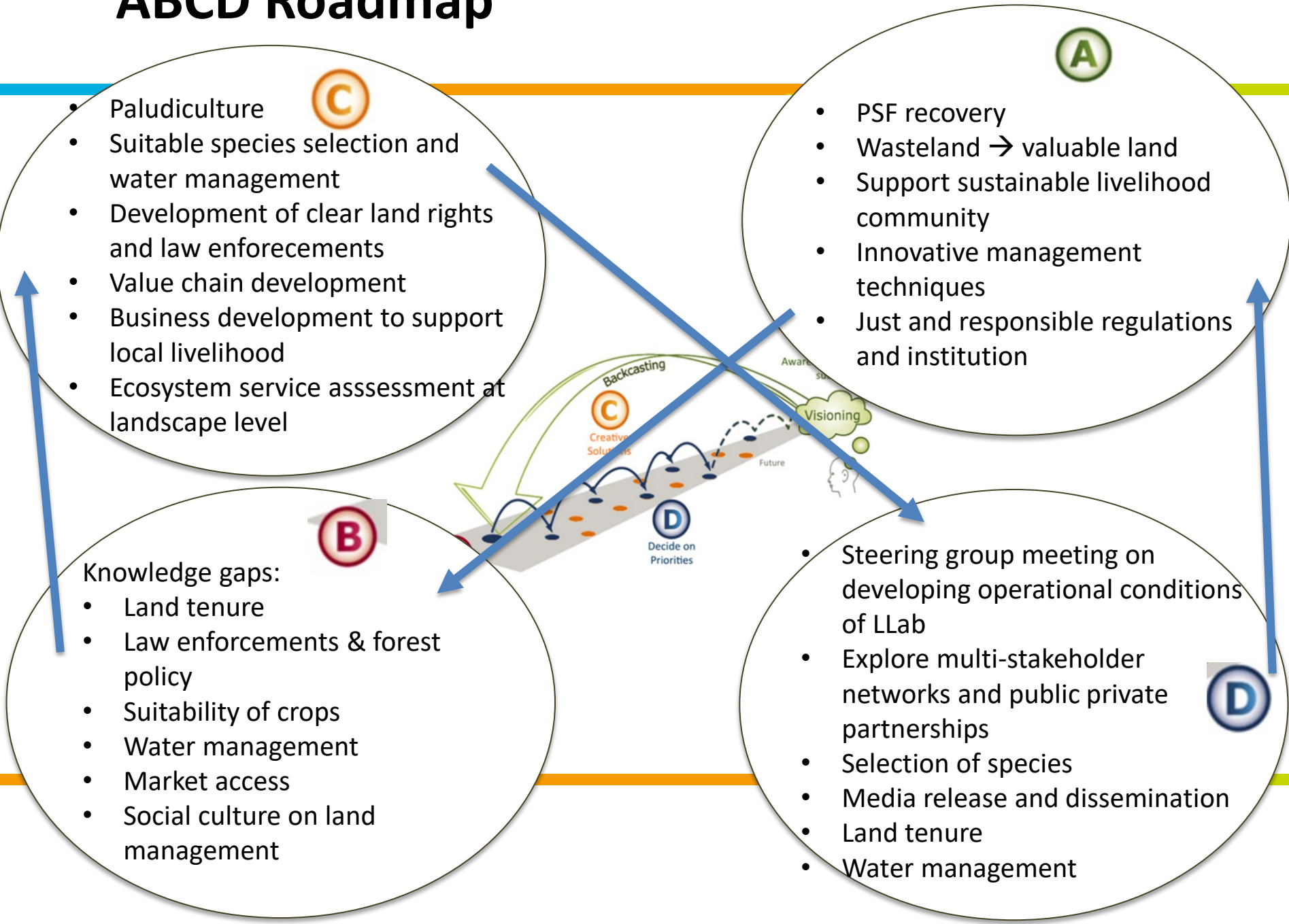
# Workshop Banjarbaru, Kalimantan (July 2019)

**Vision:** Degraded peatlands in Kalimantan & Sumatra are restored providing valuable ecosystem services for people, the economy and the environment through collaboration of stakeholders, embedded in just and responsible institutions

- **Target groups:** KPH's & other Govt agencies, local communities, private parties, NGO's
- **Potential Locations:** Kalimantan (Tumbang Nusa, Hutan Lindung Banjarbaru) Sumatra (Jambi area)



# ABCD Roadmap





# Living Lab Peat Rehabilitation – results so far

- Workshop July 2019
- Various student studies:
  - Value chain study Sago (MSc thesis)
  - Inventory paludiculture crops (BSc-thesis)
- Funding opportunities (2 proposals)
- Large groups of (potential) stakeholders identified



IMPROVING SAGO VALUE CHAIN FOR INDONESIA AND EU MARKET. A CASE STUDY OF KAPUAS DISTRICT IN CENTRAL KALIMANTAN, INDONESIA

Akalugwu Chinyere



# Living Lab Peat Rehabilitation – looking forward

- Further development of the Living lab approach:
  - short term project activities vs longterm partnerships
  - implications for education at associated universities
  - Involvement of private industries (including Oil Palm companies)
- Explore multi-stakeholder networks and public private partnerships
- Setting up paludiculture trials for testing





# Terimah Kasih

