BRG's Roadmap for Peatland Restoration

CBD & FAO Workshop:
"Forest Ecosystem Restoration"
Bangkok, 27 June 2016

Budi Wardhana,
Deputy for Planning and Cooperation
Peatland Restoration Agency (BRG)

The Peat Restoration Agency Indonesia (BRG)

- Peat Restoration Agency (BRG) is a non structural agency under the auspices of and reports to the President
- BRG has the task of coordinating and facilitating the restoration of peatland in the provinces of Riau, Jambi, South Sumatra, West Kalimantan, Central Kalimantan, South Kalimantan and Papua
- BRG mandated to plan and implement the peat ecosystem restoration for a period of 5 (five) years of approximately 2,000,000 (two million) hectares of degraded peatland.

BRG Mission

a) Coordination and strengthening policy in the overall peatland restoration actions;

b) Develop policy, strategy and planning, provide direction and promote cooperation in peatland restoration activities;

c) Carry out peatland inventory and hydrological unit mapping on seven priority provinces;

d) Review and determine land use/zonation of peatland areas (based on protection and cultivation functions);

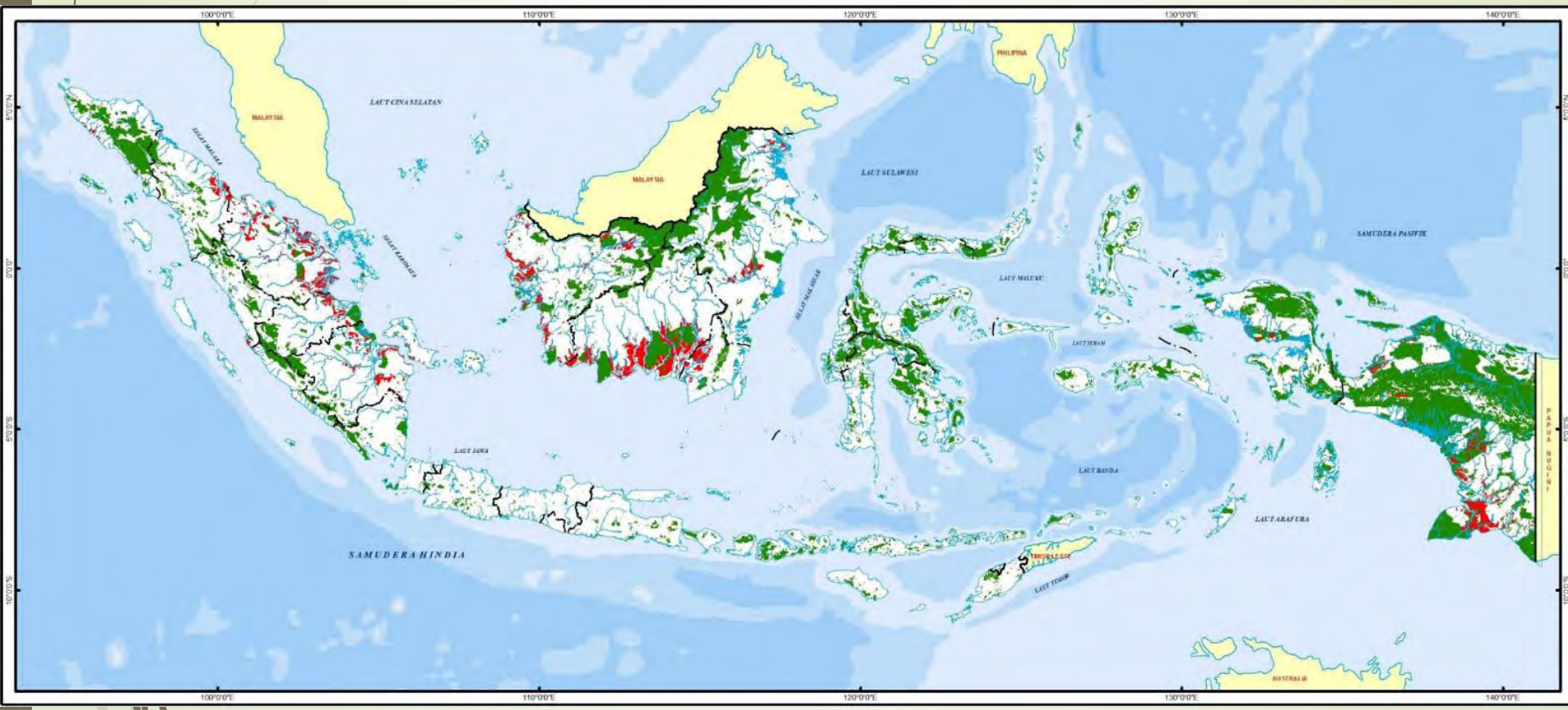
e) Provide guideline, standard and supervision on the construction, operation and maintenance of rewetting infrastructure and all its accessories;

f) Review permits and licenses of peatland management or concession over peatlands which fail to control peatland degradation and/or fire;

g) socialization and education on sustainable management of peatland and its restoration;

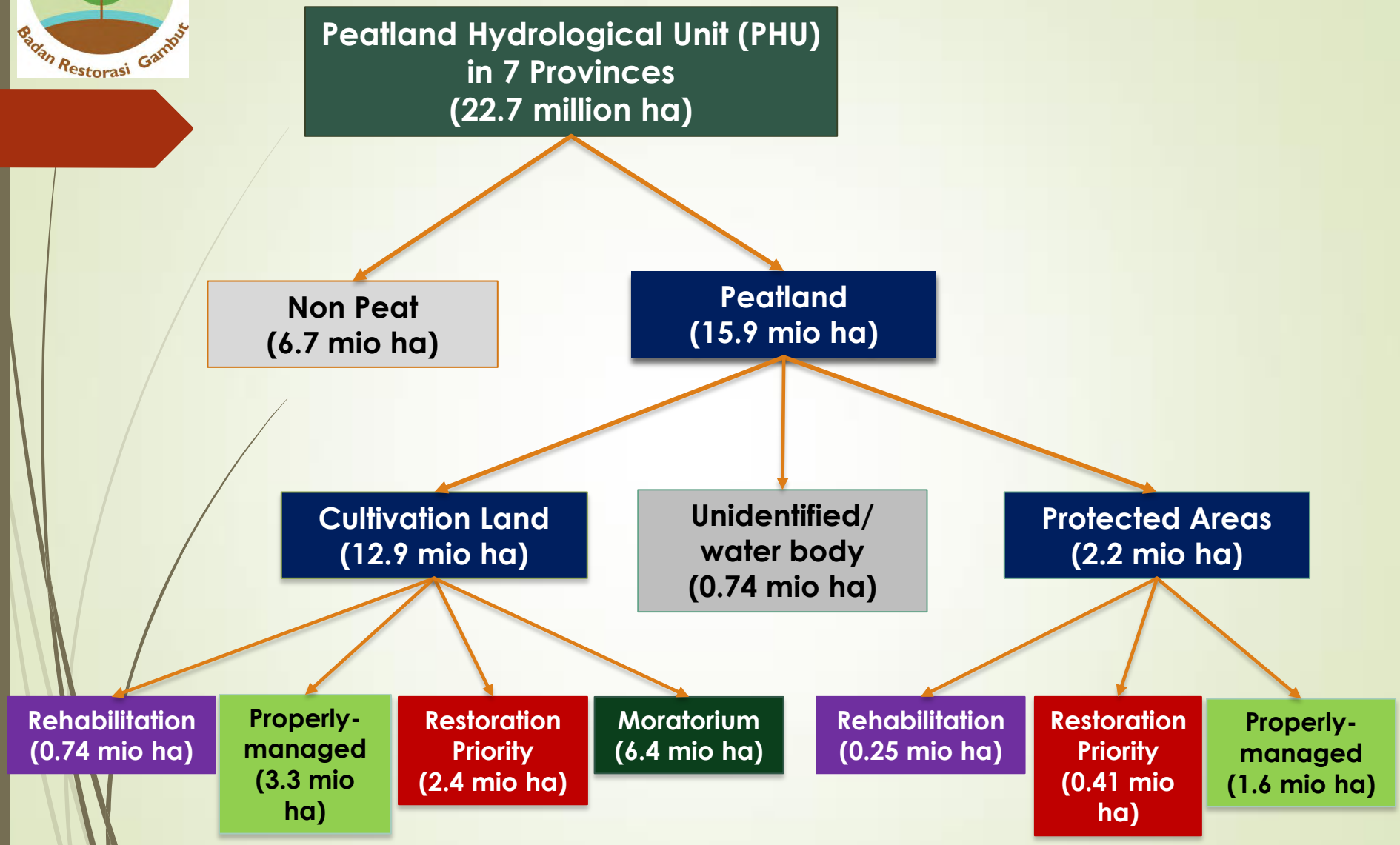
h) Coordinate research and development for alternative economic activities for sustainable use of peatlands in the concession and community's cultivation areas;

Peatland and Intact Forests Map of Indonesia

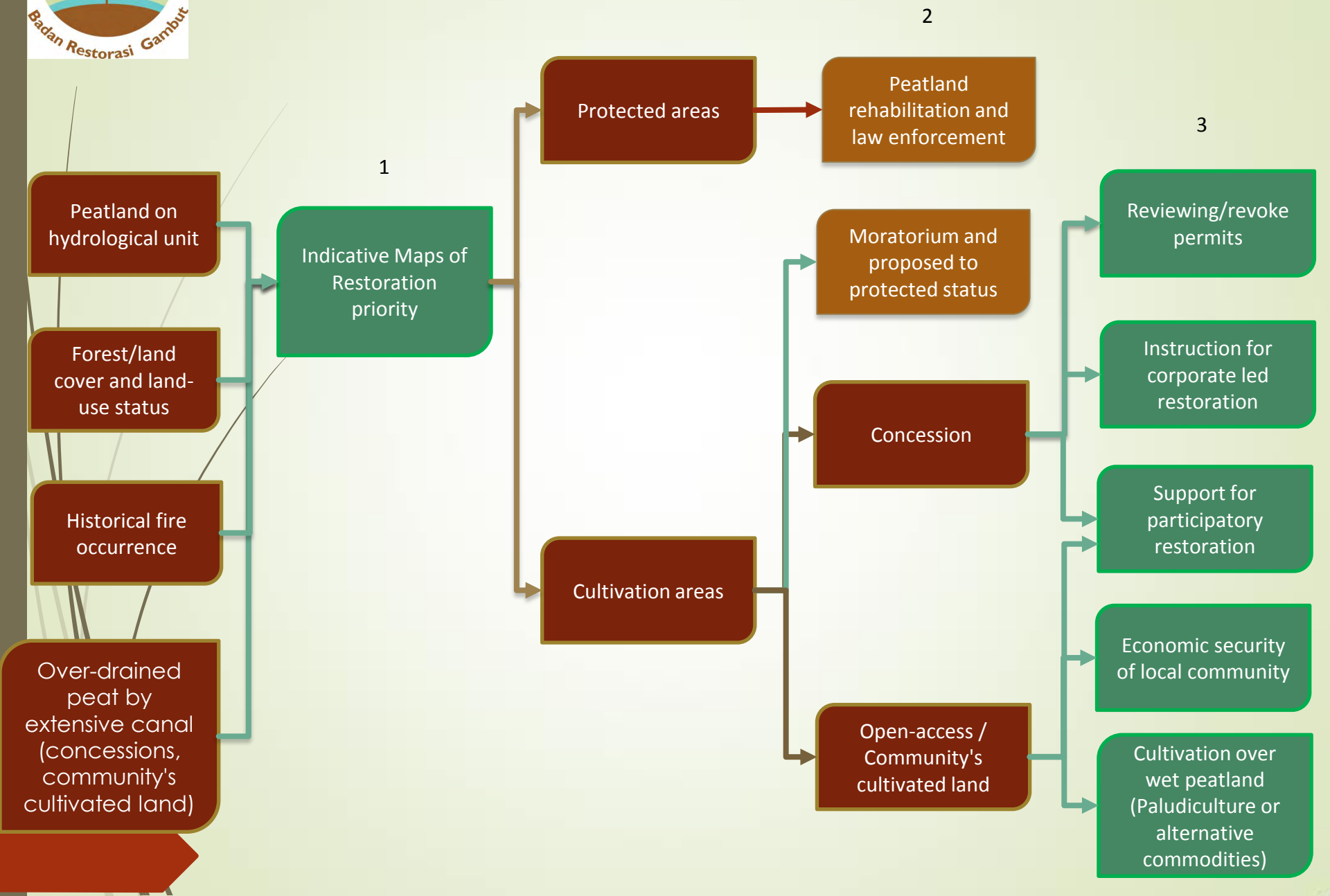


Peatland Hydrological Unit (PHU), Peatland and Peat-dome

Provinces	#PHU	PHU Area (hectares)	Peatland area (hectares)	Peat-dome area (hectares)	Non-peat area (hectares)	Restoration priority (hectares)
Riau	49	5,140,000	4,221,000	1,486,780	918,755	938,619
Jambi	10	1,040,000	751,000	298,804	288,669	136,541
South Sumatera	26	2,371,800	1,171,800	690,715	1,183,324	445,749
Sumatera Total	**85**	**8,551,800**	**6,143,800**	**2,476,299**	**2,390,747**	**1,520,909**
West Kalimantan	91	3,040,400	1,840,400	698,653	1,183,917	324,285
Central Kalimantan	32	4,633,000	3,053,000	1,770,940	1,581,809	683,024
South Kalimantan	4	340,814	160,214	93,946	180,561	68,734
Kalimantan Total	**127**	**8,014,214**	**5,053,614**	**2,563,539**	**2,946,286**	**1,076,043**
Papua	226	6,099,500	4,899,500	730,076	1,176,608	82,293
Total 7 Provinces	**438**	**22,665,514**	**16,096,914**	**5,769,914**	**6,513,641**	**2,679,245**


Peatland Hydrological Unit (PHU) in 7 Provinces (22.7 million ha)
Non Peat (6.7 mio ha)
Peatland (15.9 mio ha)
Cultivation Land (12.9 mio ha)
Unidentified/ water body (0.74 mio ha)
Protected Areas (2.2 mio ha)
Rehabilitation (0.74 mio ha)
Properly-managed (3.3 mio ha)
Restoration Priority (2.4 mio ha)
Moratorium (6.4 mio ha)
Rehabilitation (0.25 mio ha)
Restoration Priority (0.41 mio ha)
Properly-managed (1.6 mio ha)

Restoration Priority Analysis



Planning and Restoration Action

Peatland mapping and inventory:

- Hydrology
- Land use and status of peatland (concession maps, land tenure, protected areas)
- Conflict over land use and/or tenurial
- Biodiversity, habitat, species
- Degradation degree (over drain for intensive canal, fire scars/historical fire)

Reclassification of land use for protected and cultivated functions (re-zonation)

Private sector partnership, direction and promoting cooperation in peatland restoration

The construction and maintenance of peatland rewetting infrastructures

Conflict resolution over peatland tenurial and land-use, and the promotion of community based/ participatory restoration actions

Restoration Implementation
(for 2 million ha priority Target)

Peatland mapping and inventory overlaid with land-use

Stock taking of existing programs, policy and activities related to peatland and their objectives

Agree on party responsible for restoration based on land-use mapping and existing programs

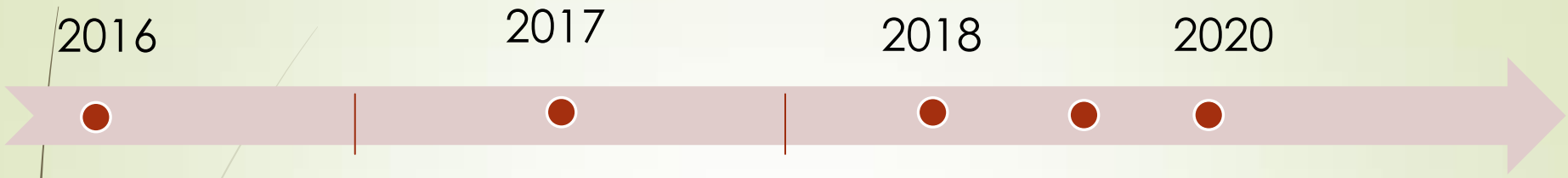
Establish necessary agreement with the responsible party, including at least feasibility study, cost analysis, design and techniques, detailed map, community engagement

Restoration work starts, led by:

- **Concession holder (Agriculture, pulp & paper, or logging**
- **Local Community**
- **Provincial Government (Forest Management Unit or other)**
- **Technical Operational Unit of National Government**

Strengthening policy and enforcement of peat land protection regulations at national and provincial level

Roadmap of Peatland Restoration



Strategy 1 : Controlling peatland degradation and conversion

1. Moratorium for further expansion of cultivation on peatland
2. Control and prevent forest and peatland fire (Providing early warning system, monitoring, ensuring peatland wetness index to safe level)

3. Data and information on peatland management (permits, plan, status) available to the public through the development of Geospatial Information Systems → national → regional

4. Determine the protected status of peatland as essential ecosystem for life-support system

- L — Government as lead actor
- S — Government as supporting actor
- L — Corporate as lead actor
- S — Corporate as supporting actor
- L — NGO/Research as lead actor
- S — NGO/Research as supporting actor

Roadmap of Peatland Restoration

Strategy 2 : Assessment of peatland degradation impacts (costs/value) and determine options for future sustainable land use

1. Develop and designate National standard for determining peatland degradation (criteria and indicator) for mapping, assessment and monitoring — L S S
2. Assess and make public the condition and distthousandtion of peatland both inside and outside the concession areas — L S
3. Commitments related to sustainable peatland management plans in both the concession (concession holder) and outside the concession (the government) — L S
4. Assessment of options and recommendation for wet-peatland culture (timber/fiber silviculture, plantation estate) — L S S

- L — Government as lead actor
- S — Government as supporting actor
- L — Corporate as lead actor
- S — Corporate as supporting actor
- L — NGO/Research as lead actor
- S — NGO/Research as supporting actor

Roadmap of Peatland Restoration

Strategy 3 : Implementing sustainable peatland management at landscape level (peatland hydrological unit/PHU)

1. Phasing-out drainage based agriculture/silviculture on peatland
2. Restoration of degraded peatland on concession as part of phasing out drainage-based

L S

3. Hydrological restoration
4. Vegetation restoration through natural and assisted revegetation

L S

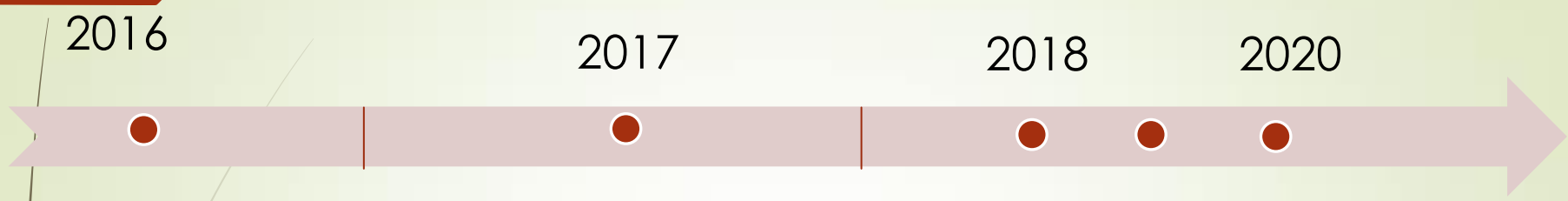
5. Identifying and piloting sustainable paludiculture options
6. Developing market for commodities suitable for wet peatland production/cultivation

L S S

7. Implementation of sustainable management practices

L S S

Roadmap of Peatland Restoration



Strategy 4 : Conserving peatland as essential ecosystems (and its biodiversity) and its Surrounding Areas/PHU

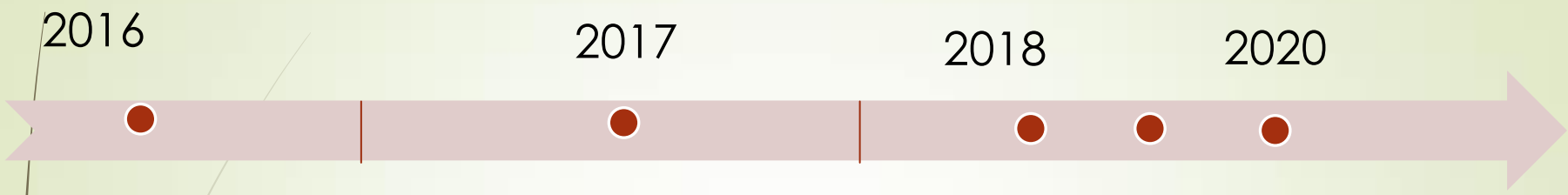
1. Conserving domes, wildlife corridors, wildlife sanctuary, habitat and sources of wild relatives of food and agriculture resources
2. Monitoring biodiversity in corridors and habitats

L S S

3. Protection of carbon storage and water management system

L S S

Roadmap of Peatland Restoration



Strategy 5 : Improve social conditions and resolve conflict over resources

1. Fully comprehend the socio-economic dynamics of local communities by using the principle of FPIC in the management of peatland, as well as for restoration activities

2. Recognise the rights of local/indigenous communities and integrate mutually agreed conflict resolution procedure into peatland land use planning and restoration activities

3. Develop partnership to support and improve local community livelihood for sustainable peatland-based economic activities.

4. Improve capacity of local communities to increase sustainable management practices in peatland areas

Roadmap of Peatland Restoration

Strategy 6 : Enhance Good Governance for Forest and Peatlands

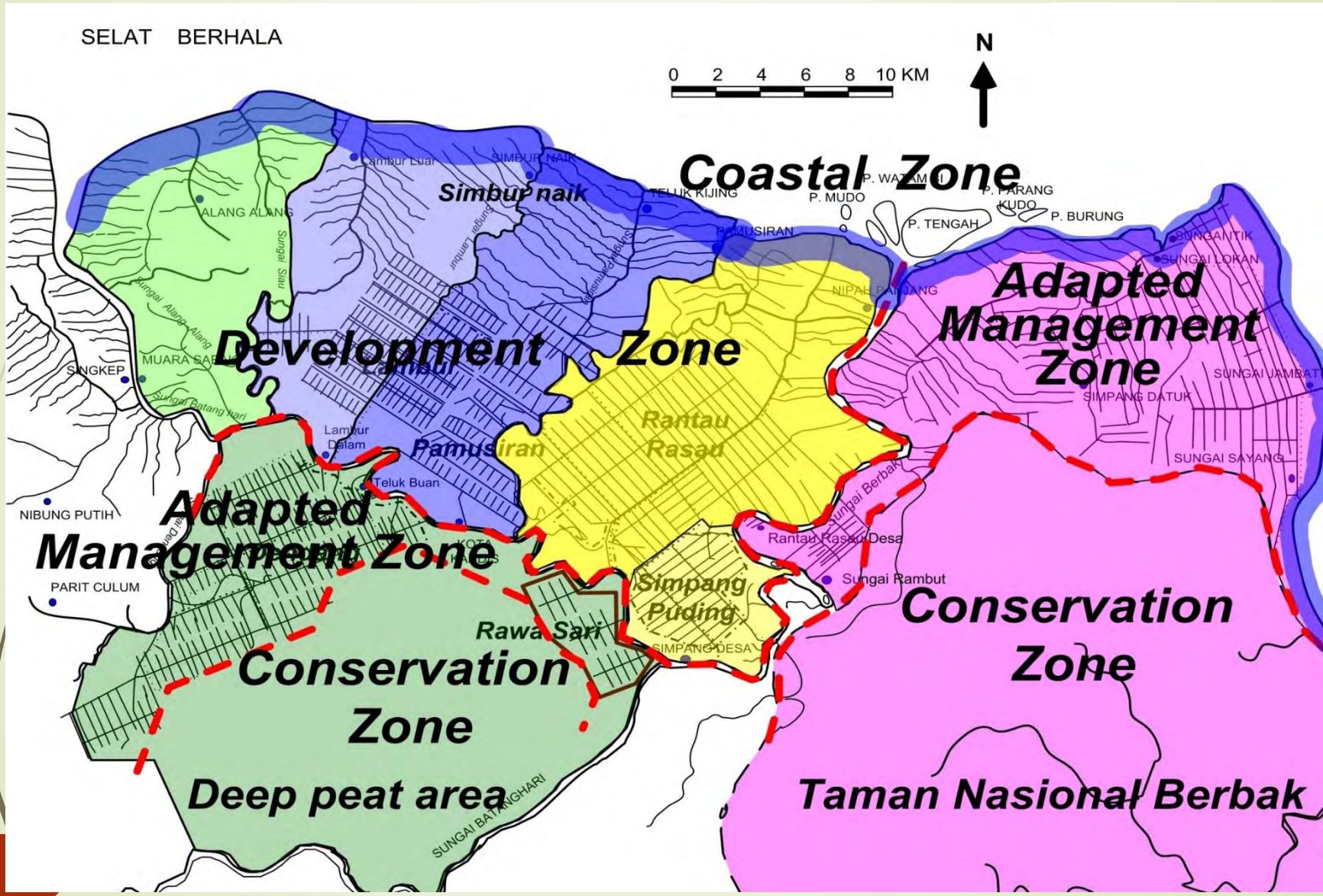
1. Enhance transparency on peatlands management policy and monitoring along with strict law enforcement — L S
2. Budget available for incentives and disincentives mechanism towards sustainable peatland management — L
3. Assessment of rights over resources in policy formulation
4. Participatory and consultative process in decision making. — L S
4. Accountability — L S S

Overview of issues

- Indonesia's 15-20 mio ha of peatland was mostly undrained and forested until 20 years ago, used for productive selective logging;
- now mostly drained, deforested, burning, emitting carbon and often unproductive;
- any improvement relies on raising water levels – 'rewetting';
- this was always clear scientifically and is now recognized by GoI;
- an ambitious target was set to rewet millions of ha in a few years;
- this takes blocking of probably >10,000 km of canals (large & small);
- i.e. construction of probably >10,000 dams;

- **QUESTION: what method(s) can produce hundreds of dams per month, for an affordable budget, that will last permanently?**

Separation of Conservation & Development Zone

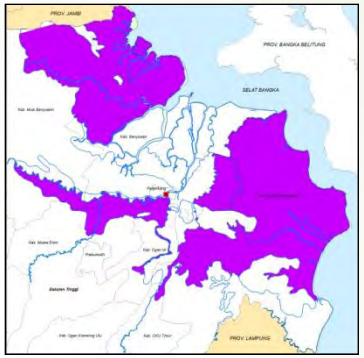


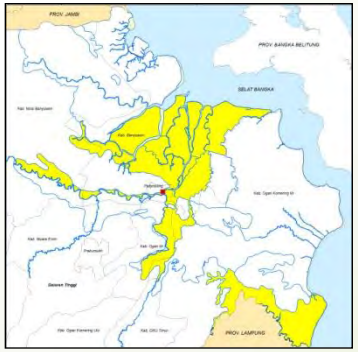
FLOW OF THINKING ON LOW-LAND MACRO ZONATION

Hydrological unit is outer boundaries of combined NWS lowland and PHU

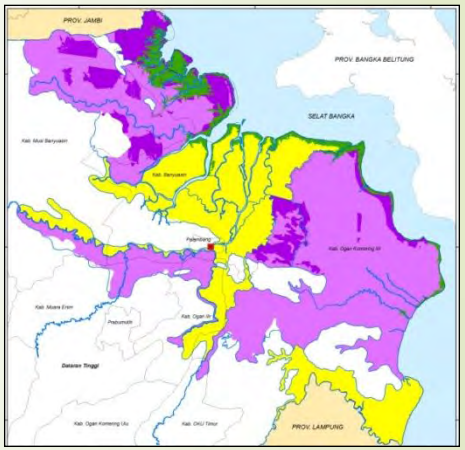
Divided into 2 zones :
1. Development Zone
2. Conservation Zone

Conservation Zone (with Conservation Attribute*)





Development Zone (No Conservation Attribute)

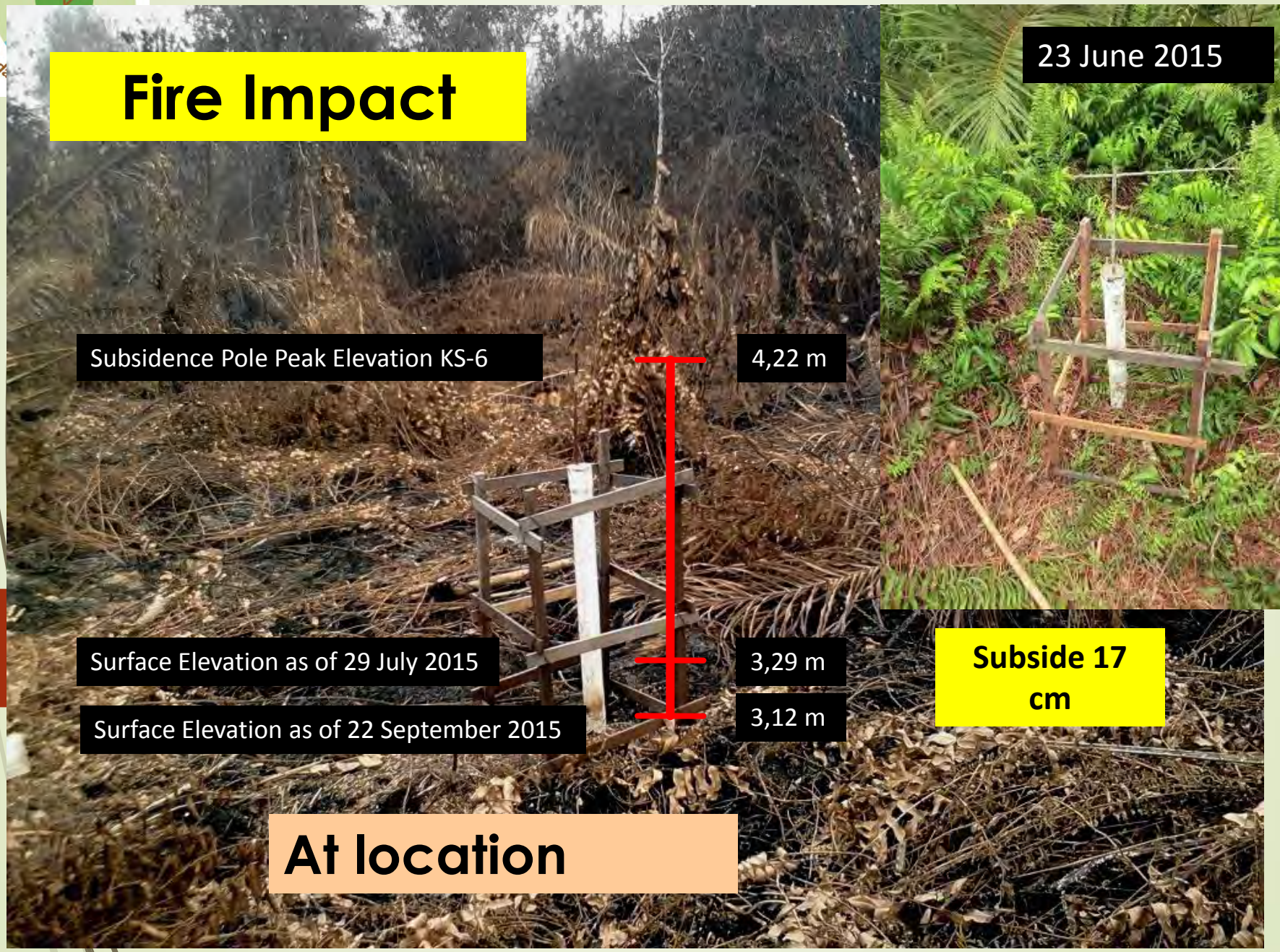


Divided into 4 areas:
1. Conservation Management Area
2. Adaptive Management Area
3. Coastal Management Area
4. Development Area

*Conservation attributes are KSA, KPA, HL, Peat dome, peatland> 3 m, peatland < 3 and area (30% hydrological unit), HCVA


EMBUNG 03

Subsidence at KS-6 S. Buluh,Jambi (Small Scale Plantation)

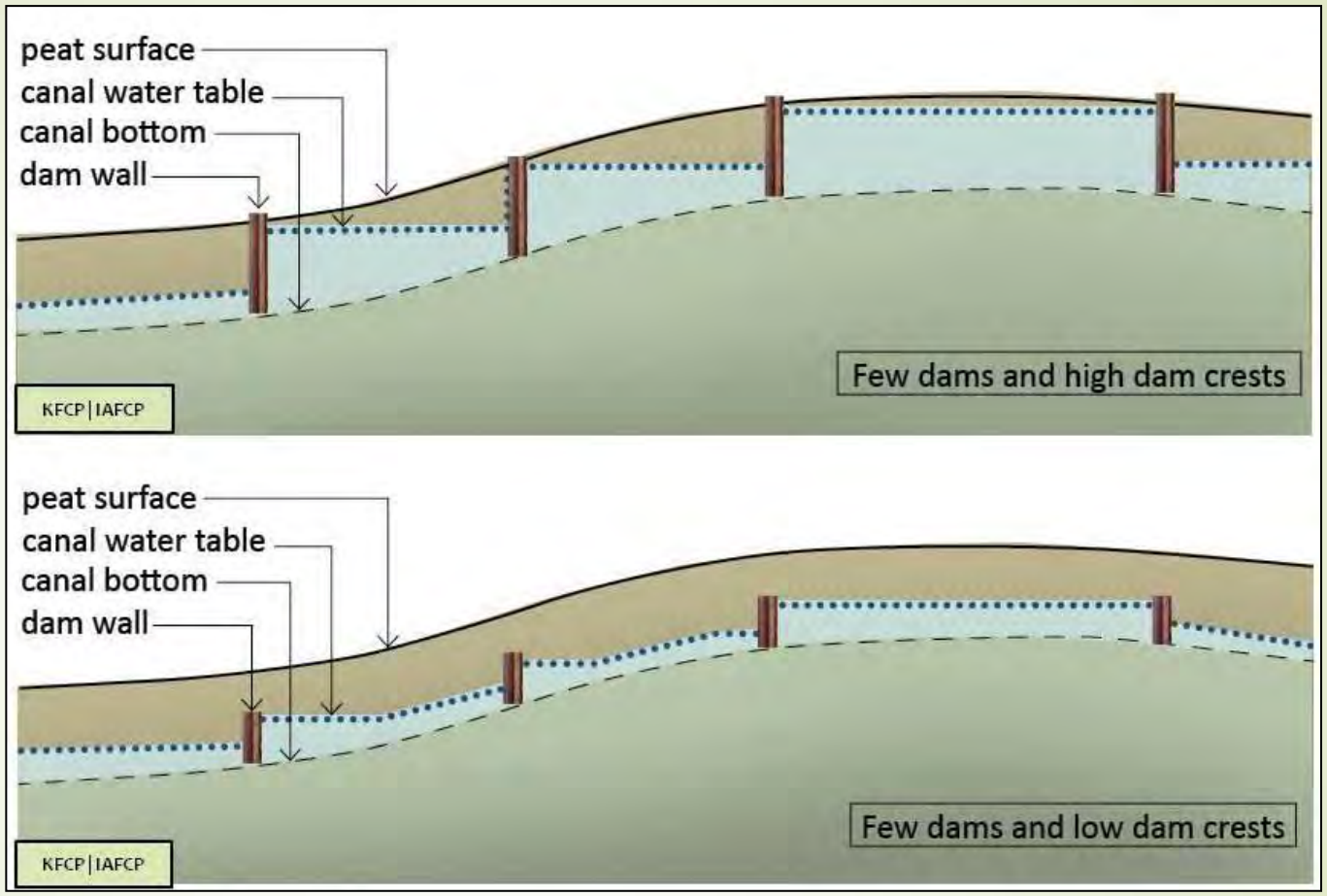


Water Management Measures in Peatland Area

- Based on Hydrological Peatland Unit (PHU),
- Peat dome is treated as a natural water storage system in which its existence and water availability need to be maintained
- Water level control and water loss prevention
- Keep the land wet, especially in the dry season
- Water loss control and prevention (canal blocking construction, long storage serial, shallow retention pond, water gate, levelled compacted embankment)

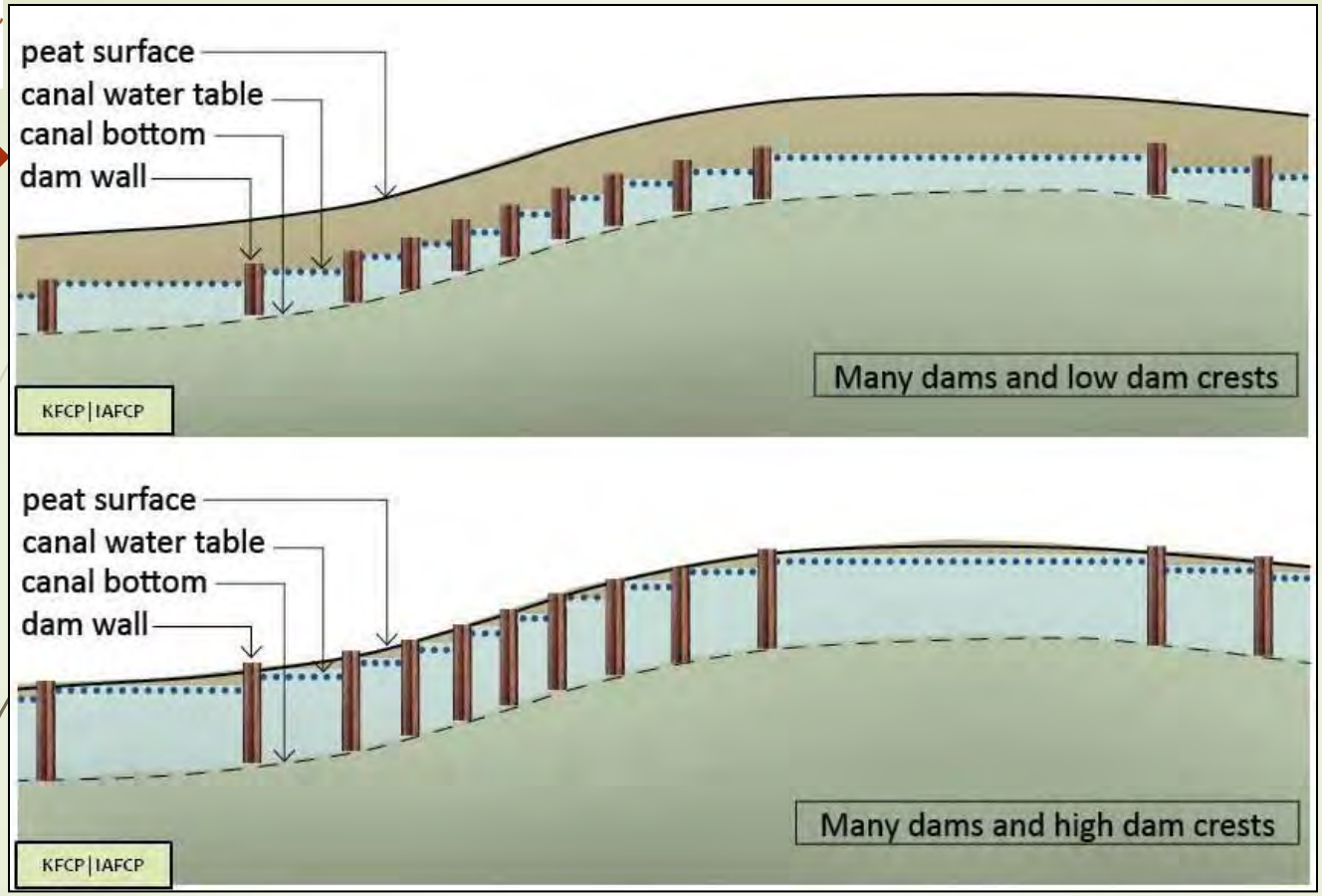
CANAL BLOCKING

OVERVIEW OF CANALS WITH MINIMUM BLOCKING AND VARIOUS BLOCKING HEIGHTS



- Limited number of blocking and high peat-blocking: water surface will increase until it reaches peat surface but only within blocking area.
- Limited number of blocking and low peat-blocking: water surface will not reaches peat surface, the water from canal will overflow above canal blocking which will damage canal blocking infrastructure.

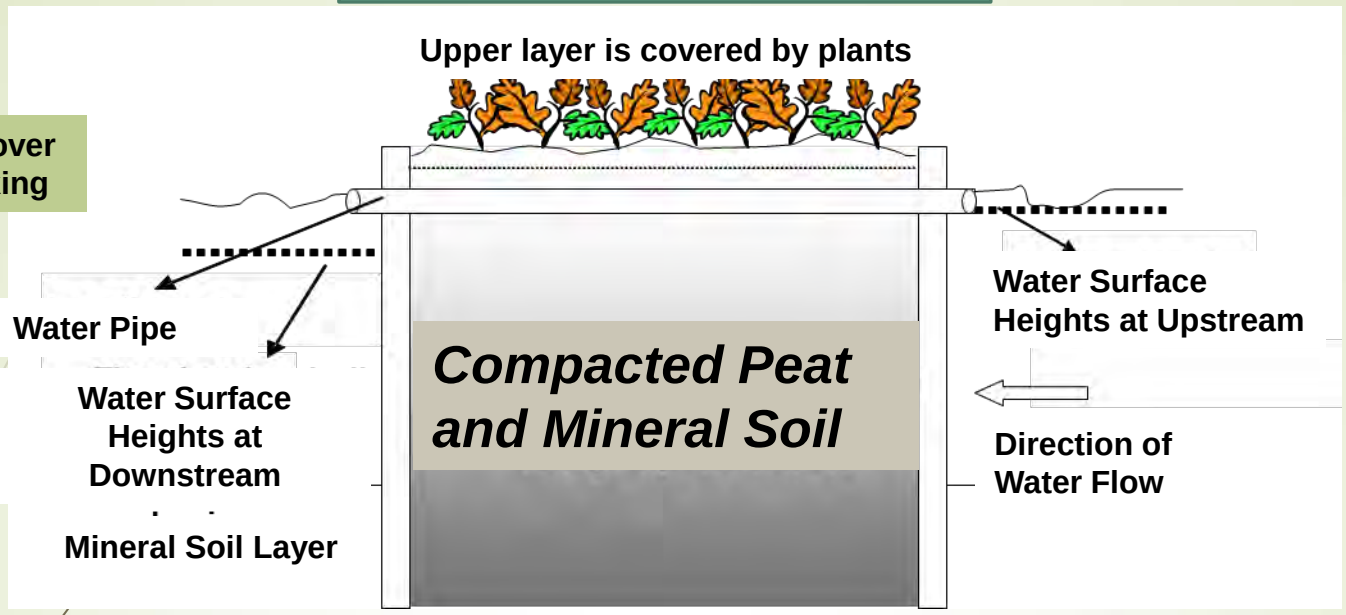
OVERVIEW OF NUMEROUS CANAL BLOCKING WITH VARIOUS BLOCKING HEIGHTS



- Abundant canal blocking with lower peat-blocking than peat surface: water surface will not reach peat surface, the water in canal will water overflow above canal blocking
- Abundant canal blocking with high peak blocking: water will reach peat surface (ideal condition)

Plant Trees over Canal Blocking Structure

Vegetation over Canal Blocking



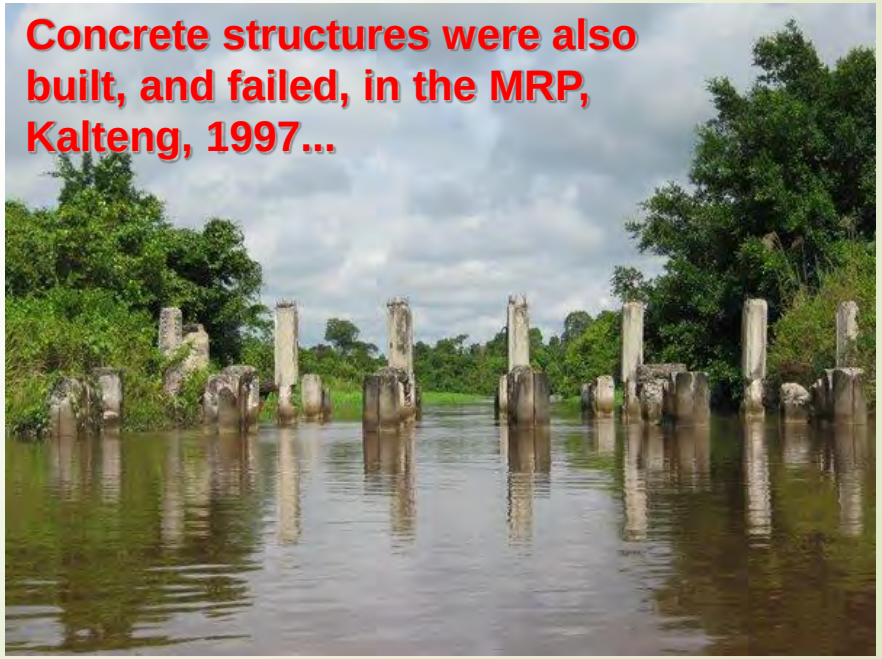
Canal blocking options: concrete structures

Structures of concrete and steel are very expensive at >50,000$ each, take very long to build (months), and do not last long as they:

[i] are broken down by people and

[ii] sink into the soft peat / clay underground.

Canal blocking options: concrete structures [2]



Canal blocking options: box dams [1]

Box dams are made of wooden 'boxes' filled by sand bags or peat, created by local community labour. These cost >5,000$ each, take weeks to build, and usually do not last long as they are quickly eroded by water. Much maintenance required. A few hundred have been created in Indonesia.

Canal blocking options: box dams [2]

After some years....

Canal blocking options: compacted peat dams [1]

Plantation industry has long applied dams created of compacted peat. Peat, when compacted by an excavator, becomes a dense (*2) and strong material – that is lightweight (no sinking) and abundantly available. These dams are created quickly (<1 day) and cost ~500-1500$ each. Many thousands of these have been created *(>6000 by APP alone in Sep 2015 – Jan 2016; > 1000 a month, using ~100 excavators*).

Canal blocking options: compacted peat dams [2]

Partial canal infilling – demonstration [1]

Partial canal infilling – demonstration [2]

Canal blocks constructed

Partial canal infilling – demonstration [3]

Partial canal infilling – demonstration [4]

Examples of peat dam cascades – Brunei

Brunei, Badas peat dome, 2014, for Shell with Wetlands International

Examples of peat dam cascades – Sumatra [1]

Sumatra & Kalimantan, plantation perimeter canals, 2015

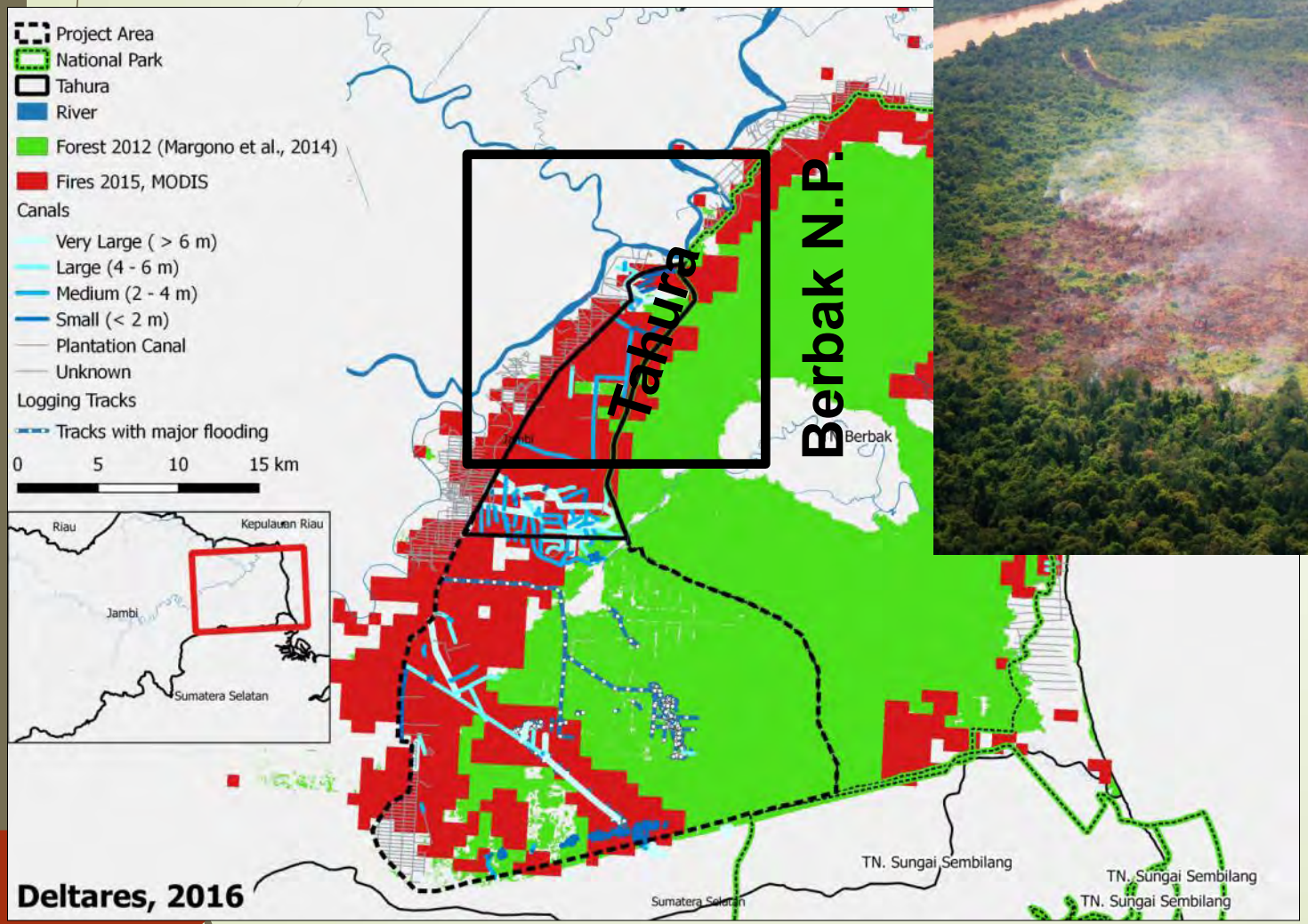
https://www.deltares.nl/en/projects/reducing-impact-plantation-operations-peatlands-indonesia-2/

Examples of peat dam cascades – Sumatra [2]

Sumatra & Kalimantan, plantation perimeter canals, 2015, for APP

Post 2015 fire restoration design: Tahura, Jambi [1]

(TENTATIVE – IN DISCUSSION – MAY CHANGE)



Post 2015 fire restoration design: Tahura, Jambi [2]

(TENTATIVE – IN DISCUSSION – MAY CHANGE)

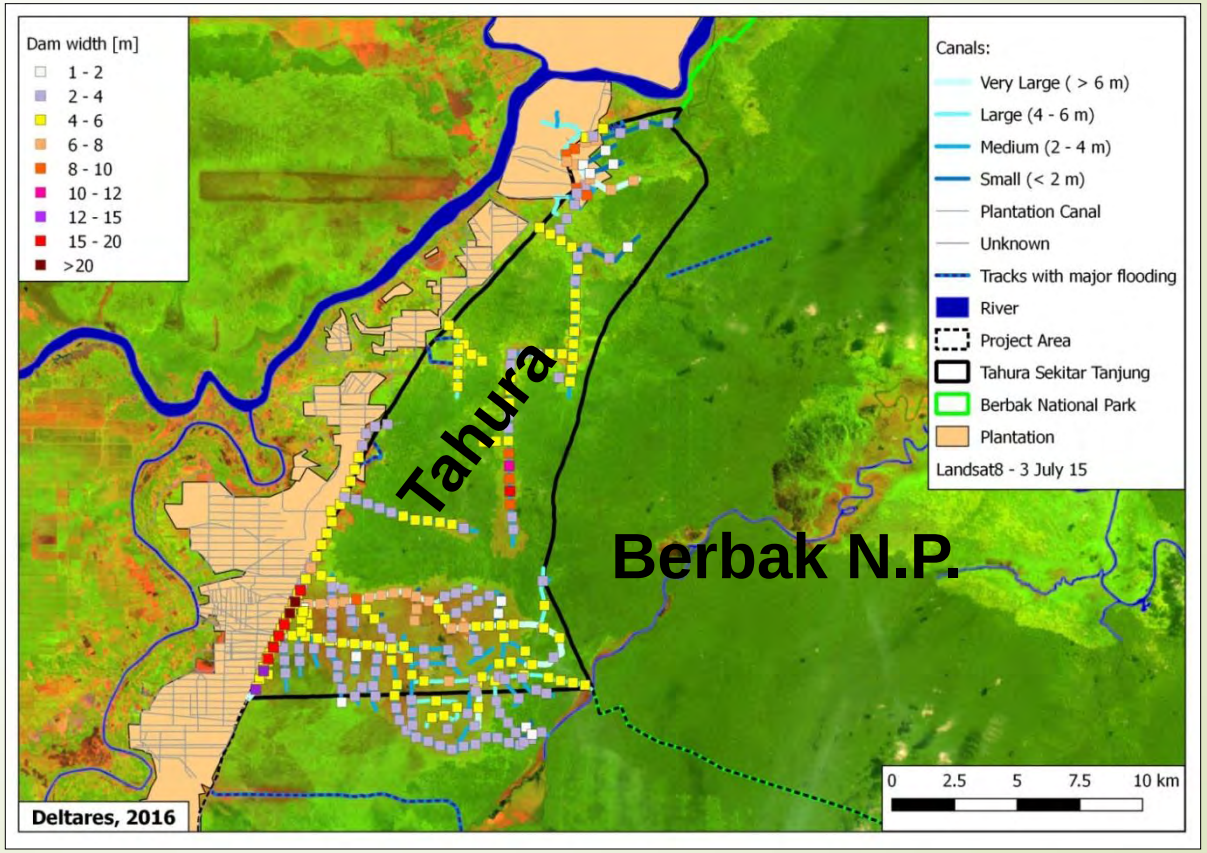
207 dams tentatively planned in Tahura (~20,000 ha). To be implemented in 1 year maximum (from approval). Dams designed based on LiDAR derived land surface slope canal dimensions.

COST:

Peat dams & infilling:
$500,000 total;
= $2400 / dam
= $26 / ha

Peat dams only:
$250,000 total;
= $1200 / dam;
= $13 / ha

Box dams (est.):
$1,300,000 total;
= $6000 / dam;
= $65 / ha



Recommended canal blocking options

- We recommend the following applications of different systems in different settings and for different applications:

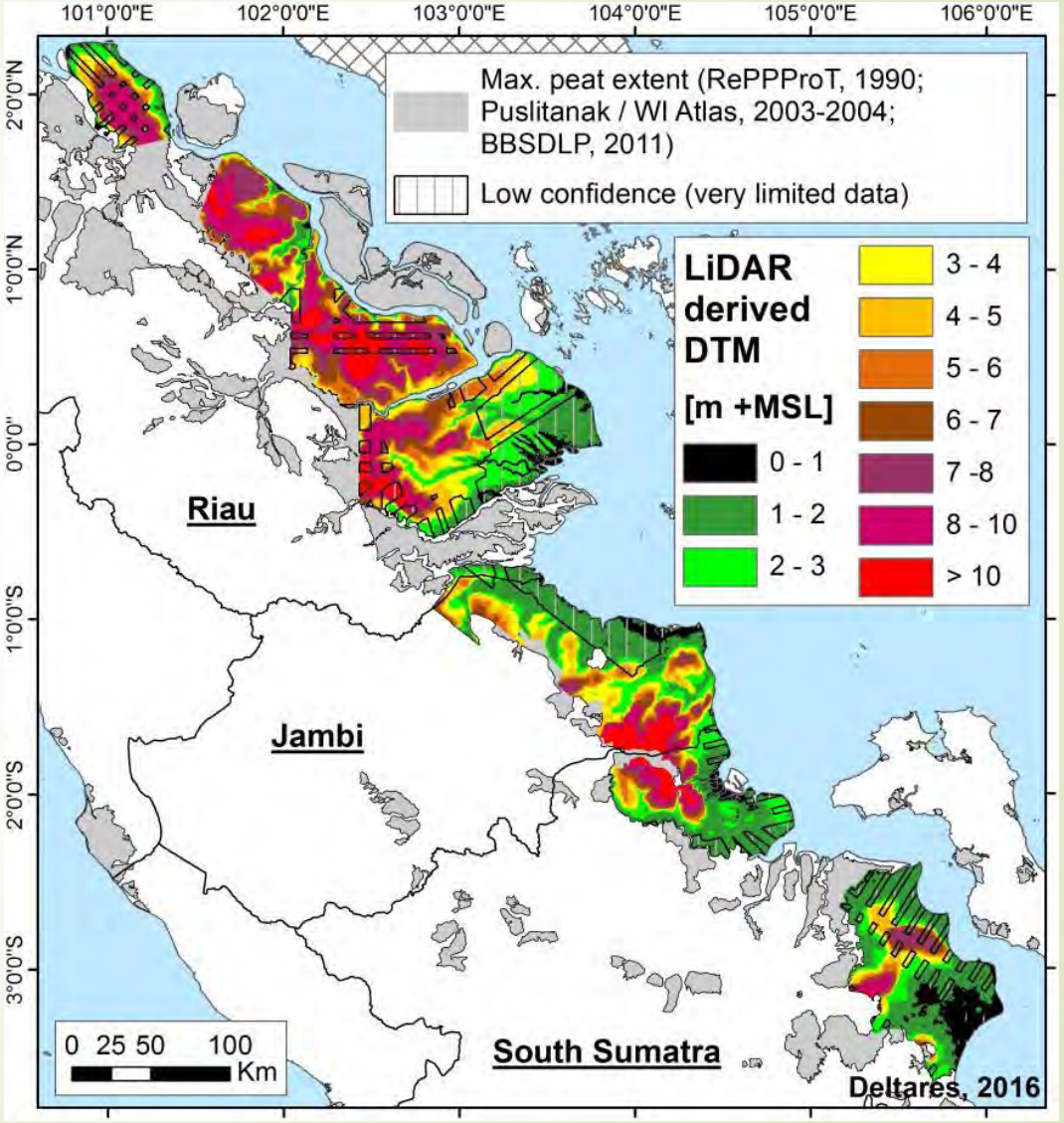
  (1) For large-scale water management improvement in industrial plantations, where water levels should be raised but flooding prevented: compacted peat dams with spillways.

  (2) For large-scale rewetting in forest and degraded peatlands where forest is to be restored: compacted peat dams (no spillways) and partial canal infilling.

  (3) For water management improvement in community agriculture lands, where access must be maintained: combination of measures that may also involve box dams to ensure community support through involvement in construction.

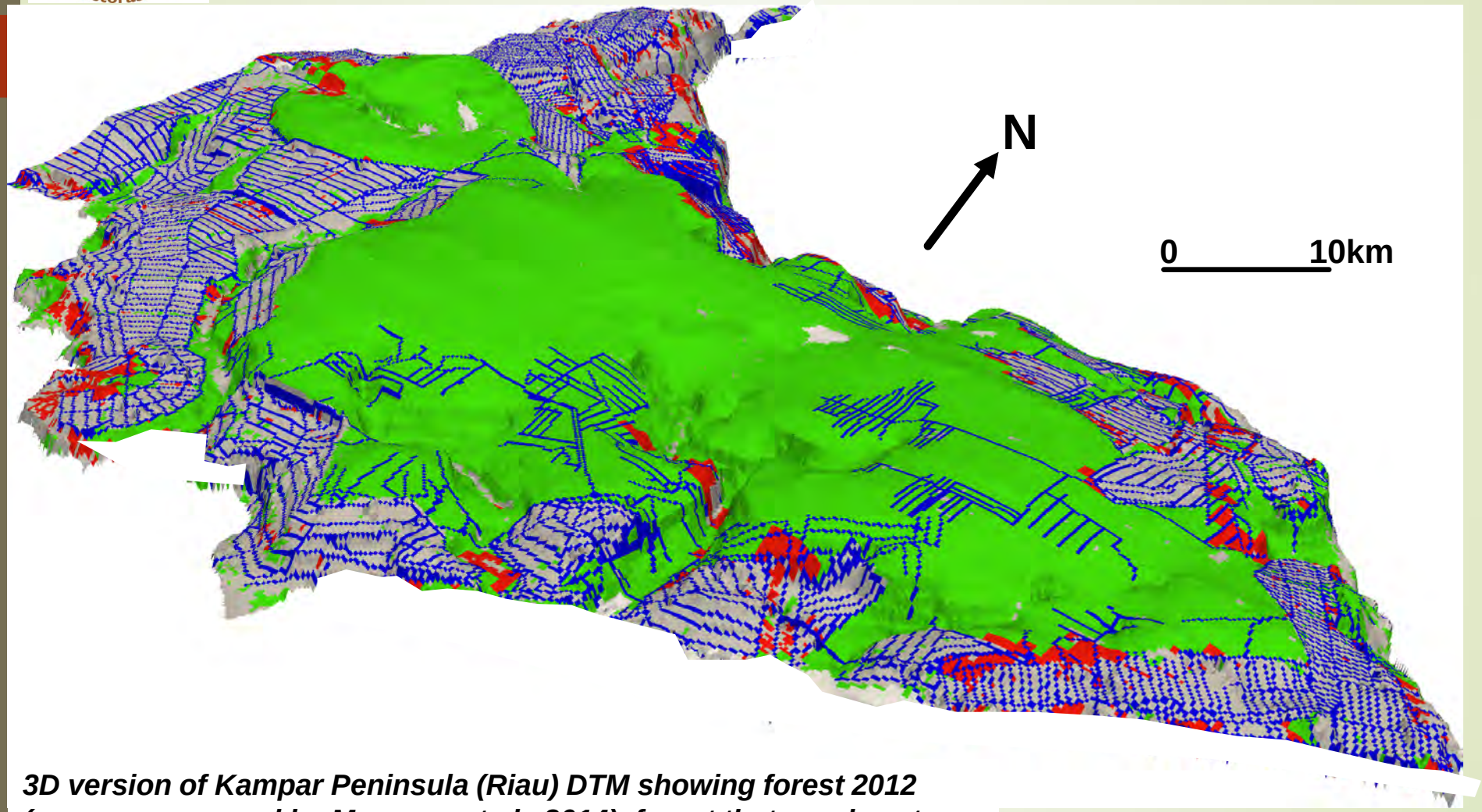
Data requirements – LiDAR [1]

- LiDAR elevation / slope data may be used to determine intervals between blocks. However this should not be too detailed; better to have a few interval classes for different slopes, e.g.:
  - (a) <0.25 m/km: 1000 m
  - (b) 0.25-0.5 m/km: 500 m
  - (c) 0.5-1 m/km: 250 m
  - (d) > 1 m/km: <250 m
- The LiDAR data required for this are now available for much of East Sumatra; refinement / expansion work is underway.



https://www.deltares.nl/en/projects/lidar-data-large-scale-peatland-management-flood-risk-assessment/

Data requirements – LiDAR [2]



3D version of Kampar Peninsula (Riau) DTM showing forest 2012 (green; as mapped by Margono et al., 2014), forest that was burnt or partly burnt since 2012, as indicated by MODIS hotspots (red) and canals + logging tracks (blue).

https://www.deltares.nl/en/projects/impact-assessments-for-pulp-and-oil-palm-plantations-in-the-kampar-peninsula-peatlands-riau-indonesia/

"Sustainability issues in peatlands comprise complex sets of challenges that require involvement and determination of all stakeholder"

CALL FOR CLOSE AND IMPACTFULL COLLABORATION

Thank You
Terima Kasih