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Innovation on Restoration Opportunities Assessment Methodology to Support Successful Forest and Landscape Restoration in Indonesia

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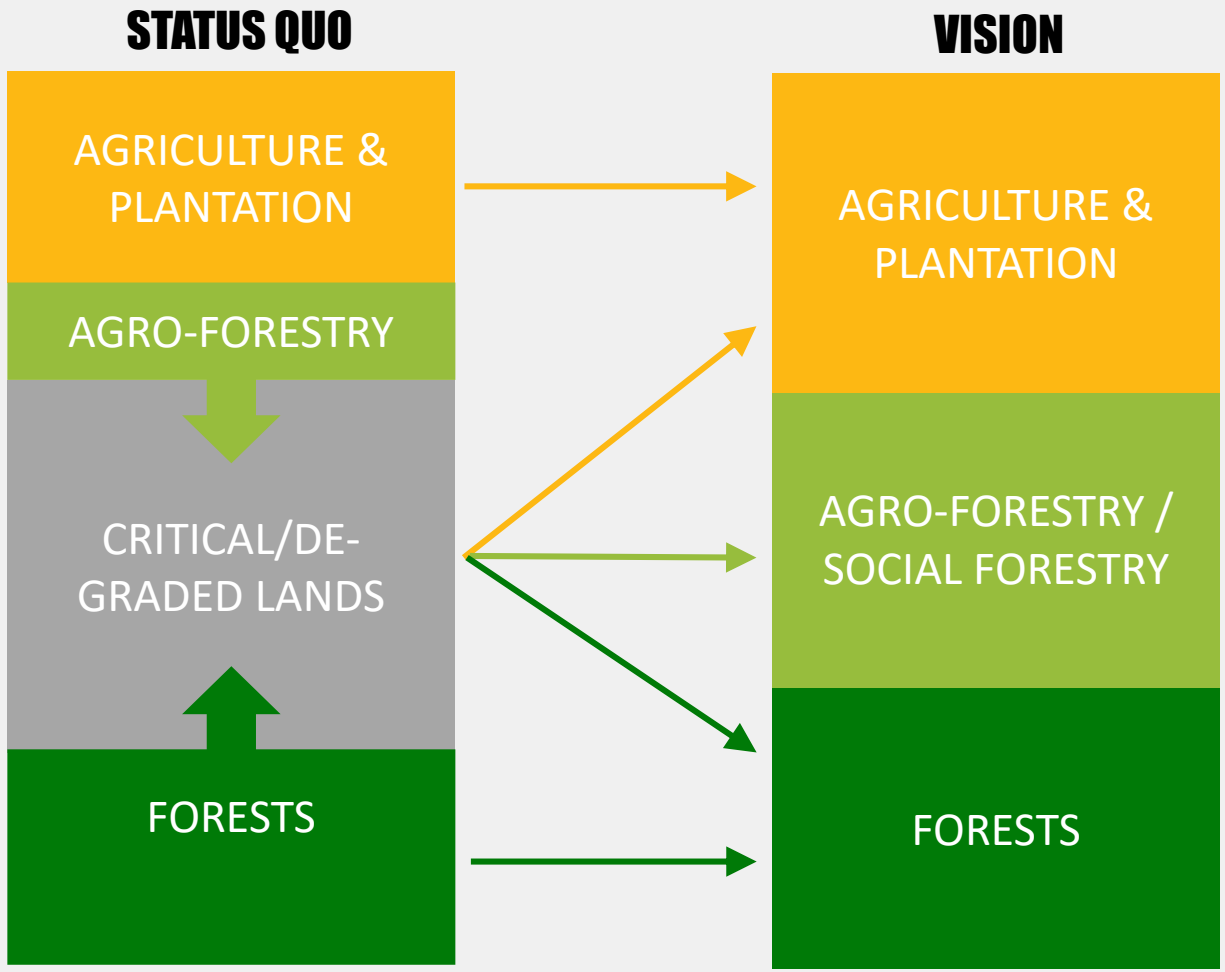
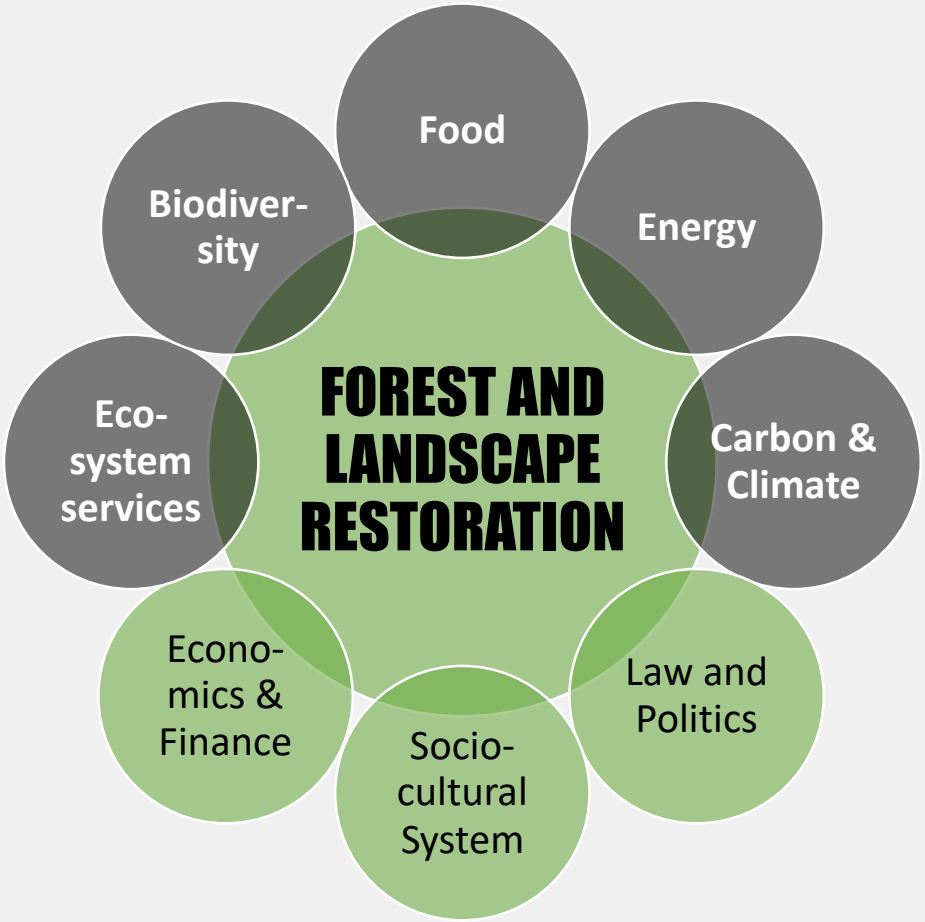
FOREST AND LANDSCAPE RESTORATION (FLR) in Indonesia

is about restoring various functions, with an emphasis on multiple benefits that can be achieved.



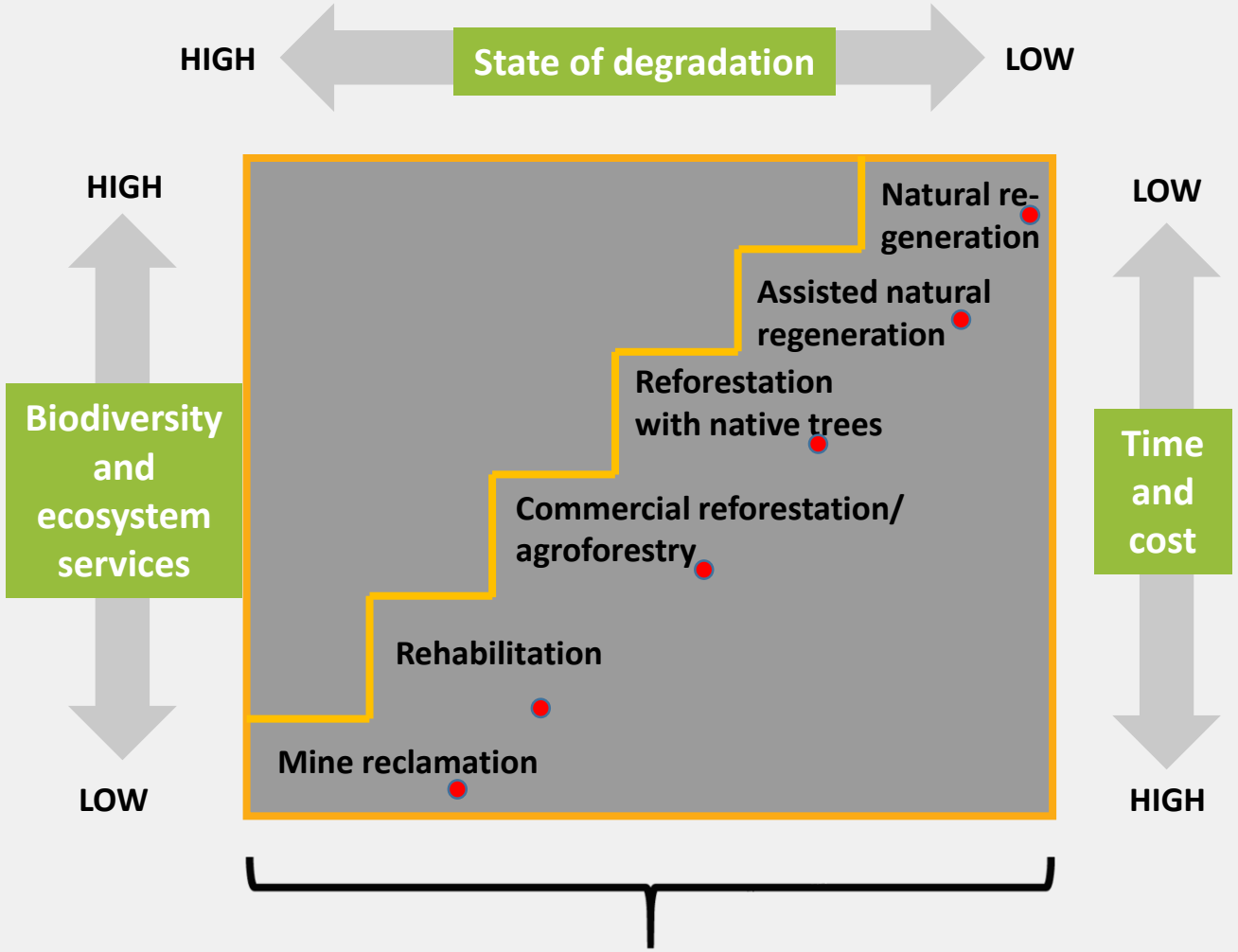
Why restore?



How to restore?

RESTORATION STAIRCASE

(Chazdon 2008)



FLR in Indonesia encompasses various activities and strategies, with *little success* thus far

FLR-related targets

Ministry of Environment and Forestry (~22.6 million Ha between 2015 and 2019):

- **Social forestry, with high restoration opportunities (12.7 million Ha)**
- **Rehabilitation of degraded forest and land (5.5 million Ha)**
- **CSR efforts (1.6 million Ha)**
- **Ecosystem restoration concession (2.791 million Ha)**
- **Ecosystem recovery in conservation areas (100,000 Ha)**

Peat Restoration Agency

(2 million Ha by 2020)

Major Restoration Initiatives in Indonesia through Time

- 1983 - MoF reforestation of protection conservation forests, afforestation of community areas
- 1988 - HTI industrial plantations to rehabilitate logged areas HPH logging concessions to plant and regenerate state-owned companies assigned rehabilitation task
- 1998-2004 - Small-scale CBFM for community and timber
- 2000 - Master plan for rehabilitation
  2002 - Reforestation funds regulation
- 2003 - National movement for rehabilitation (GN-RHL/GERHAN)
- 2004 - Ecosystem Restoration Licenses for Degraded Production Forests (IUPHHK-RE)
- 2005 - Climate change & REDD+
- 2008 - One Man One Tree
- 2011 - One Billion Trees
- 2016 - Peat Restoration Agency (BRG) established

PROBLEMS

Indonesia had >400 rehabilitation projects 1990s to 2004 - little positive outcome (Nawir et al. 2007)

TECHNICAL

- No baseline site data
- Species chosen by government
- Few nurseries
- Planting at wrong time
- Inadequate budget

ECONOMIC

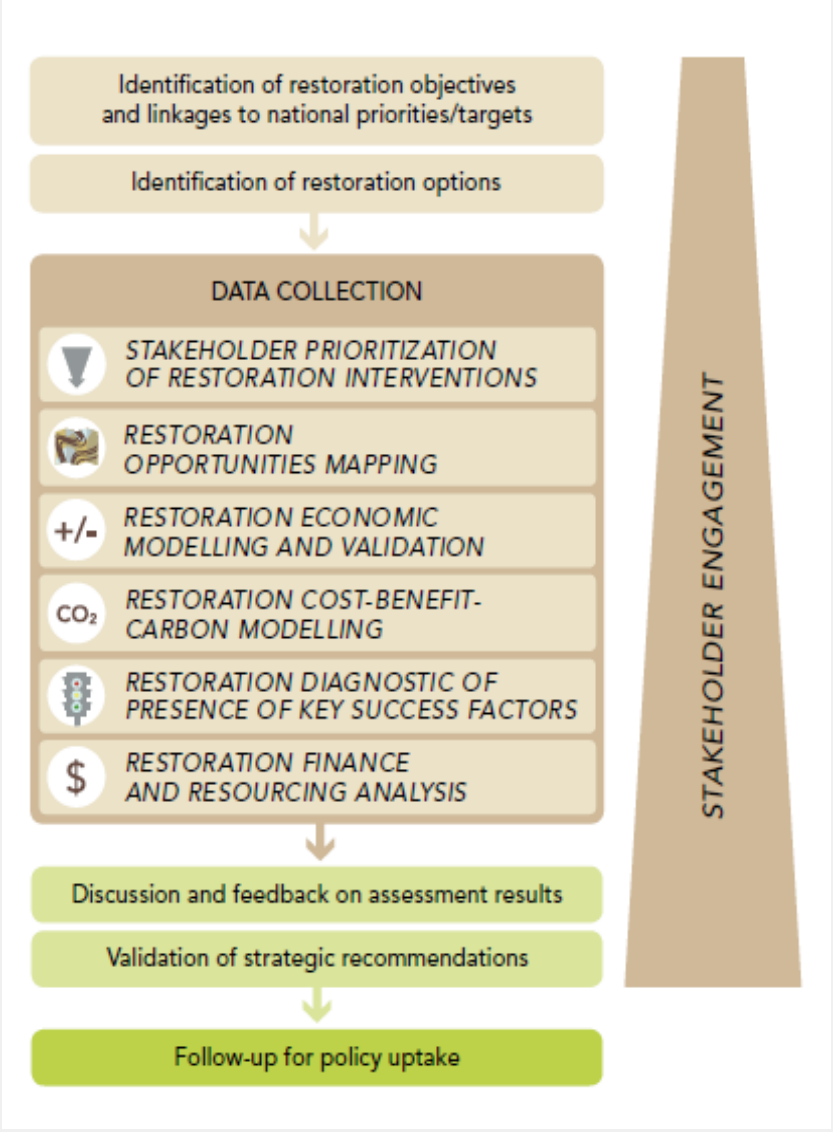
- Inadequate economic viability analysis
- No clear market integration
- No funding plan after project

SOCIO-CULTURAL

- Limited rights issued
- Limited consultation
- No conflict resolution mechanism

THERE IS A LACK OF COORDINATION IN IMPLEMENTING RESTORATION PLAN

ROAM

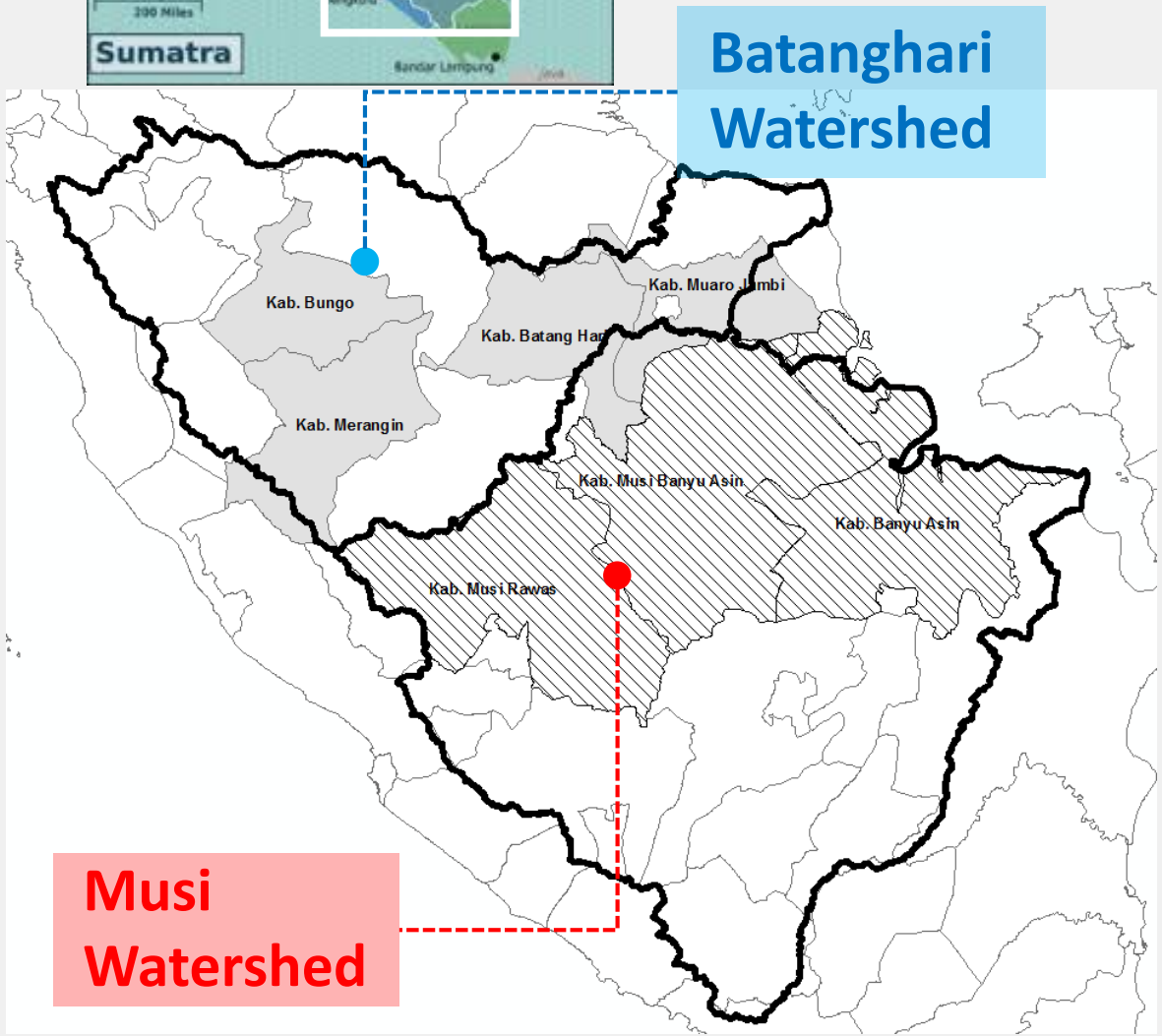


IUCN and WRI. 2014. A guide to the Restoration Opportunities Assessment Methodology (ROAM): Assessing forest landscape restoration opportunities at the national or sub-national level. Working Paper (Road-test edition). Gland, Switzerland: IUCN. 125pp.

FLORAS in 6 steps

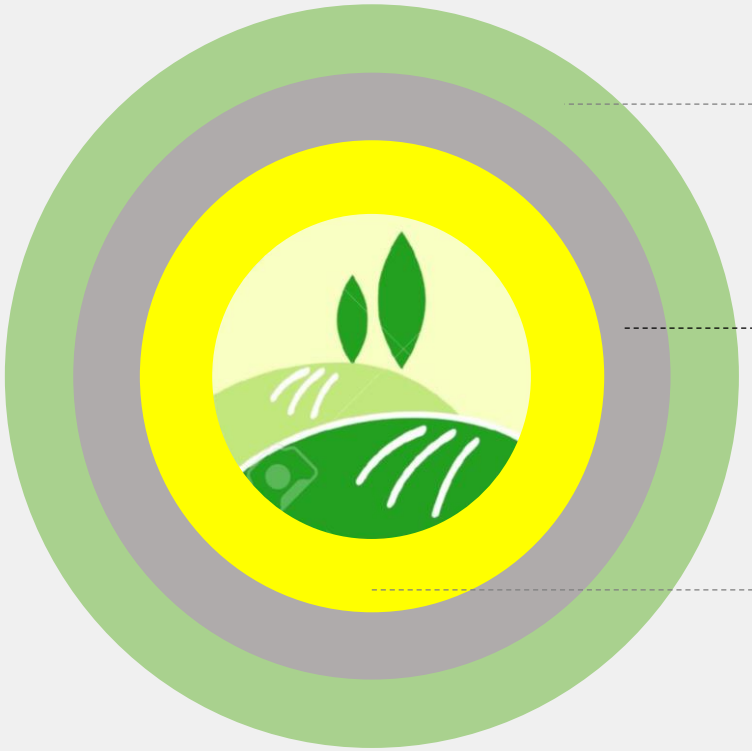
- **FLORAS** translates **ROAM** into a technical work plan suitable for the Indonesian context
- **FLORAS** facilitates multi-stakeholder dialogue that results in FLR assessment, action plan, and strategy.

Forest and Landscape Restoration Assessment [FLORAS]



- Goal: **strengthening the capacity of stakeholders** to conduct FLR in Jambi and South Sumatra
- Methods: Using **Restoration Opportunities Assessment Methodology (ROAM)**, an inclusive and integrative approach, combining local knowledge and best available science
- Scope: **watershed (macro-level), district (meso-level), Forest Management Unit (micro/site-level)**

1 FLORAS Partners

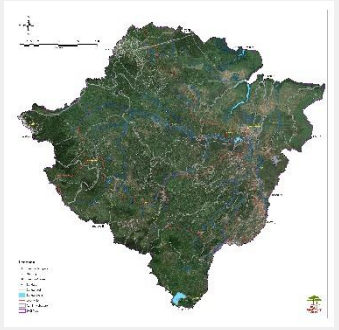


- At the **macro level**, partnering with **Watershed Management Forum**, established by the Governor
- At the **meso level**, collaborating with **District Planning Agency**
- At the **micro level**, collaborating with **Forest Management Unit** and **Forest Conservation Park**

2 Determining Scope and Goals of Restoration

GENERAL CONDITION MAP OF AREA OF INTEREST

- **TOPONYM** (Names of places)
- **ADMINISTRATIVE BORDERS** (Districts/Sub-districts)
- **ROAD AND RIVER NETWORK**
- **SATELLITE IMAGES** (Google Earth)



IDENTIFYING POTENTIAL PROBLEMS

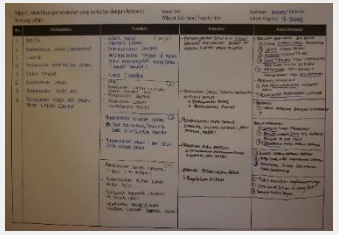
- Identifying environmental problems and their locations
- Identifying drivers of environmental problems and their locations
- Identifying past and present restoration activities/ interventions and their statuses
- Identifying desired activities/interventions

RESULTS FROM FOCUS GROUP DISCUSSIONS ON PROBLEM IDENTIFICATION

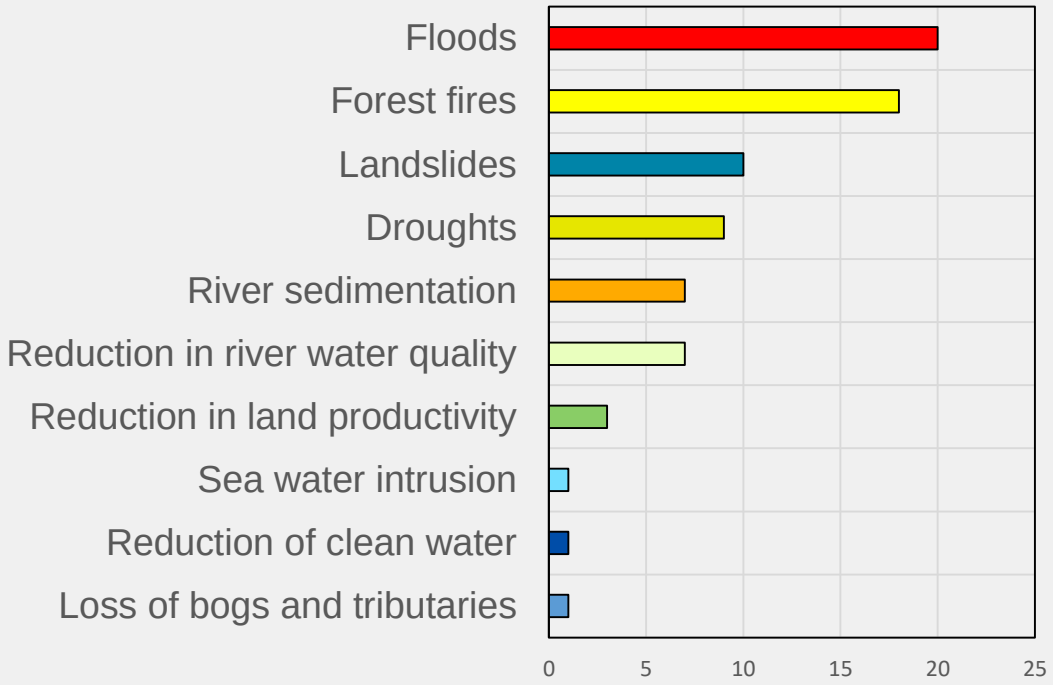
- **LIST OF ENVIRONMENT PROBLEMS** + **LOCATIONS**
- **LIST OF DRIVERS OF ENVIRONMENTAL PROBLEMS** + **LOCATIONS**
- **LIST OF PAST AND PRESENT RESTORATION ACTIVITIES** + **STATUS (LEVEL OF SUCCESS)**

RESTORATION SCOPE AND GOALS

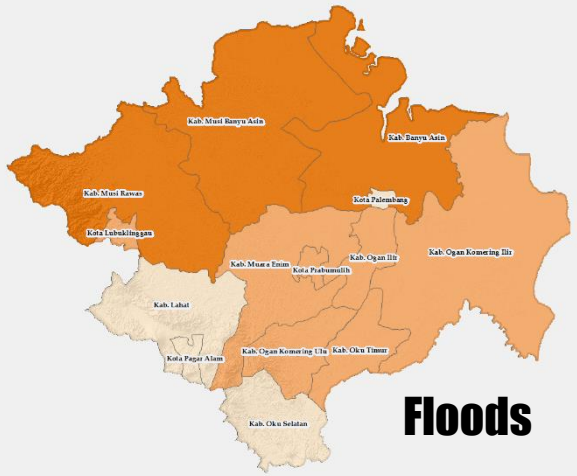
+



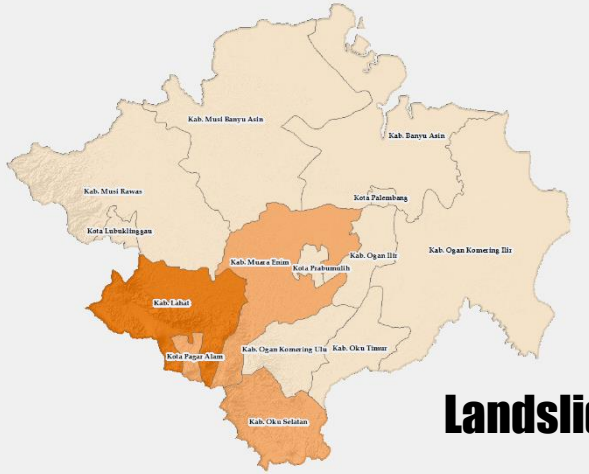
Musi Watershed Problems



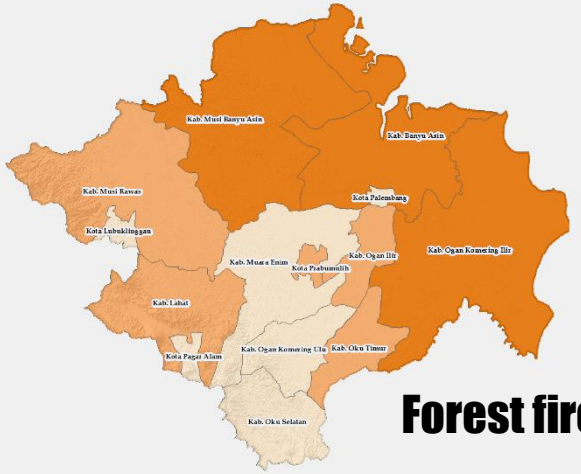
Musi Watershed Problems



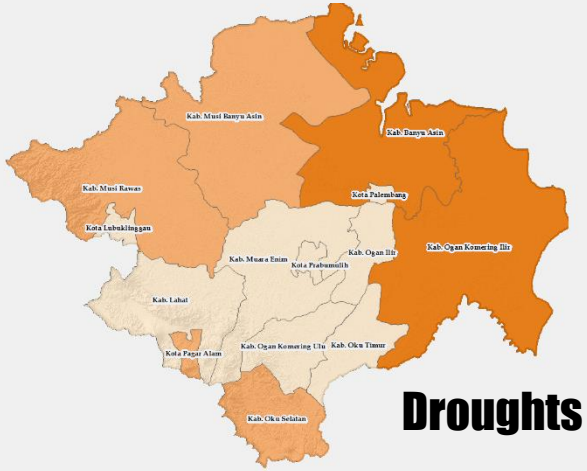
Floods



Landslides

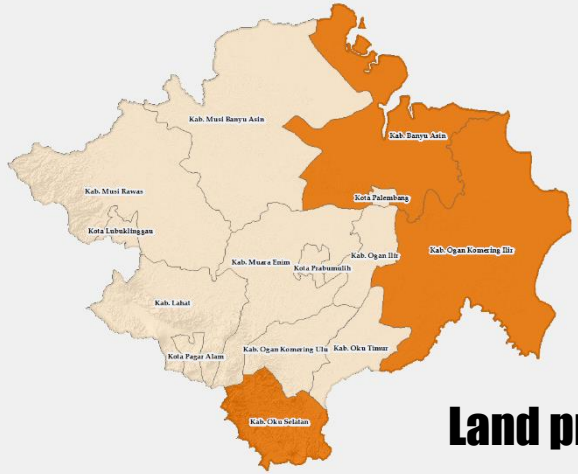


Forest fires



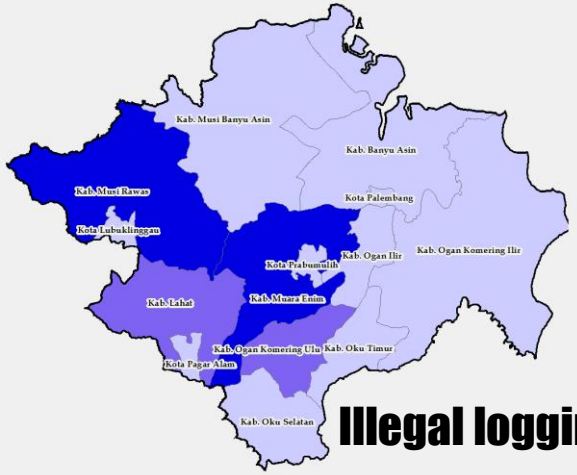
Droughts

Water quality

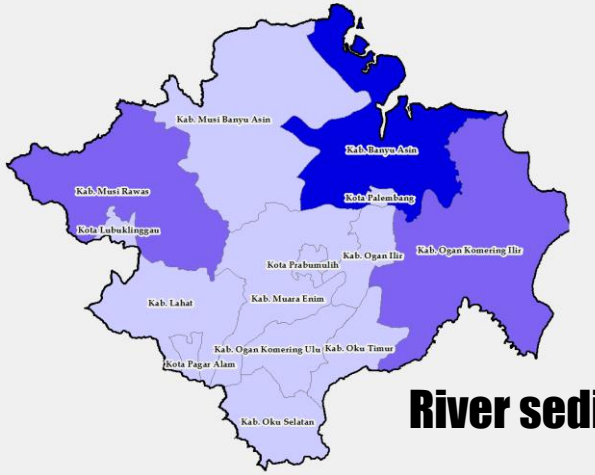


Land productivity

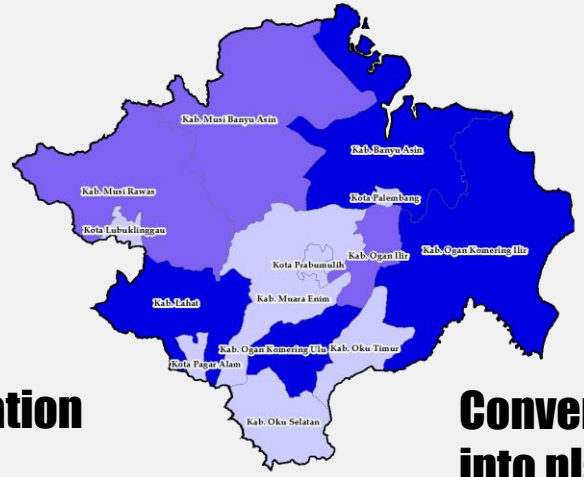
Drivers of Floods



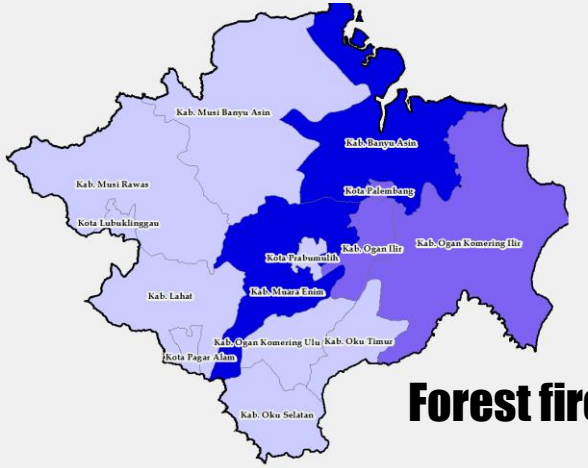
Illegal logging



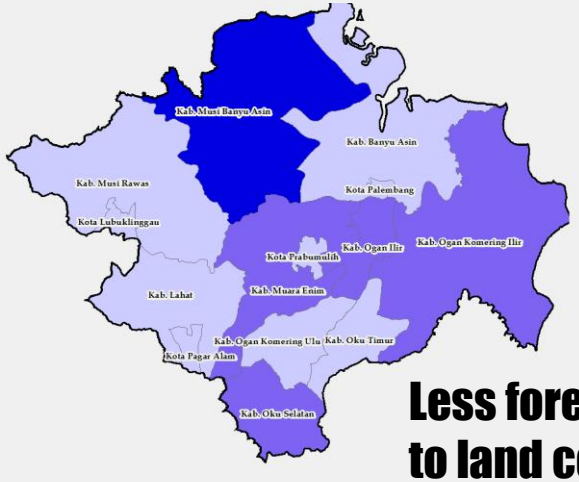
River sedimentation



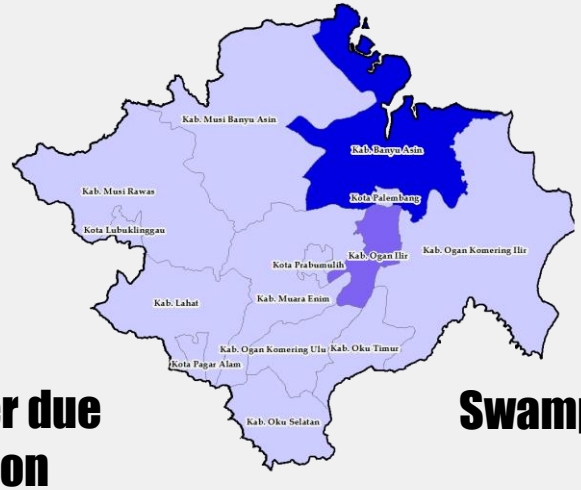
Conversion of forests into plantation



Forest fires

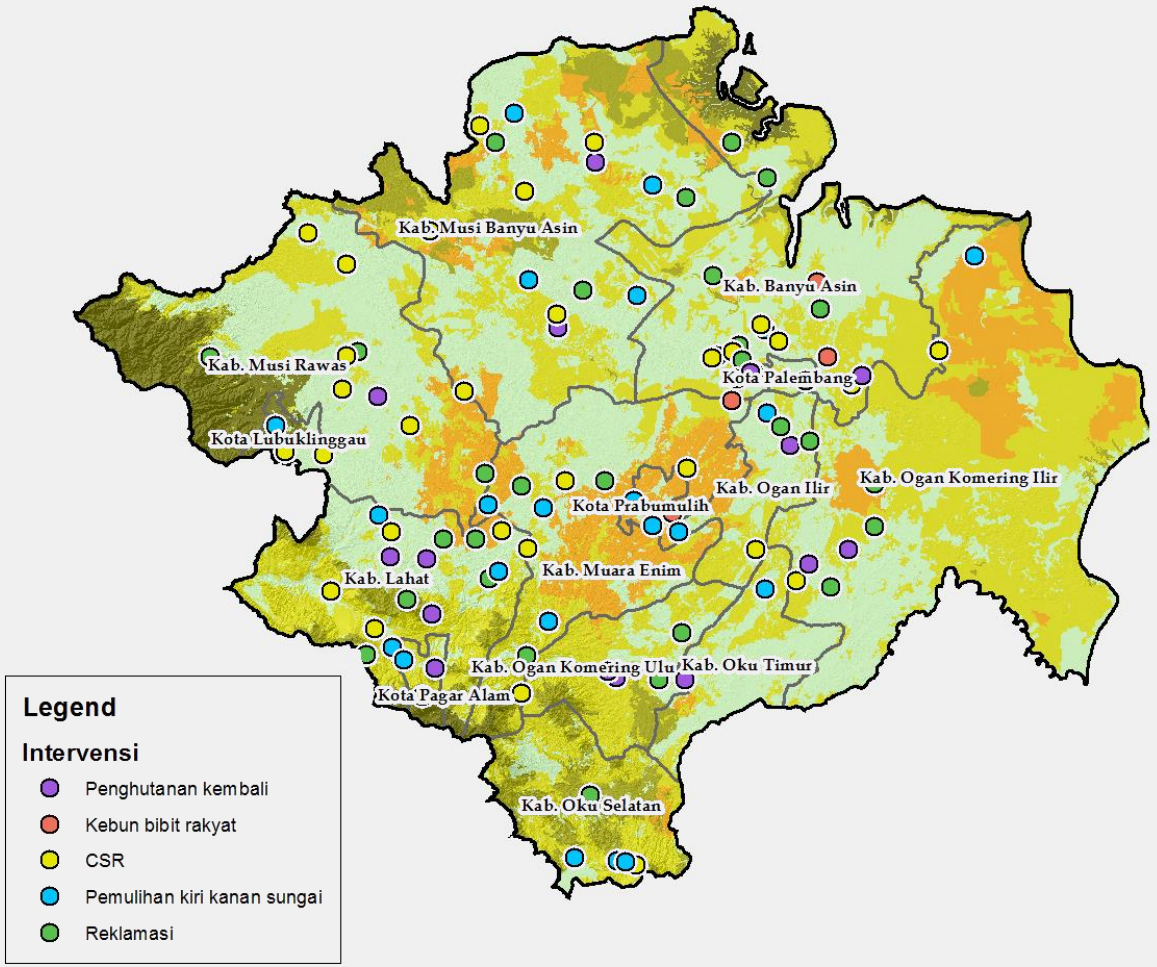


Less forest cover due to land conversion



Swamp fill for housing

Problems surrounding “restoration” activities



1. No budget allocation for post-planting care
2. Planted species are not physically suitable for the location
3. Planted species are not economically-worthy and not desired by the communities
4. No monitoring after planting
5. No measurement or assessment on how activities contribute to the expected improvement of a certain function
6. No integrated planning
7. Limited/slow reforestation efforts compared to deforestation

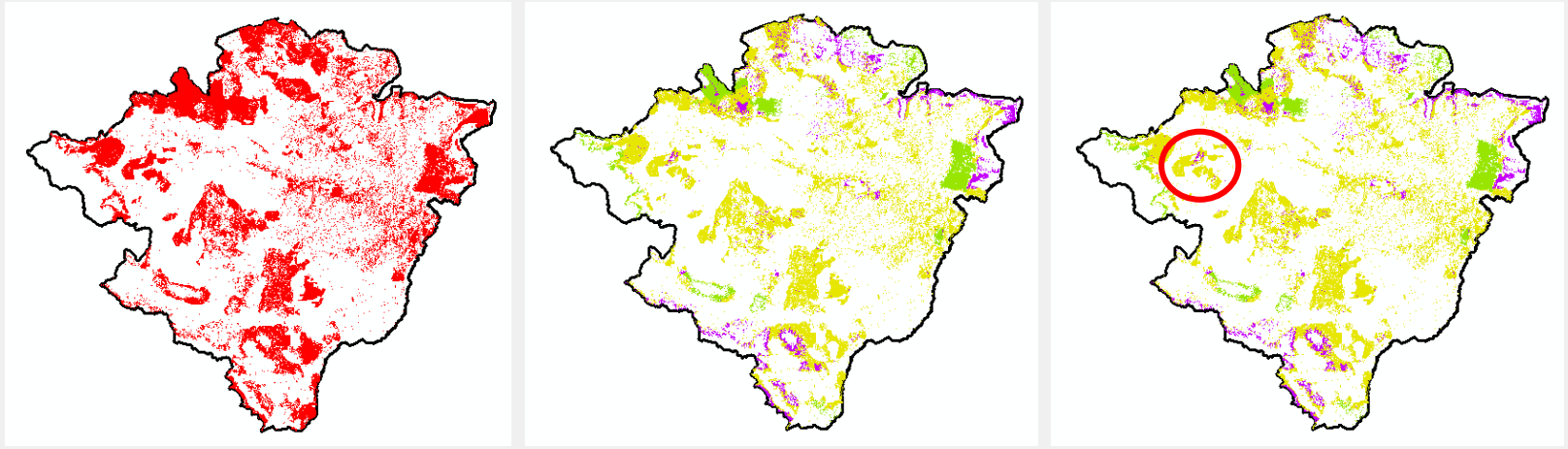
Restoration goals

"to restore the function of Musi Watershed through fire prevention and recovery of burned areas, to improve the quality of upstream water catchment and the extent of water catchment area downstream"

3 Identifying potential areas for restoration

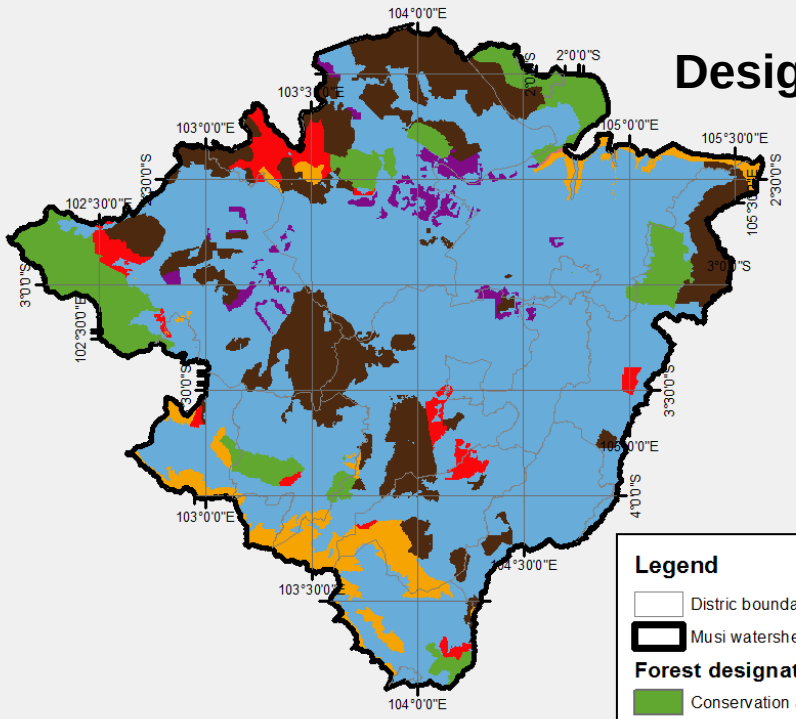
DETERMINING RESTORATION SCOPE AND GOALS → DETERMINING RESTORATION OPPORTUNITIES → DETERMINING RESTORATION POTENTIAL → DETERMINING RESTORATION PRIORITY

restoration goals



IDENTIFICATION OF RESTORATION OPPORTUNITIES

Area Designation Map



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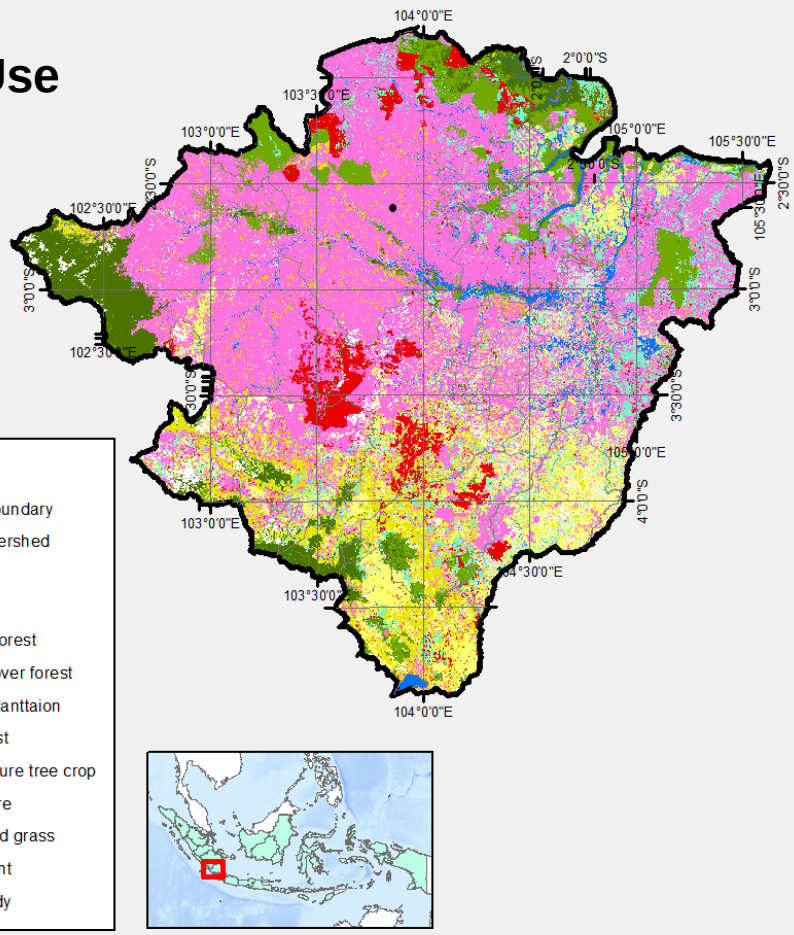
when observed landscape does not function as expected: restoration potential

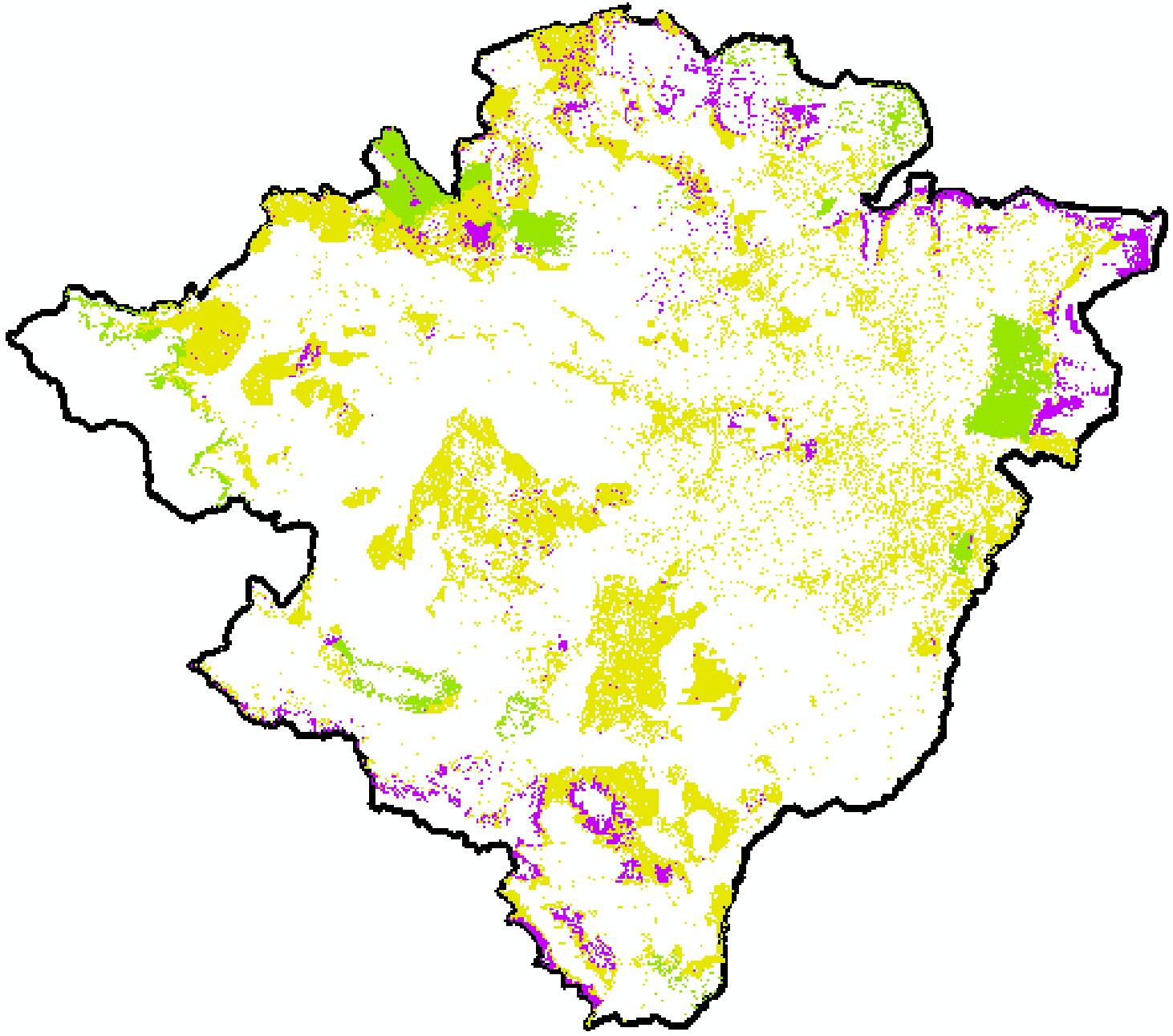
Actual Land-Use Map



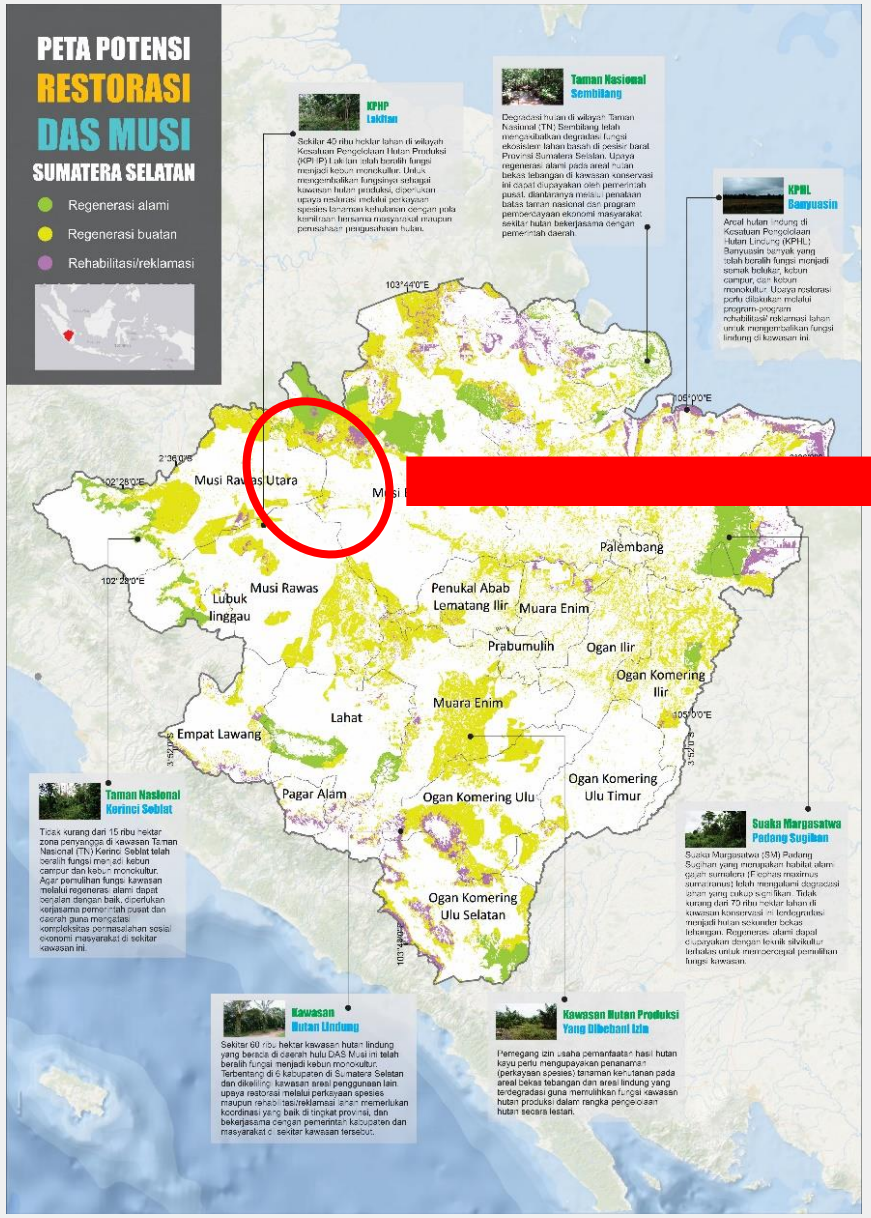
Suitable restoration options were then determined by stakeholders based on local conditions using *pebble distribution method* (Sheil and Liswanti 2006)

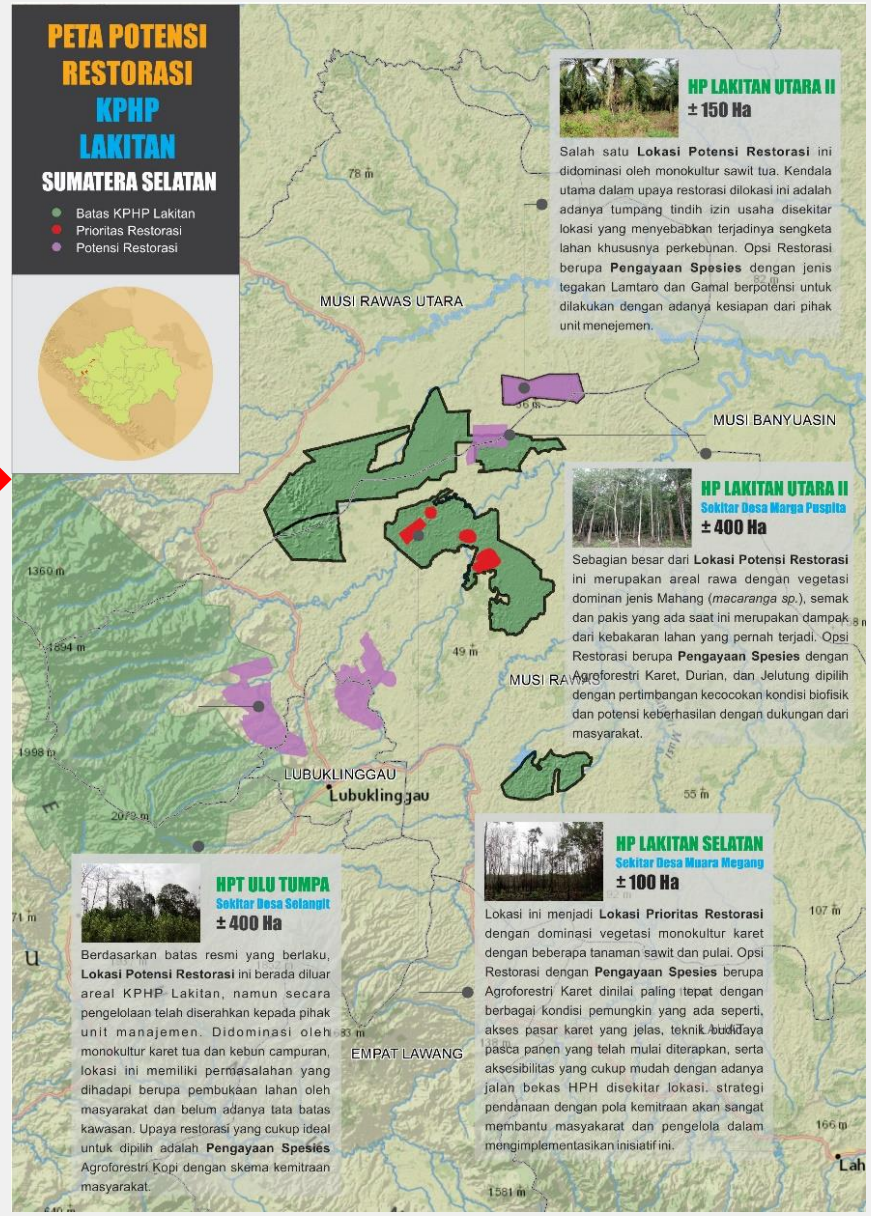
RESTORATION INTERVENTION OPTIONS

INTERVENTION OPTIONS	CATEGORIES
Natural regeneration	Natural regeneration
Assisted natural regeneration	
Enrichment planting with native species	Enrichment planting / agroforestry
Enrichment planting with commercial species	
Land rehabilitation	Rehabilitation and mine reclamation
Mine reclamation	



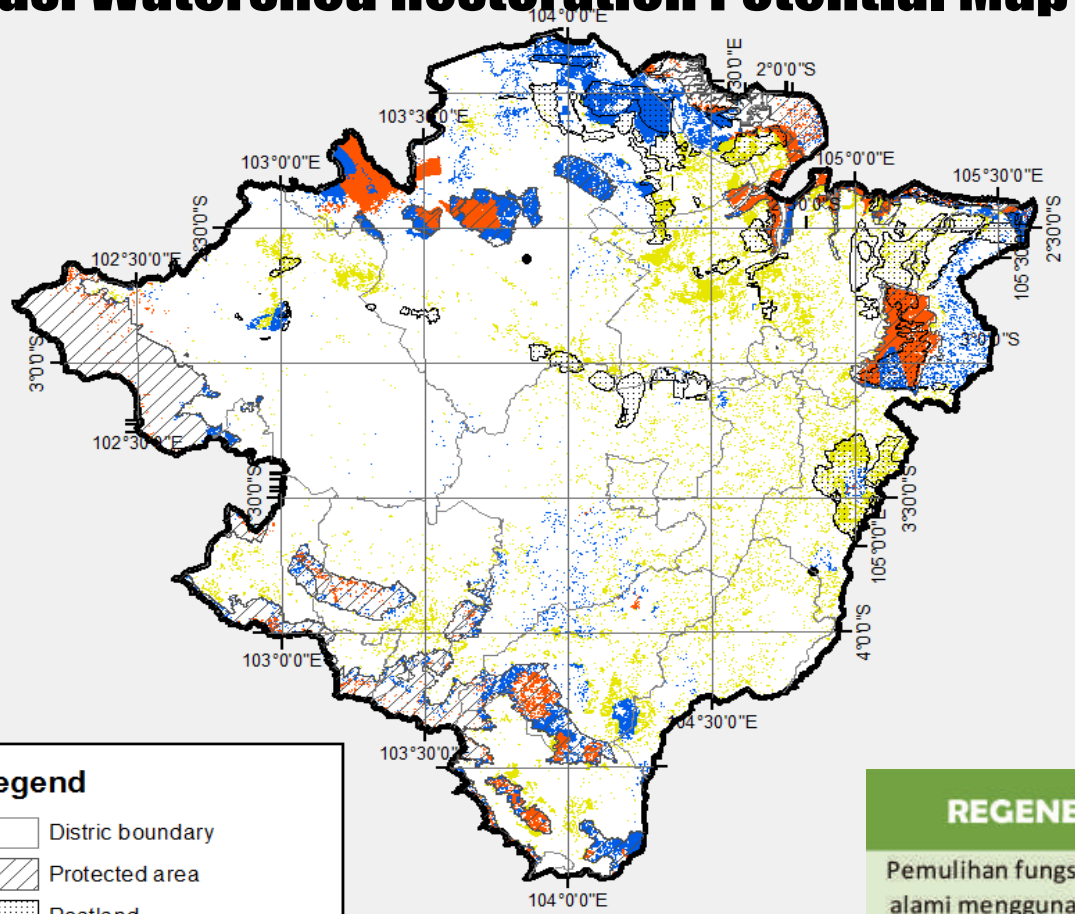
RESTORATION PRIORITY





4 Mapping landscape-level restoration opportunities

Musi Watershed Restoration Potential Map



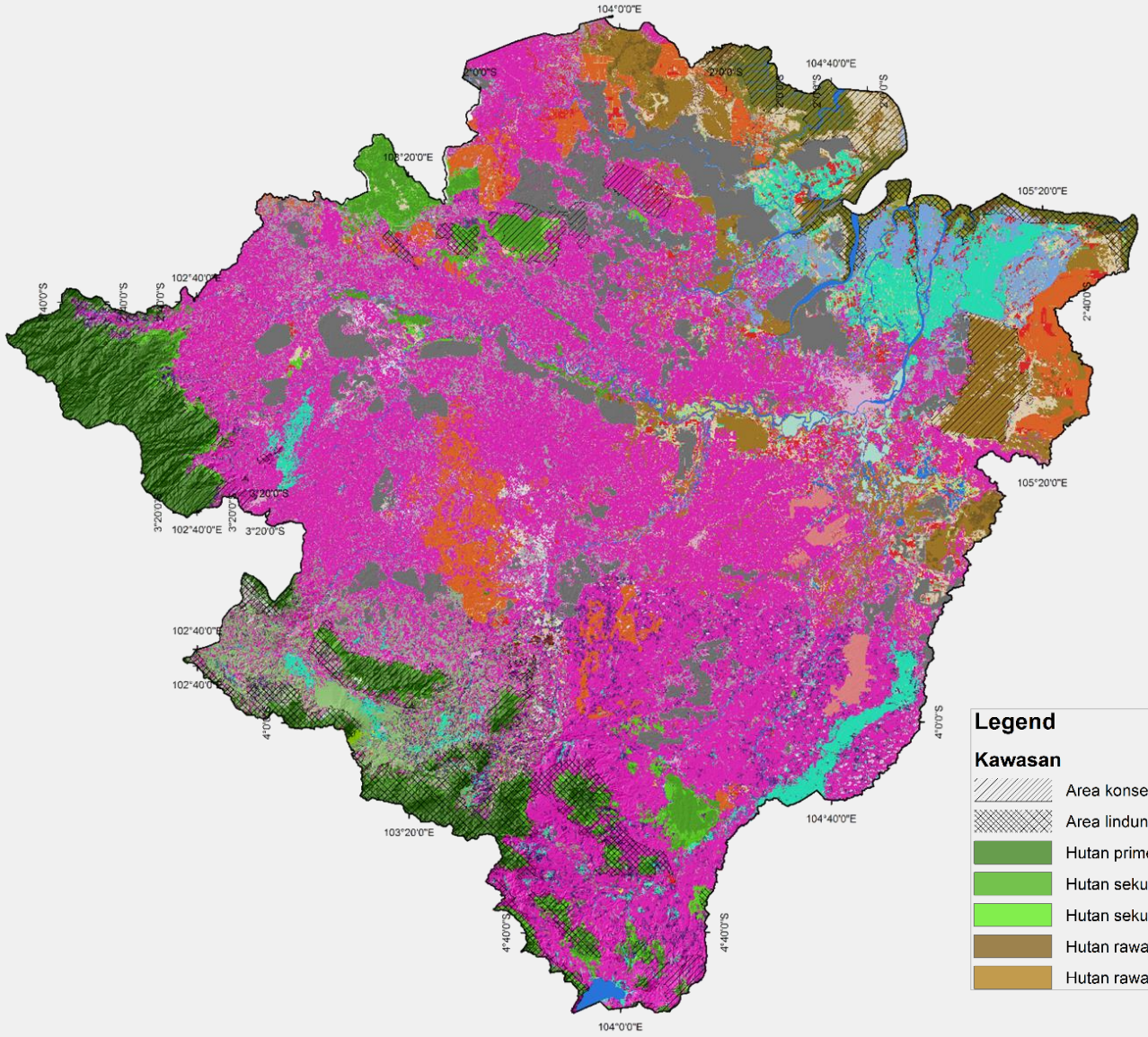
- **> 1.1 million hectares or 16% of Musi Watershed** identified as having the potential for restoration given deviation or degradation from allocated function.
- **~395 thousand hectares or 36% from potential areas** are located on peatlands
- **15% of potential areas** are located in conservation & protected areas

REGENERASI ALAMI	PERKAYAAN SPESIES	REHABILITASI DAN REKLAMASI LAHAN
Pemulihan fungsi hutan dan ekosistem alami menggunakan bibit tanaman asli yang bersumber dari lokasi setempat, dengan atau tanpa teknik silvikultur untuk mempercepat peningkatan lahan tersebut. Regenerasi alami rentan terhadap adanya gangguan aktivitas manusia.	Penanaman kembali lahan berhutan atau ekosistem alami melalui perkayaan spesies asli maupun komersil untuk memenuhi kebutuhan masyarakat, meningkatkan produktivitas, meningkatkan kesuburan tanah, dan memperbaiki tata air.	Penanaman kembali lahan kosong/terbuka pada areal-areal yang hanya memiliki daya dukung minimum untuk tanaman dapat tumbuh maupun pada areal-areal yang telah terdegradasi berat/terpolusi oleh limbah berat bekas tambang.

Musi Watershed Conservative Restoration Scenario

	Area	Scenario
Natural Regene-ration	161k Ha	• No conversion from secondary forest land cover in conservation areas • Plantation land cover in conservation areas restored into agroforestry land-cover; restoration conducted gradually from 2018 to 2030 • Bushes, grasslands, and open areas land cover types in conservation areas restored naturally, restoration conducted gradually from 2018 to 2030 • Bushes, grasslands, and open areas in non-conservation areas restored into agroforestry
Enrich-ment planting	909k Ha	• All types of land cover, except those in forest estates (conservation, protected and production forests) restored into agroforestry • Tree-based restoration in areas with bushes, grasslands, and open area land cover types located on “forest for other land uses”
Rehabili-tation / reclama-tion	80k Ha	• Tree-based restoration in areas with bushes, grasslands, and open area land cover types located on non-forest estates and non-“forest for other land uses”

Projected carbon at 2030 with BAU scenario



	Emission (Ton CO_2-eq)	Sequestration (Ton CO_2-eq)
NR	6,232,888.22	1,260,541.91
EP	32,112,896.26	4,739,075.88
RR	15,379,331.77	927,645.46

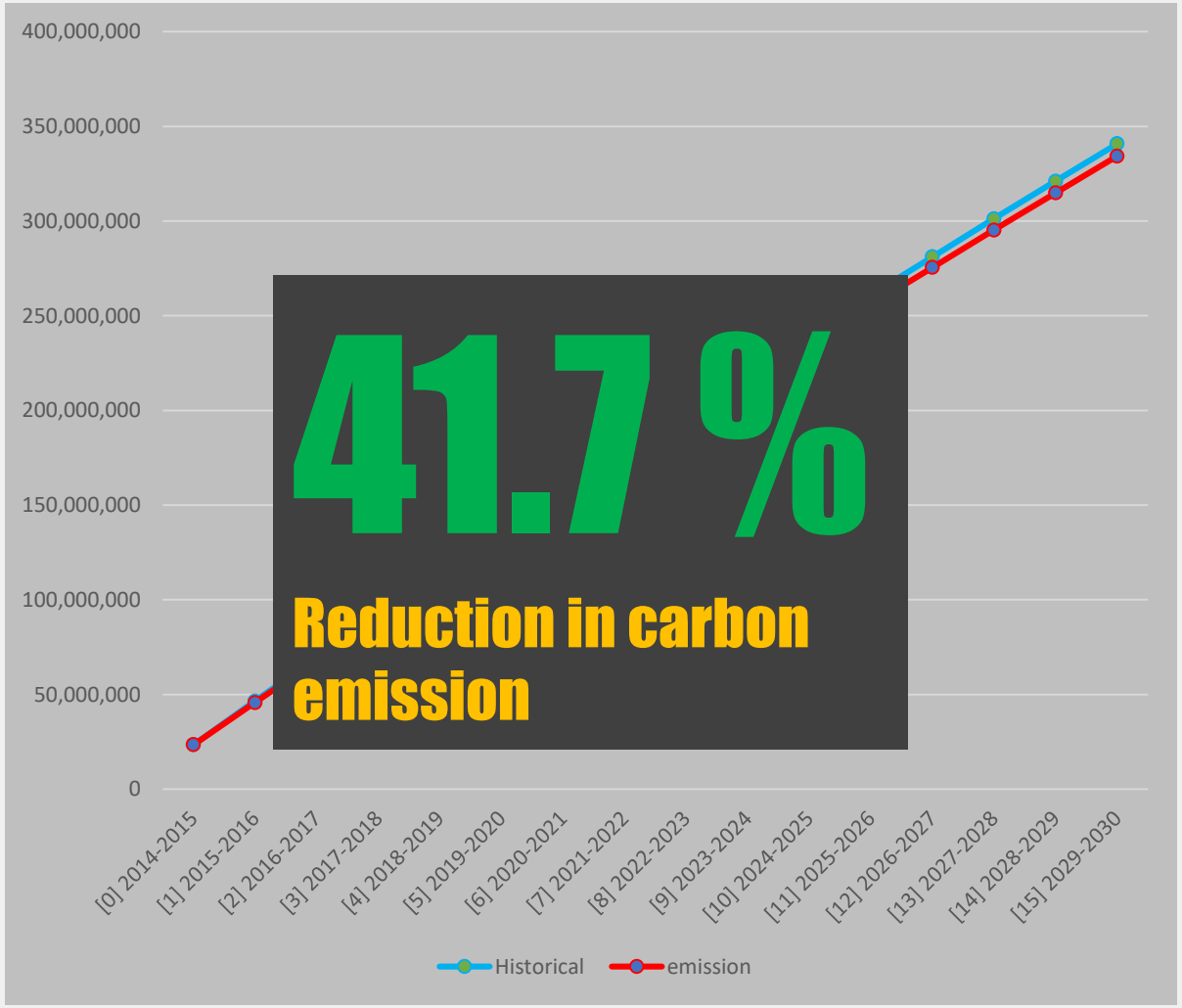
Legend

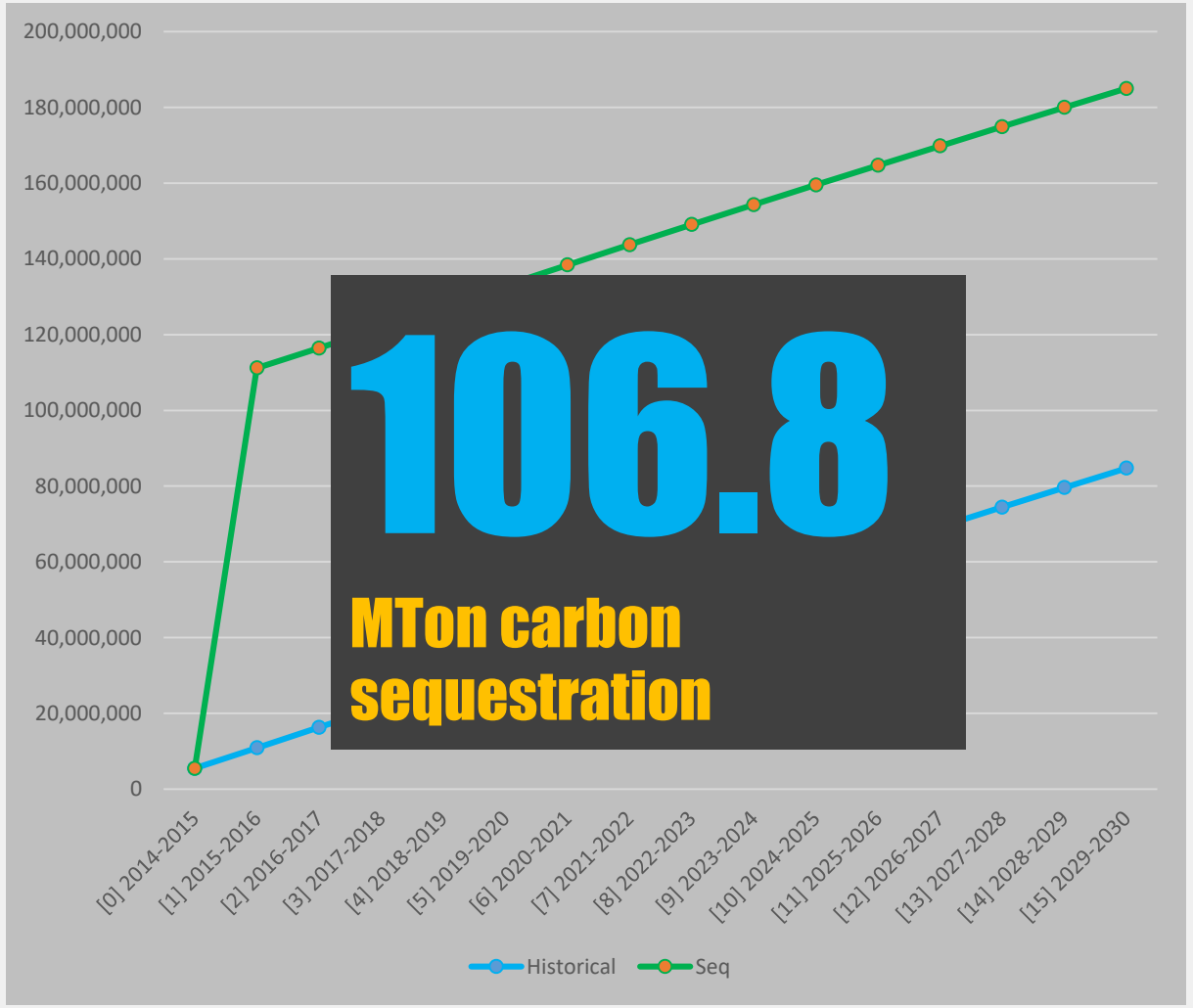
Kawasan

- Area konservasi
- Area lindung

- Hutan primer
- Hutan sekunder kerapatan tinggi
- Hutan sekunder kerapatan rendah
- Hutan rawa primer
- Hutan rawa sekunder
- Hutan bakau primer
- Hutan bakau sekunder
- Tanaman kayu industri
- Kebun campuran
- Agroforestri kopi
- Karet agroforestri
- Karet
- Kelapa sawit skala besar
- Kelapa sawit skala kecil
- Kelapa
- Teh
- Sawah irigasi
- Sawah tadah hujan
- Tebu
- Tanaman semusim lain
- Semak belukar
- Rerumputan
- Tambang
- Lahan terbuka
- Pemukiman
- Tambak
- Tubuh air

Projected Emission-Sequestration(Ton CO_2-eq)
restoration scenario compared to BAU/Historical scenario





5 Site-level Restoration Assessment

GENERAL CONDITION MAP OF FOREST MANAGEMENT UNIT (FMU)

- **FMU MAP**
- **ADMINISTRATIVE BORDERS** (Sub-district/Village)
- **ROAD AND RIVER NETWORKS**
- **SATELLITE IMAGES** (Google Earth)

IDENTIFYING PRIORITY LOCATIONS AND PROBLEMS

- Assessment of current regulations and work plans
- Location identification
- Identification of current conditions and problems
- Desired outcomes

RESULTS OF FOCUS GROUP DISCUSSIONS

- **LIST OF PROBLEMS** + **POTENTIAL RESTORATION AREAS**
- +
- **EXPECTATIONS ON HOW TO MANAGE POTENTIAL RESTORATION AREAS**

FMU-LEVEL POTENTIAL RESTORATION SITES & WORKPLAN

ROAM for Tropical Peatlands

Objective

To provide relevant analytical input to national/subnational policymaking on peatland restoration, especially to support the development of peatland restoration plans and their implementation

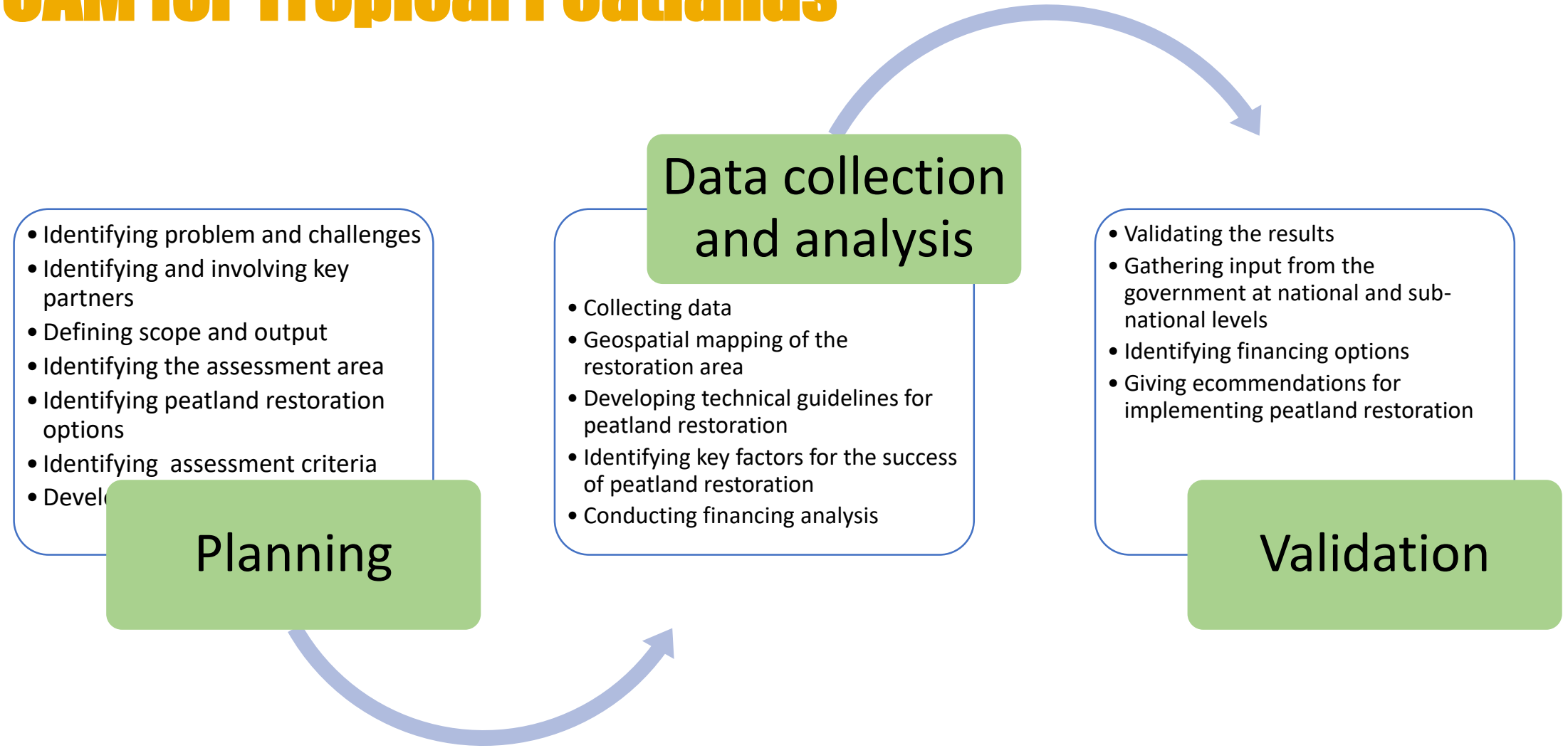
Scope

Focusing on SE Asian peatlands, although it is possible to expand the scope

Users

- Government officials commissioning assessment on peatland restoration opportunities
- Assessors who need to assess peatland restoration opportunities
- Experts or stakeholders at national or regional level who need to know what peatland restoration opportunities entail

ROAM for Tropical Peatlands



WRI INDONESIA

World Agroforestry Centre

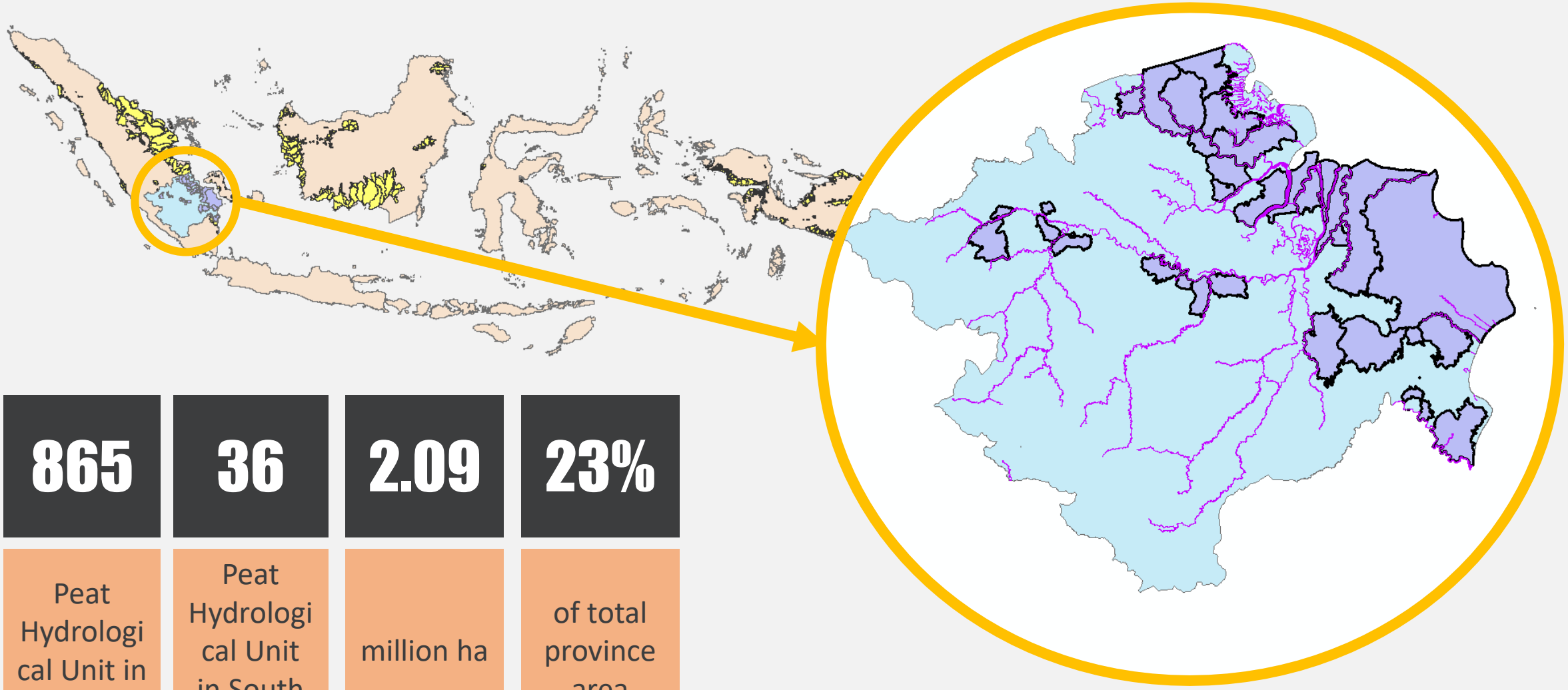
Wetlands INTERNATIONAL

support

Badan Restorasi Gambut

SUMATERA SELATAN
BERSATU TEGAR

PEATLAND ECOSYSTEM IN SOUTH SUMATERA



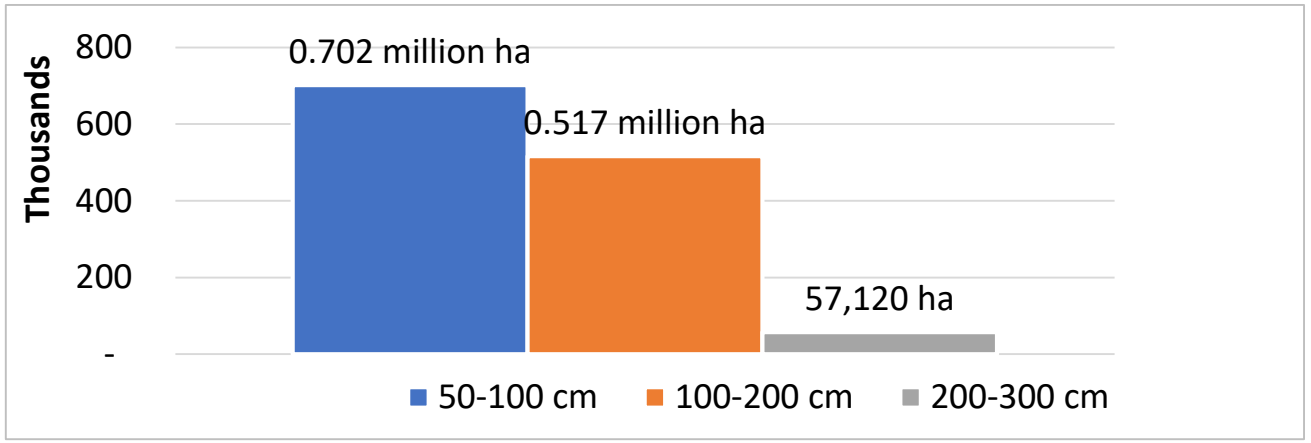
865	36	2.09	23%
Peat Hydrological Unit in Indonesia	Peat Hydrological Unit in South Sumatera	million ha	of total province area

Peatland Ecosystem Restoration Plan in South Sumatera

Peatland area in South Sumatra Province

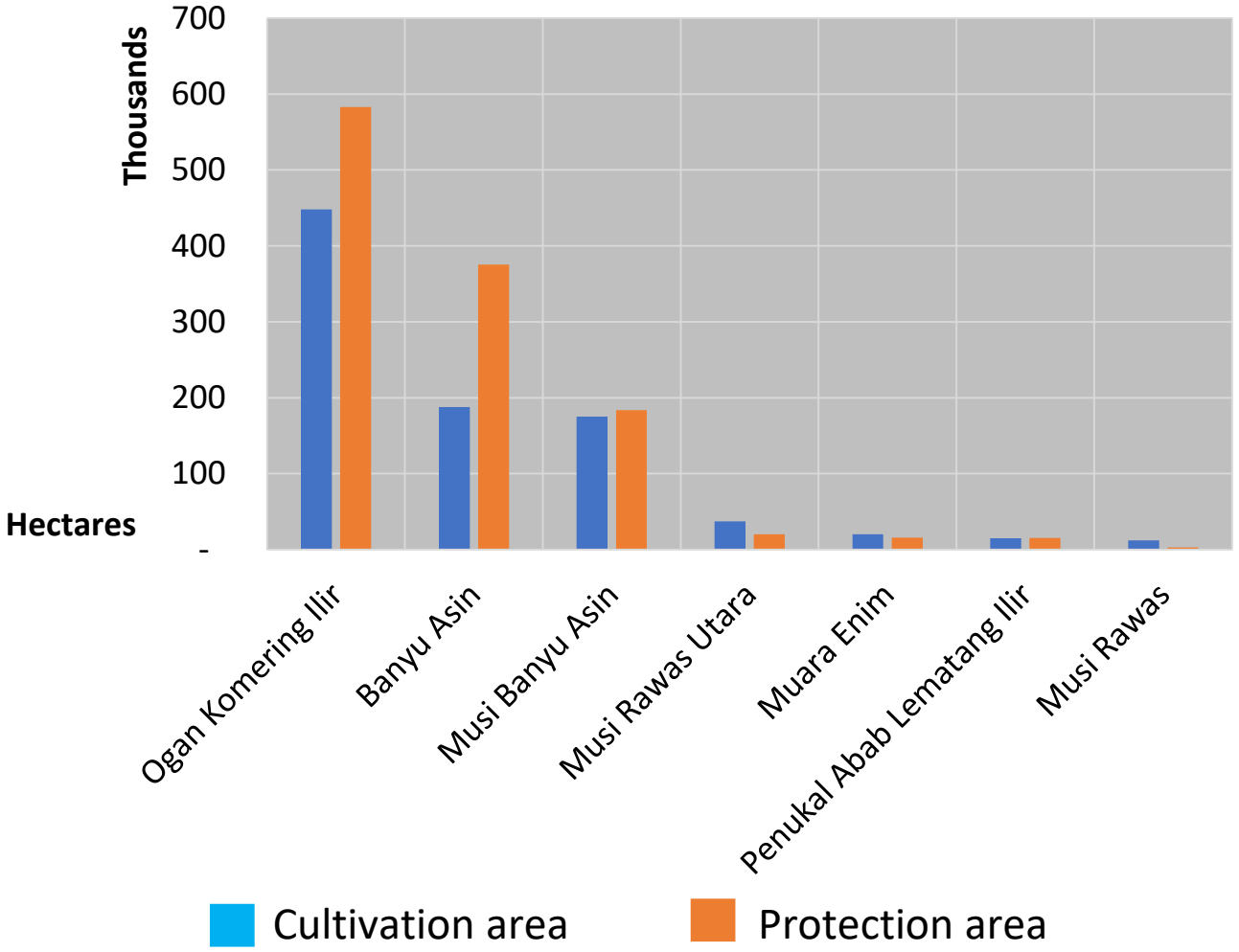
No	District	Area (ha)	%
1	Ogan Komering Ilir	1,030,601	49.28
2	Banyu Asin	563,083	26.92
3	Musi Banyuasin	358,938	17.16
4	Musi Rawas Utara	57,515	2.75
5	Muara Enim	35,894	1.72
6	Penukal Abab Lematang Ilir	30,305	1.45
7	Musi Rawas	15,104	0.72
		2,091,440	**100**

Area (ha) based on peat depth in South Sumatra Province

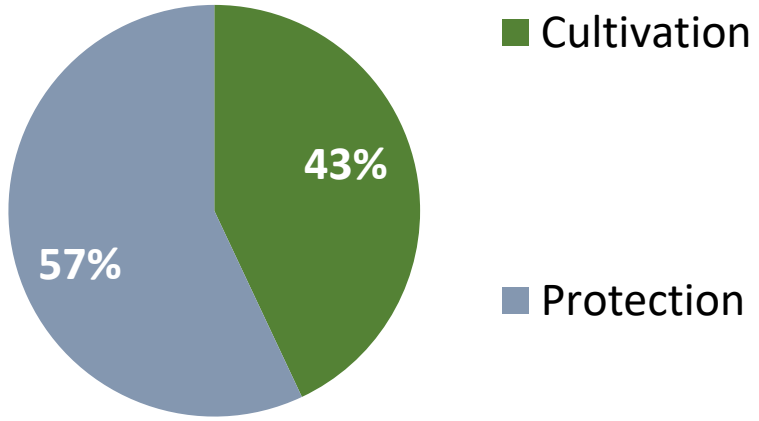


Peatland Ecosystem Restoration Plan in South Sumatera

Indicative area of peatland ecosystem function

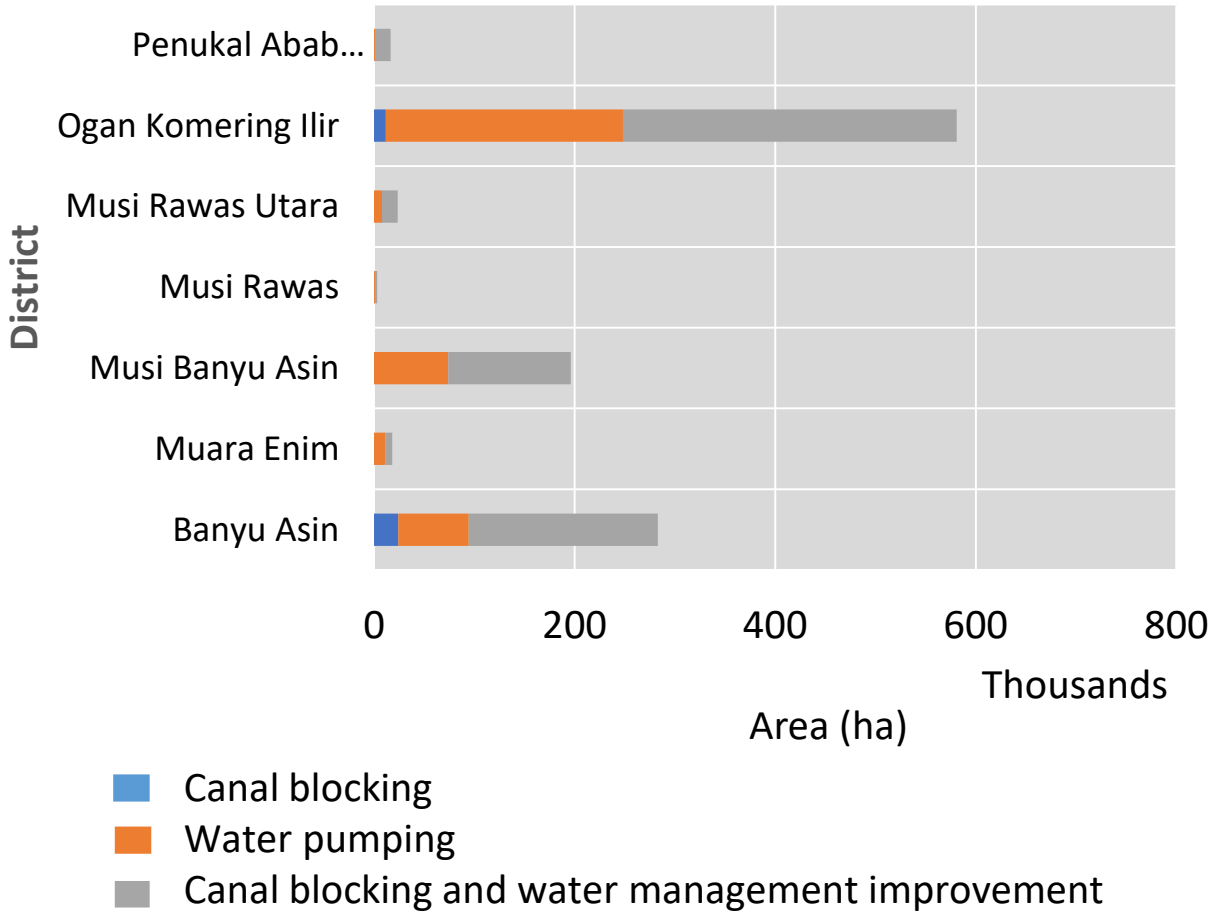


Peatland Ecosystem Function in South Sumatra Province

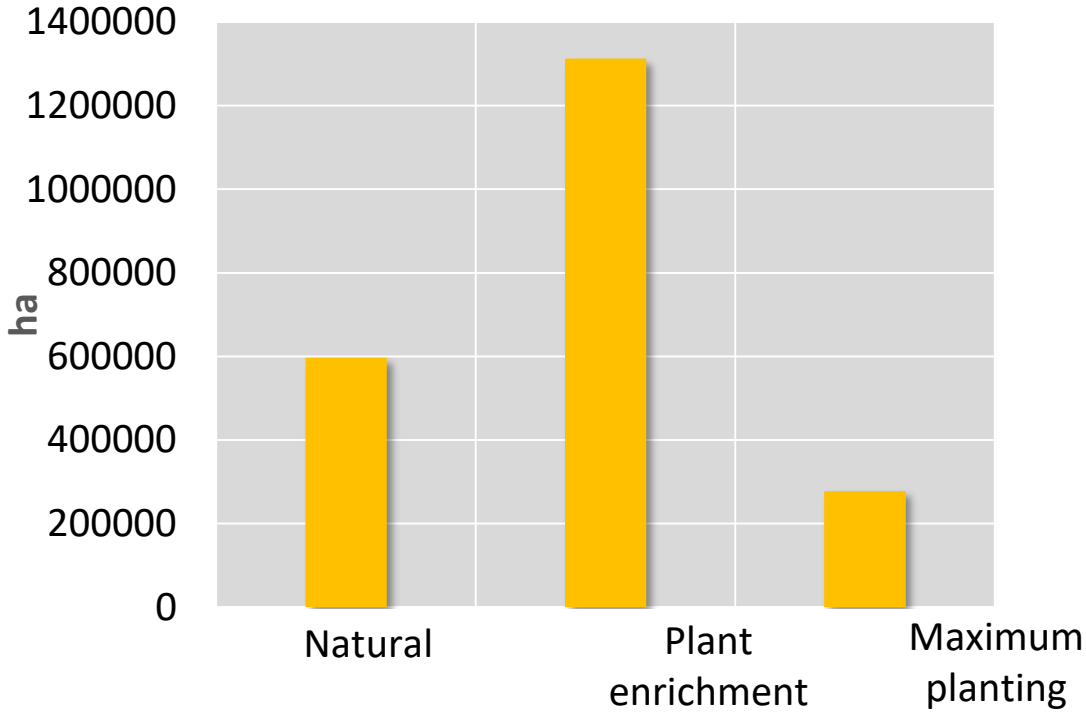


Peatland Ecosystem Restoration Plan in South Sumatera

Rewetting Plan



Area of Re-vegetation Plan



SUMMARY

- Past restoration-related projects in Indonesia have not been very successful due to various reasons, particularly lack of coordination among different levels of authority in implementing restoration plans
- ROAM was adapted at three different levels (macro, meso, and micro) within a landscape to assess restoration potential in an inclusive, comprehensive manner and to increase the capacity of stakeholders in following up the results
- Results include restoration intervention options, priority areas for restoration, cost and benefit calculation, carbon emissions scenarios, diagnosis of the presence of key success factors, action plans, and financing options for restoration