Mangrove Conservation and Restoration Enhancing Synergies with Climate Change Mitigation & Adaptation, Disaster Risk and Poverty Reduction for Coastal Communities

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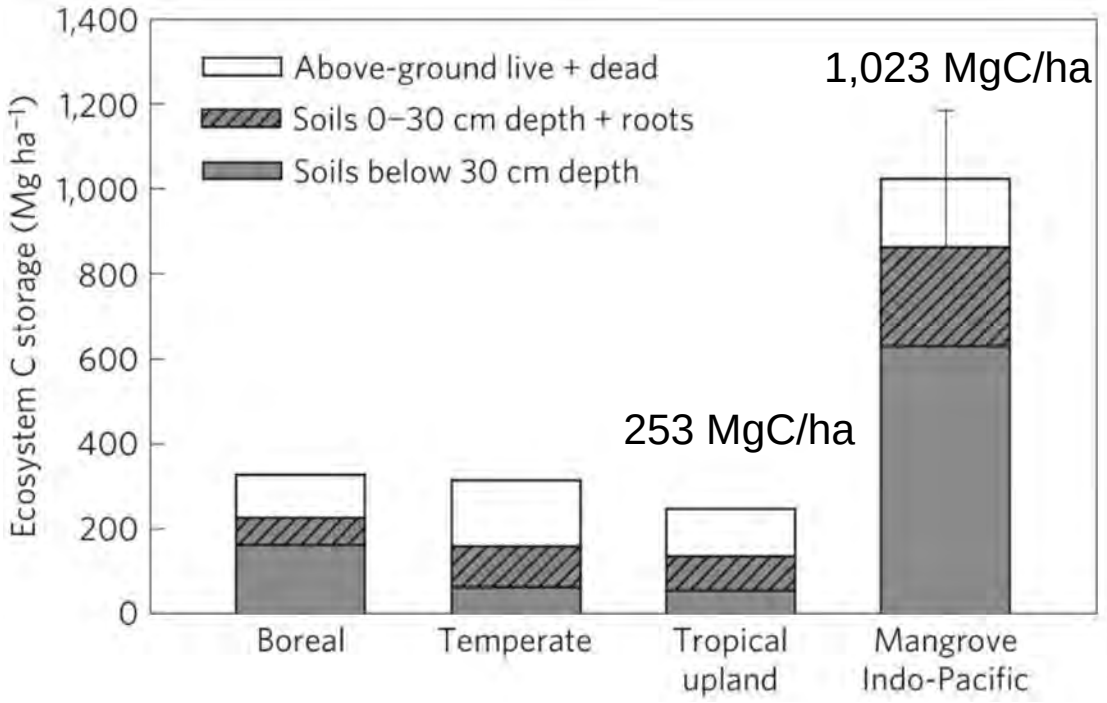
Multiple Benefits from Mangrove Ecosystem

Contribution of Mangrove Ecosystem to Climate Change Control

Mitigation

Mangrove ecosystems store much higher carbon

Mangrove ecosystem stores much higher carbon in **<u>below-ground</u>** than terrestrial forests. **85-90%** of total carbon is stored belowground (Donate et al. 2011).



<u>Organic matters from river and sea</u>, are <u>trapped by roots</u> and deposited on the ground. then <u>stored below-ground</u> <u>for longer period</u> <u>under anaerobiotic condition</u>.

Adaptation

Sediment trap & accretion function of mangroves protect coastal lines from SLR and abrasion

Soil Accretion Rate by Mangrove Ecosystem

Habitat Type	Accretion rate (mm/year)
Fringe	**1.6 – 8.6**
Riverine	**6.5 - 13.0**
Interior	**0.7 - 20.8**
Overwash island	**4.4 - 6.3**

（Krauss *et al* 2014）

- Average accretion rates in mangrove are higher than SLR rate (3.2mm/year) between 1993 and 2010.
- Enable to address SLR rates projected by IPCC
  1.5℃ rise: 3.33 – 6.39mm/year (SSP1-1.9 scenario)
  2.0℃ rise: 3,72 – 7.21mm/year (SSP1-2.6 scenario)

Contribute to Climate Change Adaptation in Coastal Areas and SIDS

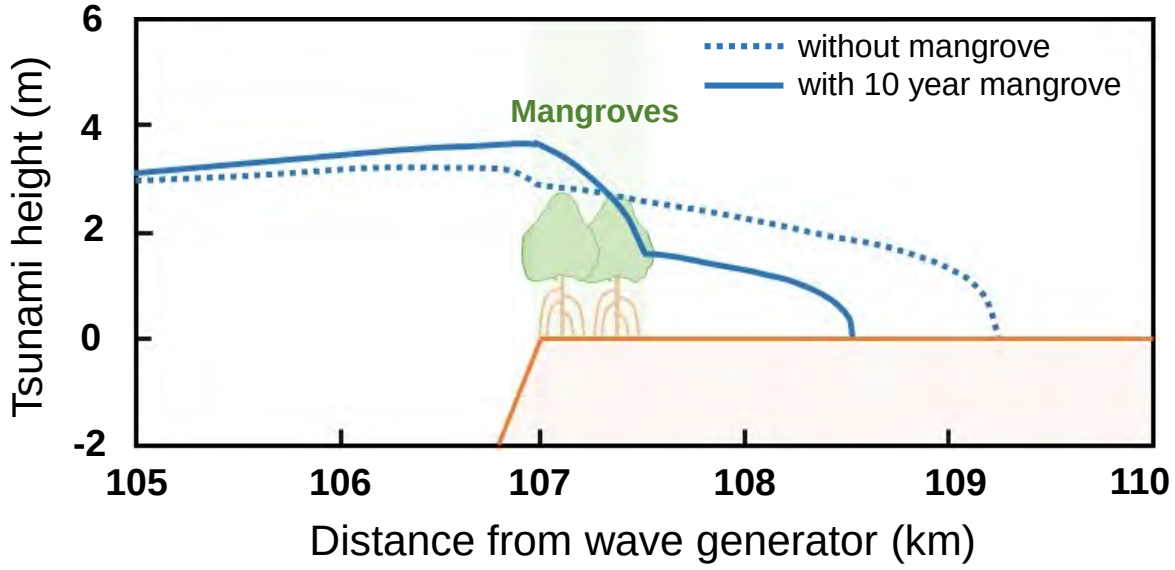
Contribution of Mangrove ecosystem to DRR and Livelihood

Tsunami reduction by mangrove

- Tsunami reduction effect was analyzed by field survey and modeling on the 2004 Indian Ocean tsunami in Banda Aceh (Yanagisawa, *et al*. 2009).
- Tsunami height is effectively reduced by mangroves, compared without mangroves.

Tsunami height reduction by mangroves

This figure is modified from original one by Yanagisawa *et al*. (2009).



Conditions for numerical modelling
Tsunami : Wave Period: 40 min. Height: 3m
Coastal landform : Simplified from the nearshore of Banda Aceh
Mangrove forest : 500m width and composed of 10 year-old *Rhizophora*

Livelihood enhancement

Fisheries

Tourism

Economic value of Fisheries and Tourism

Based on reviews on relevant literatures in the world, economic value of fisheries and tourism of mangrove forests are estimated. (Salem & Mercer, 2012)

	Mean (USD/ha/year)	Min - Max	Sites
Fisheries	**23,613**	10 - 555,168	51
Tourism	**37,927**	1.74 - 507,368	14

How do we maximize the multiple benefits in mangrove restoration?

Challenges on the Restoration

- *Trade-off on Carbon versus Biodiversity, other services*
- *Sustainable management by local communities with livelihood*

Key points for ensuring multiple benefits in the restoration

Results from Mangrove Side Event at the COP16, CBD at Cali Colombia

Evaluation on multiple services

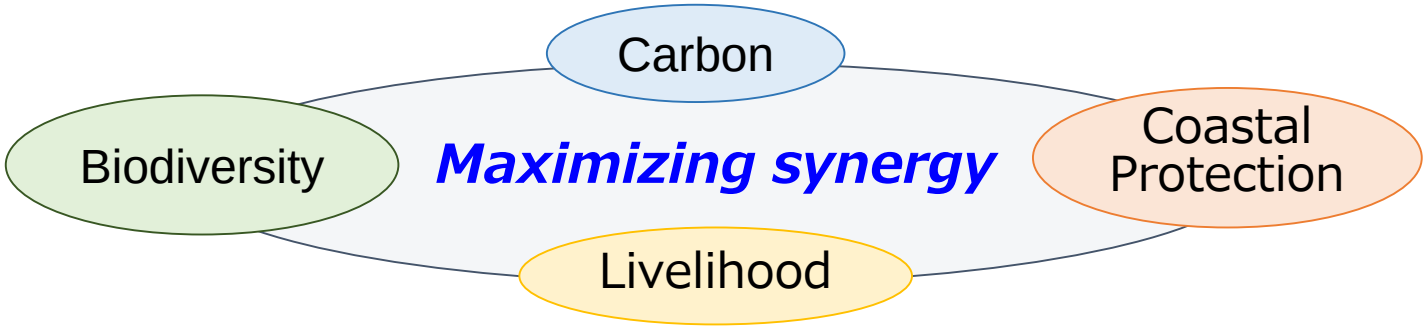
Protocols for quantitative evaluation, including indicators & methodologies

Technical & Institutional guideline/scheme

Guidance for project design and implementation, MRV

Sustainable management

Community-based sustainable management with income generation



High Quality Carbon
(Carbon + Non-carbon Benefits)

Scale up the Restoration by Financing from Private Sector

JICA’s Cooperation and Approach on Mangrove Conservation with Addressing Social Challenges

JICA's Cooperation for Mangrove Conservation

JICA Projects on Mangroves in the World

JICA has been conducting cooperation projects with Philippines, Indonesia, Vietnam, Myanmar, Palau, Oman, Mauritius, Brazil and Mexico.

Supporting to enhance capacities and develop models for mangrove rehabilitation and sustainable management through technical cooperation.

Cooperation with Indonesia

MoEF Indonesia and JICA have been working together for a long period through the following technical cooperation projects:

1992-99: The Development of Sustainable Mangrove Management Project --- Development of rehabilitation technique and sustainable management

2001-06: Mangrove Information Center Project: Development of MIC and its function

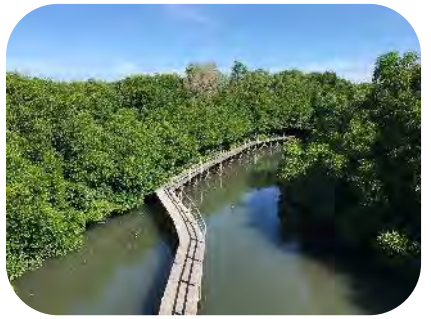
2007-10: Sub-Sectoral Program on Mangrove -- Extension of sustainable management to site levls

2011-14: Mangrove Ecosystem Conservation and Sustainable use in the ASEAN Region (MECS) Project

2022-23 Renovation of MIC Exhibition and Training Rooms

2025-28 Project on Strengthening Capacity of Sustainable Management of Mangrove for Ecosystem-based Adaptation to Climate Change

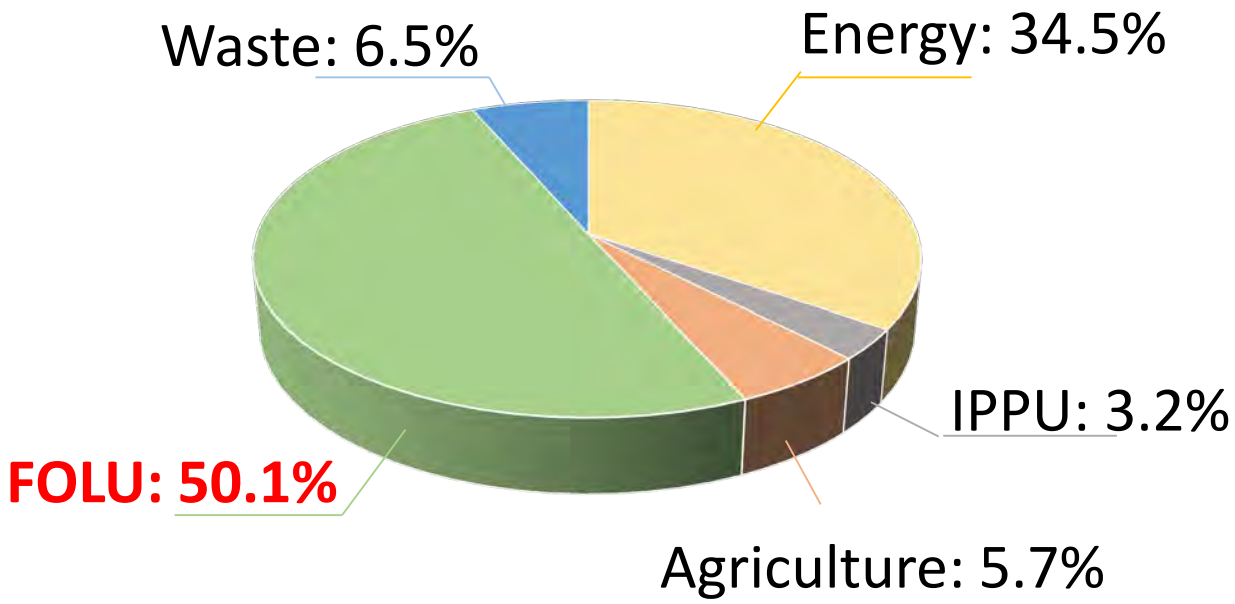
Mangrove Information Center



Contribution to Policies on Climate Change Mitigation in Indonesia

50.1% of GHG Emission comes from FOLU

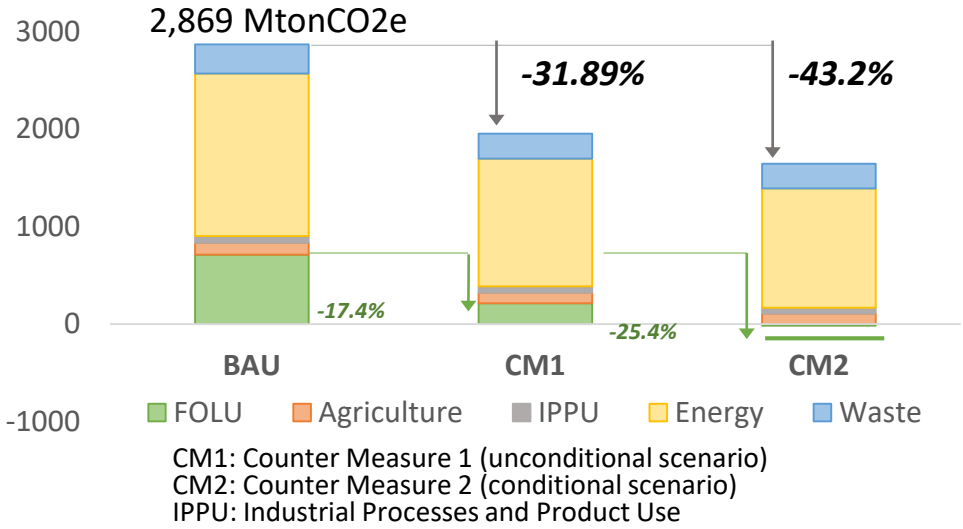
- Total GHG emissions in 2019 was 1,845 x10^6 tonCO2e
- Main contributing sector was Forestry and Other Land Uses (FOLU) **50.13%.**



Emission Reduction in Enhanced NDC 2022

- Reduce 31.9% of emission (unconditional) and up to 43.2% (conditional) against the 2030 BAU scenario (2,869 x10^6tonCO2e).
- FOLU Contribution to the Reduction
  - **17.4%** out of 31.9% target(unconditional)
  - **25.4%** out of 43.2% target **(**conditional)
- by halting deforestation, sustainable management, peatland restoration and fire prevention.

NDC targets on emission reduction by 2030



CM1: Counter Measure 1 (unconditional scenario)
CM2: Counter Measure 2 (conditional scenario)
IPPU: Industrial Processes and Product Use

Contributing to Policies on Mangrove Restoration and Sustainable Management

600,000ha Mangrove Restoration

GOI commits accelerating to restore mangrove forests targeting 600,000ha by 2024 by Presidential Decree (No.120, 2020).

Roadmap for Mangrove Rehabilitation 2021–2030

Phase 1: 2021 – 2024

Acceleration of mangrove rehabilitation: 600,000 ha of target areas are rehabilitated.

Phase 2: 2025 – 2027

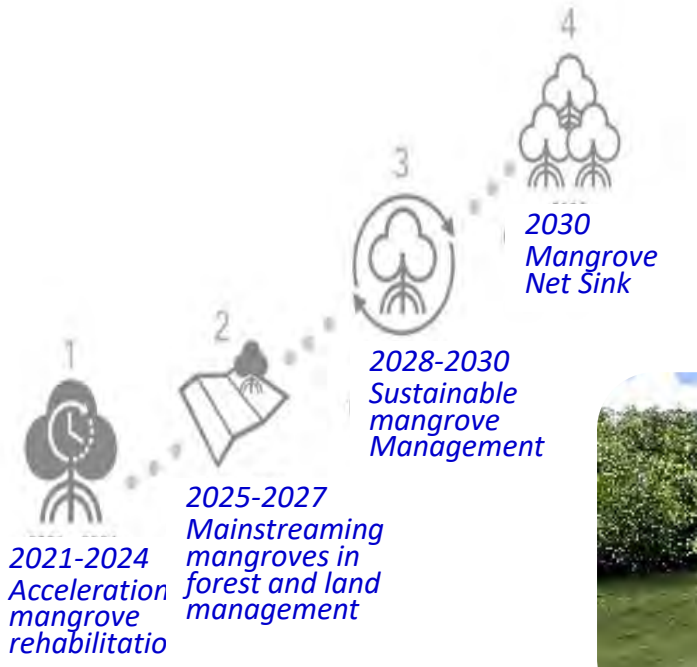
Mainstreaming mangrove management: Mangrove management integrated into development & business plans. Mangrove management units are established.

Phase 3: 2028 – 2030

Sustainable mangrove management: Sustainable management system established led by each management unit supervised by the government.

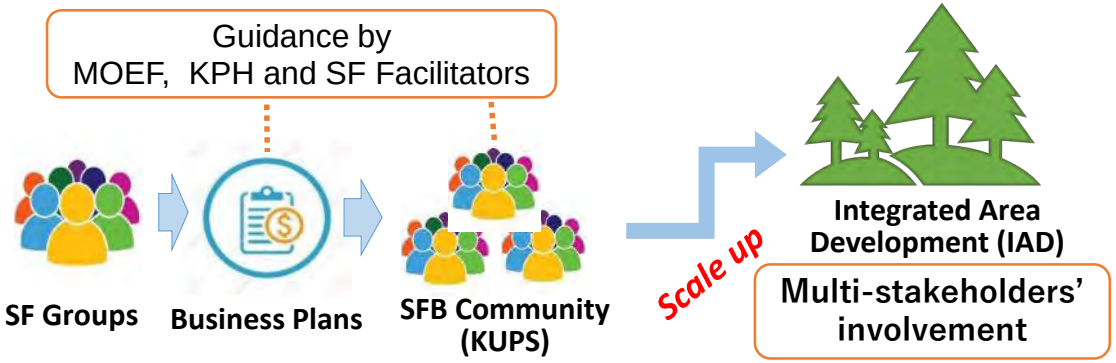
Phase 4: 2030

Mangrove Net Sink achieved through rehabilitation and sustainable management.



Social Forestry Business Development

- SFB is sustainable forest management system,
- Communities manage forests sustainably to improve livelihood, ensuring environmental and socio-cultural balance.
- SFB Groups develop Social Forestry Management Plan (RKPS), and establish SFB Community (KUPS) according to commodities, such as silvofishery and ecotourism.



Ecotourism

Silvofishery

Project on Strengthening Capacity of Sustainable Management of Mangrove for Ecosystem-based Adaptation to Climate Change

DG Climate Change Control

2. Enhancement of Scientific Basis

2-1: Assessment on resilience & vulnerability to climate change and integration of the results in SIDIK

Results

2-2: Estimation of carbon stock increase by mangrove rehabilitation

2-3: Development of protocols on valuation of mangrove ecosystem services to be used by stakeholders

Protocol

Protocol

Improvement of SIDIK indicators in coastal areas

Regulations for carbon pricing
- Estimation of GHG emission reduction
- MRV mechanism

EbA through Mangrove Restoration

DG Climate Change Control

1. Strengthening MIC function

1-1: Capacity enhancement of central & local governments and local communities

1-2: Enhancement of CEPA function of MIC

Training

Mangrove Landscape Units

WB & KfW Project sites

Mangrove Information Center

Model installation & Collaboration

Carbon credit mechanism

Carbon Credit

Carbon Sequestration

Accelerating Restoration

Restoration

Private company

Funding

Partnership

Local Community

NGO

Standardization Agency

4. Contribution to WMC

4-1: Develop a basic concept for information sharing guideline

4-2: Promote international capacity building and dialogues

Extension through Partnership

600,000ha Restoration

Supervise

Central & Local Government

Guideline

3. Development of models for restoration & sustainable management

3-1: Model development for community-based management on silvofishery & ecotourism

3-2: Guideline development on silvo-fishery & ecotourism for mangrove SF Business

3-3: Promotion of partnership development with private sector for extending mangrove rehabilitation and sustainable management

Promoting SF Business Communities (KUPS)

Sustainable Management

Contribution to

NBSAP & CBD

Achievement of NDC 2030 target

DG Watershed Management
DG. Social Forestry

Silvofishery in Lubuk Kertang, North Sumatra


Thank you
for your kind attention!!