



Hybrid Engineering, Gresik-East Java, 2018

Institutional arrangement in
mainstreaming BwN (Hybrid
Engineering): Strategic planning,
policies and implementations

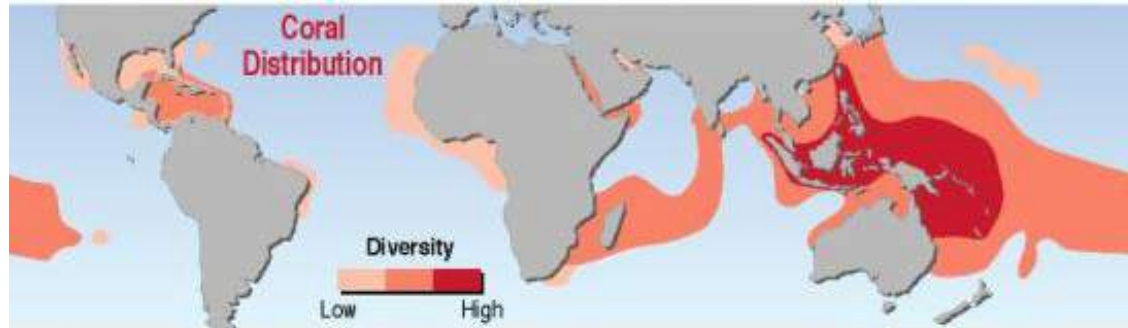
Abdul Muhari, PhD
Ministry of Marine Affairs and Fisheries

Ecoshape Conference, Netherland
2018

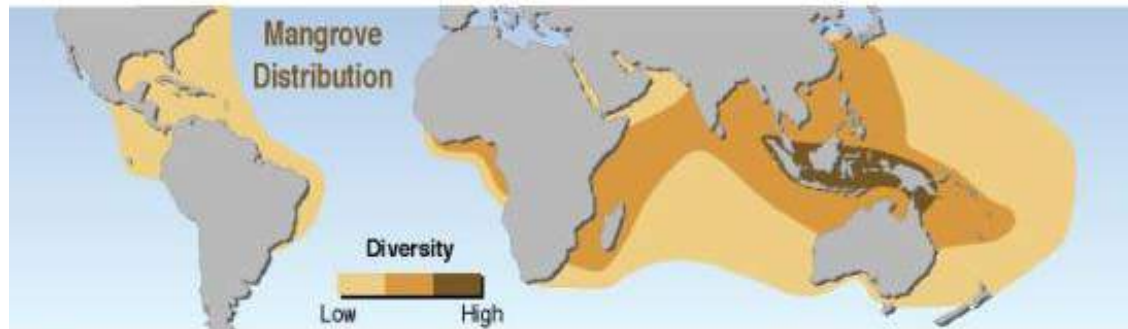
Indonesia at a glance

Coastal ecosystem in Indonesia

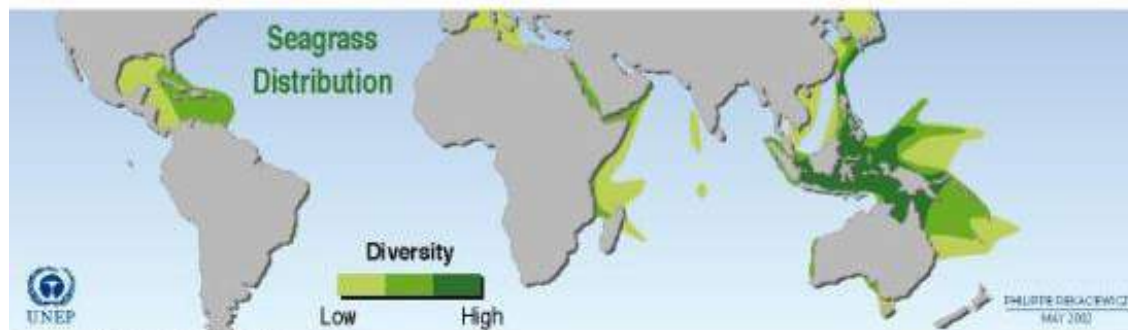
Global distribution of coral reef | Mangrove | Sea grass



14 % Coral reef of the world
82 Total number of genera
569 Total number of species



3.1 Mio Ha mangrove area
22.6% of the global mangrove



3.0 Mio Ha sea grass area
Highest diversity of sea grass species

Background problem

Existing condition of coastal areas in Indonesia

Based on Landsat data analysis 2000 dan 2014

1,950 Ha

Annual rate of abrasion

895 Ha

Annual rate of sedimentation
(natural and man made)

420 Km

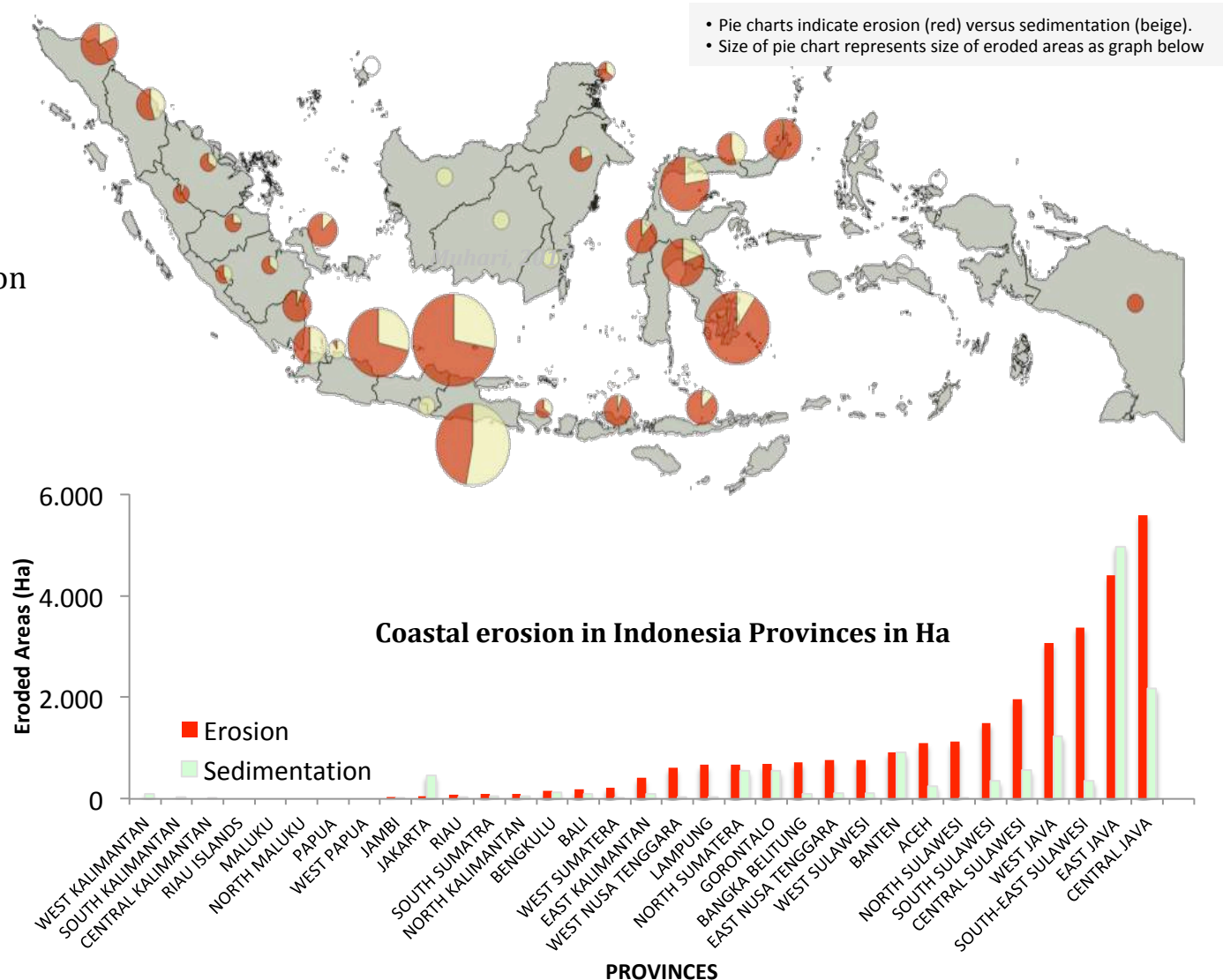
Average length of eroded
coast

304 Km

Average length of
accreted coast

46%

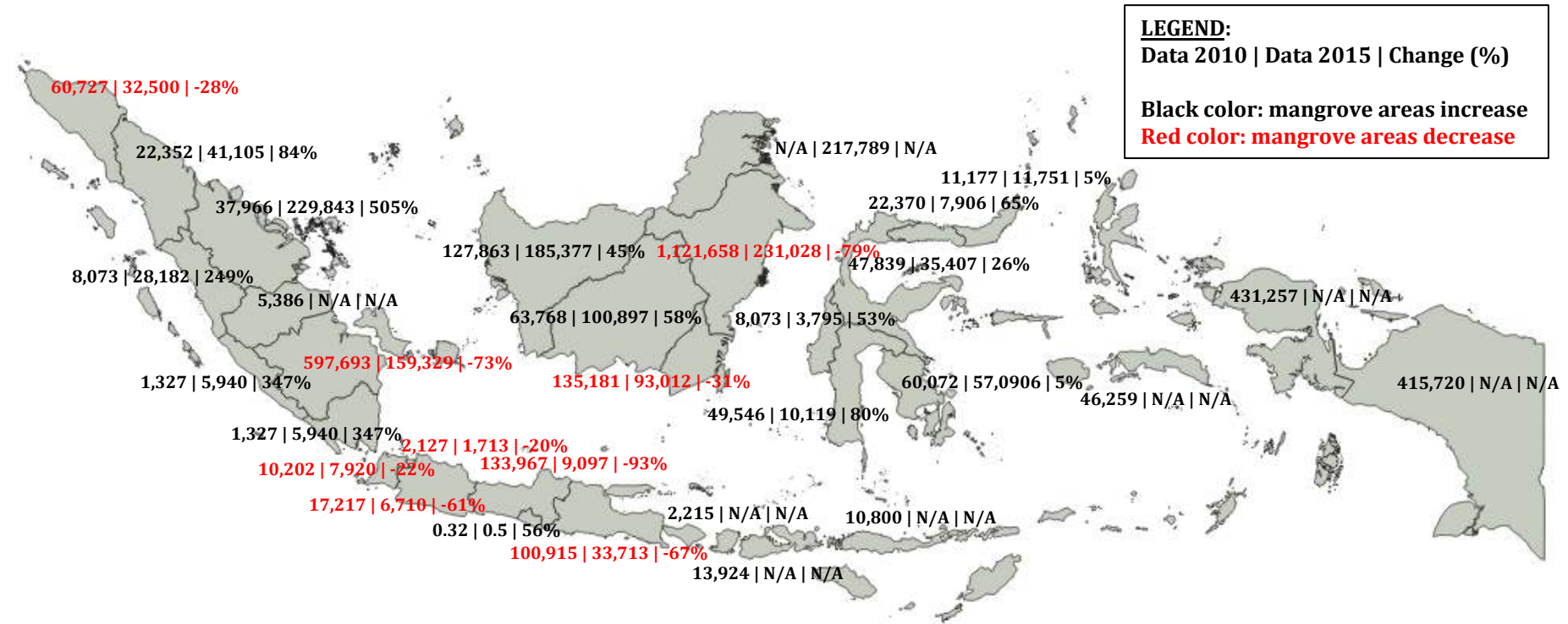
Annual Restoration rate
(business as usual |
'no intervention')



Background problem

Existing condition of coastal areas in Indonesia

Damaged mangrove forest | 2010 – 2014 in each province



Rate of mangrove **deforestation** due frequent coastal storm, industrialization and urbanization:

1. Sumatra : 22 % (181,198 Ha) | **4.3%** (36,239 Ha)/year
2. Java : 78 % (205,275 Ha) | **15.5%** (41,055 Ha)/year
3. Borneo : 43 % (620,366 Ha) | **8.6%** (124,073 Ha)/year
4. Sulawesi : 36 % (72,792 Ha) | **7.29%** (14,558 Ha)/year

Data:

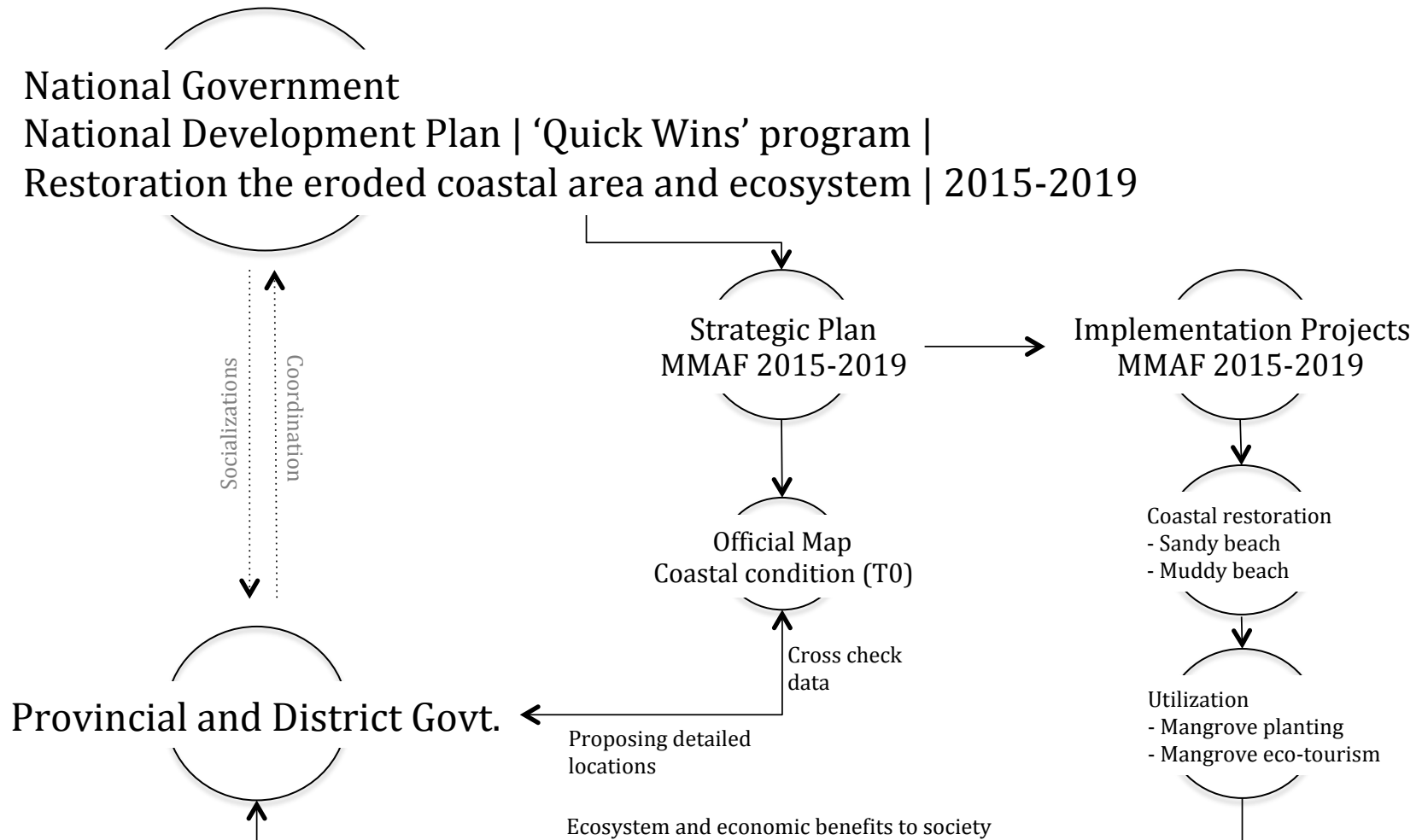
2010: Ministry of Forestry and environment

2015: Geospatial Data Agency (one map)

Policy development and practical implementations

National Government

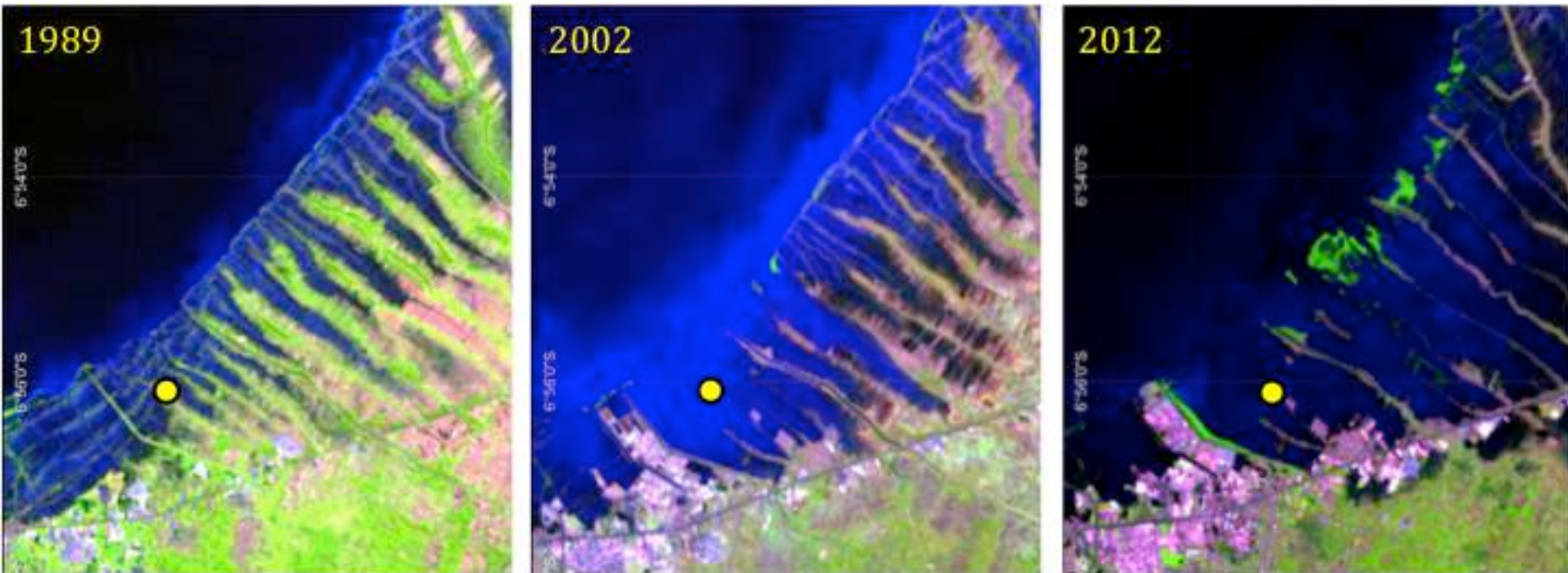
Restoration the eroded coastal area and ecosystem | 2015-2019



Joint pilot area | MMAF and Ecoshape Initiative

Demak Regency

A regularly flooded area cause at least three villages start to dissappear

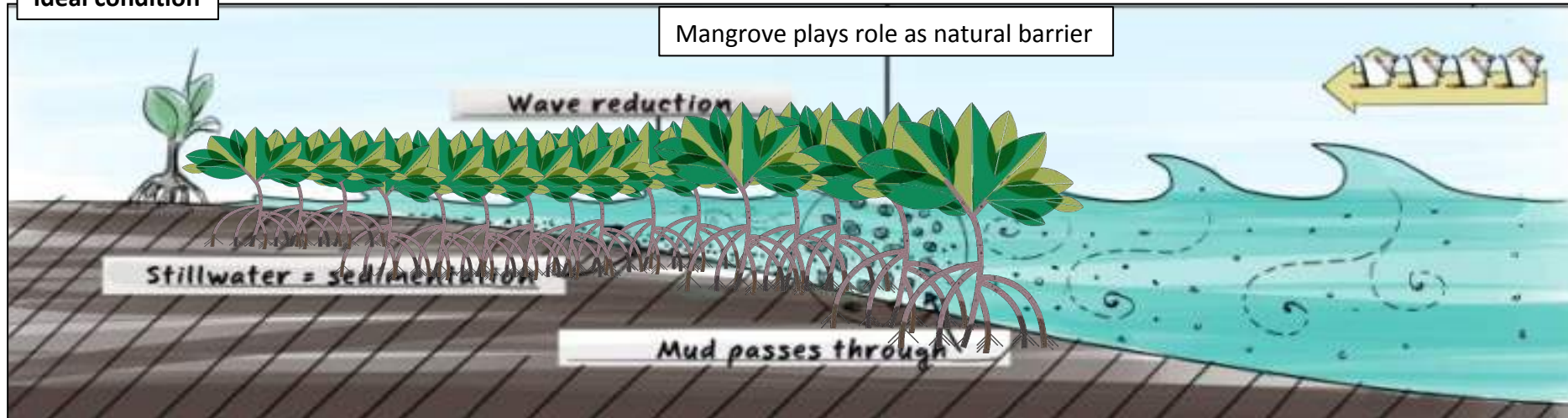


A house at the mangrove forest?

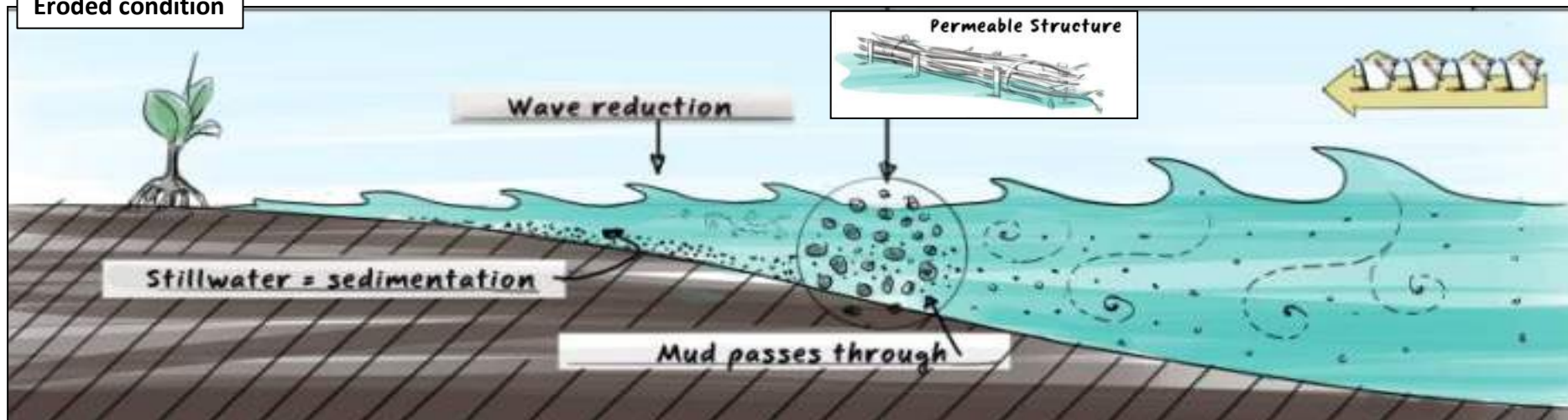
Permeable structure in Demak

Hybrid Engineering

Ideal condition



Eroded condition



Joint pilot area | MMAF and Ecoshape Initiative

Permeable structure in Demak

Hybrid Engineering

A semi permeable structure made from bamboo (two parallel fence of bamboo) and filled by brushwood to be used as sediment trap

Coastal Engineering-based
in providing scientific
bases

Using
'Nature provided'
materials

Development social
infrastructures for
sustainability

Involving local
stake holders

Preparation of bamboo fence construction



Preparation of brushwood by the community



Filling brushwood into bamboo fence



Joint pilot area | MMAF and Ecoshape Initiative

Demak Regency

Pathway in Demak

2012

Early Design Initiative
by Deltares

2013

Pilot Project
300 m by MMAF | 80 m by WII

2014

Extended construction by MMAF 385 m
Sediment monitoring by UNDIP, Kesemat

2015

Newly built structures by MMAF 915 m and 100 m
Newly built structures by Ecoshape 1040 m
Launching BwN Program in Jakarta | 03032016
MoU four parties signed in Bali | 14122016

2016

Fishpond revitalization | Ecoshape | 300 Ha
MMAF structures maintained

2017

Bio-right program | Ecoshape | 300 Ha
MMAF newly built structures | 3.5 km

A house at the mangrove forest?

Joint pilot area | MMAF and Ecoshape Initiative

Demak Regency

Join project plan and results in Demak (2016) | Timbul Sloko and Bedono



Photo by Ecoshape

UP SCALING AND REPLICATION

PERMEABLE STRUCTURES BUILT BY MMAF IN 2015

Kab. Karawang



600 m

TPI Dusun Pasir Putih.
Desa Sukajaya.
Kec. Cilamaya Kulon

Kab. Subang



600 m

Pantai Pondok Bali,
Desa Mayangan,
Kec. Legon Kulon

Kab. Indramayu



600 m

Lombang dan
Limangan
Kec. Juntinyuat

Kab. Tegal



366 m

Suradadi dan
Bojongsana
Kec. Suradadi

Kab. Kendal



483 m

Sendang Sikucing
Kec. Rowosari

Kegiatan Pelindung Pantai T.A. 2015



2.649 m **14.160 m**
Sabuk Pantai Struktur Hybrid
Total



Kab. Cirebon



2.910 m

Pasindangan,
Jatimulya, Klayan dan
Jatimerta.
Kec. Gunung Jati

Kab. Brebes



910 m

Kaliwlingi,
Kec. Brebes

Kota Semarang



3.145 m

Trimulyo,
Kec. Genuk

Kab. Demak



915 m

Timbulsloko,
Kec. Sayung

Kab. Jepara



3.140 m

Kedungmalang
Kec. Kedung

Kab. Pati



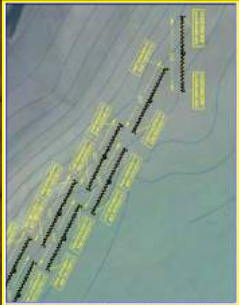
3.140 m

Raci
Kec. Batangan

Results in replicated areas

Pati Regency

Extensive sediment accummulated 3 weeks after construction



- Appropriate time to construct the structure is important | Monsoon influence
- Appropriate direction of built structure is crucial for sediment trapping
- Appropriate geometry and placement

Challenges

Maintenance | Sustainability

Technical and Social issues

Issues

- Technical
 - HE is not a breakwater, it is sediment trap structure.
 - Scientifically, it needs better placement criteria related to structure's stability, maximum wave dumping ability and proper materials
- Social | Sense of belonging
 - How important HE for the community?
 - Do they feel that they have to protect and maintain the HE?
- Annual maintenances
 - Funding
 - How long?
- Social infrastructures

Sustainability of a disaster countermeasure structures cannot be ensured if there is no economic benefit to society

Sustainability



Combine approach

Rembang Regency

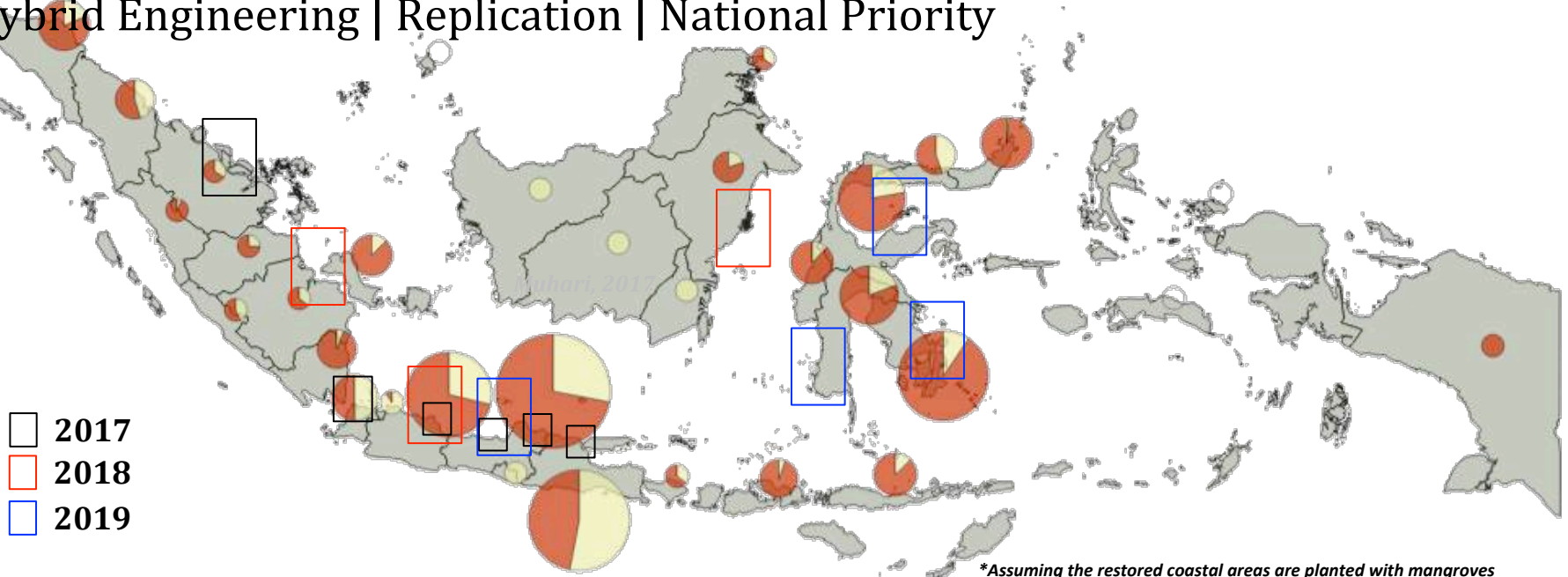
Coastal restoration and Eco-tourism | 2017



Hybrid Engineering, Rembang-Central Java, 2018

Mid term plan for Coastal Restoration

Hybrid Engineering | Replication | National Priority



**Assuming the restored coastal areas are planted with mangroves*

No	Lokasi	Luasan Lahan Terabrasi 2004- 2014 (Ha)	Panjang struktur HE (meter)			Estimasi Pemulihan Lahan (Ha)	Estimasi Biaya Pemulihan	Estimasi	Potential Value for	Estimated in
			2017	2018	2019			Serapan Carbon (Blue Carbon MgCa Ha-1)	Carbon Trading (Voluntary scheme USD)	
Hybrid Engineering									Mudyarso et al. (Nature, 2015)*	
1	Kabupaten Meranti	25.5	1,700			17	3,770,909,091	18411	184,110	2,393,430,000
2	Kabupaten Serang	397	1,500			15	3,327,272,727	16245	162,450	2,111,850,000
3	Kabupaten Cirebon	385	1,500			15	3,327,272,727	16245	162,450	2,111,850,000
4	Kabupaten Demak	550	4,000			40	8,872,727,273	43320	433,200	5,631,600,000
5	Kabupaten Rembang	106	1,100			11	2,440,000,000	11913	119,130	1,548,690,000
6	Kabupaten Gresik	964	1,200			12	2,661,818,182	12996	129,960	1,689,480,000
7	Kabupaten Banyuasin	111		2,000		20	6,000,000,000	21660	216,600	2,815,800,000
8	Kabupaten Indramayu	737		2,000		20	6,000,000,000	21660	216,600	2,815,800,000
9	Kabupaten Pati	134,3		1,000		10	3,000,000,000	10830	108,300	1,407,900,000
10	Kabupaten Penajam Psr Utr	22.5		1,000		10	3,000,000,000	10830	108,300	1,407,900,000
11	Kabupaten Bone	139			2,500	25	7,500,000,000	27075	270,750	3,519,750,000
12	Kabupaten Demak	550			1,500	15	4,500,000,000	16245	162,450	2,111,850,000
13	Kabupaten Bombana	882			4,000	40	12,000,000,000	43320	433,200	5,631,600,000
14	Kabupaten Banggai	815			4,000	40	12,000,000,000	43320	433,200	5,631,600,000
Total			11,000	6,000	12,000	290	78,400,000,000	314,070	2,794,140	36,323,820,000

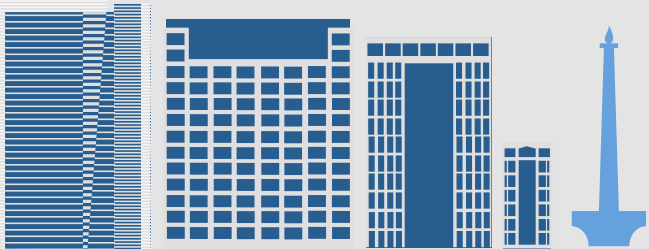
Expected Outcomes of Intervention:

Coastal Rehabilitation program outcomes

- Estimated restored coastal areas in 5 years (2015-2019): 1025.9 Ha
- Annual rate of MMAF's contribution in coastal rehabilitation of the total damage coastal areas 2015-2019: **11.2%** per year (of the total ~57% annual rate of restoration nationally)
- Annual requested budget for coastal rehabilitation: Rp. 111.810.000.000,- (1,118,100 USD/year)
- Estimated carbon storage (2017-2018): 667,453 Mg(tons)



Hybrid Engineering, Gresik-East Java, 2018



Thank you

Ministry of Marine Affairs and Fisheries
2018



OUR OCEAN CONFERENCE

BALI

29-30

OCTOBER

www.ourocean2018.org

