APAFRI 4th International Mangrove Symposium 2025
Beyond Green Carbon: Regional Solutions for a Changing Climate / Kuala Lumpur Malaysia 25-26 Aug 2025

Mangrove Blue Carbon of Southeast Asia: Overcoming the Present and Future Governance Challenges

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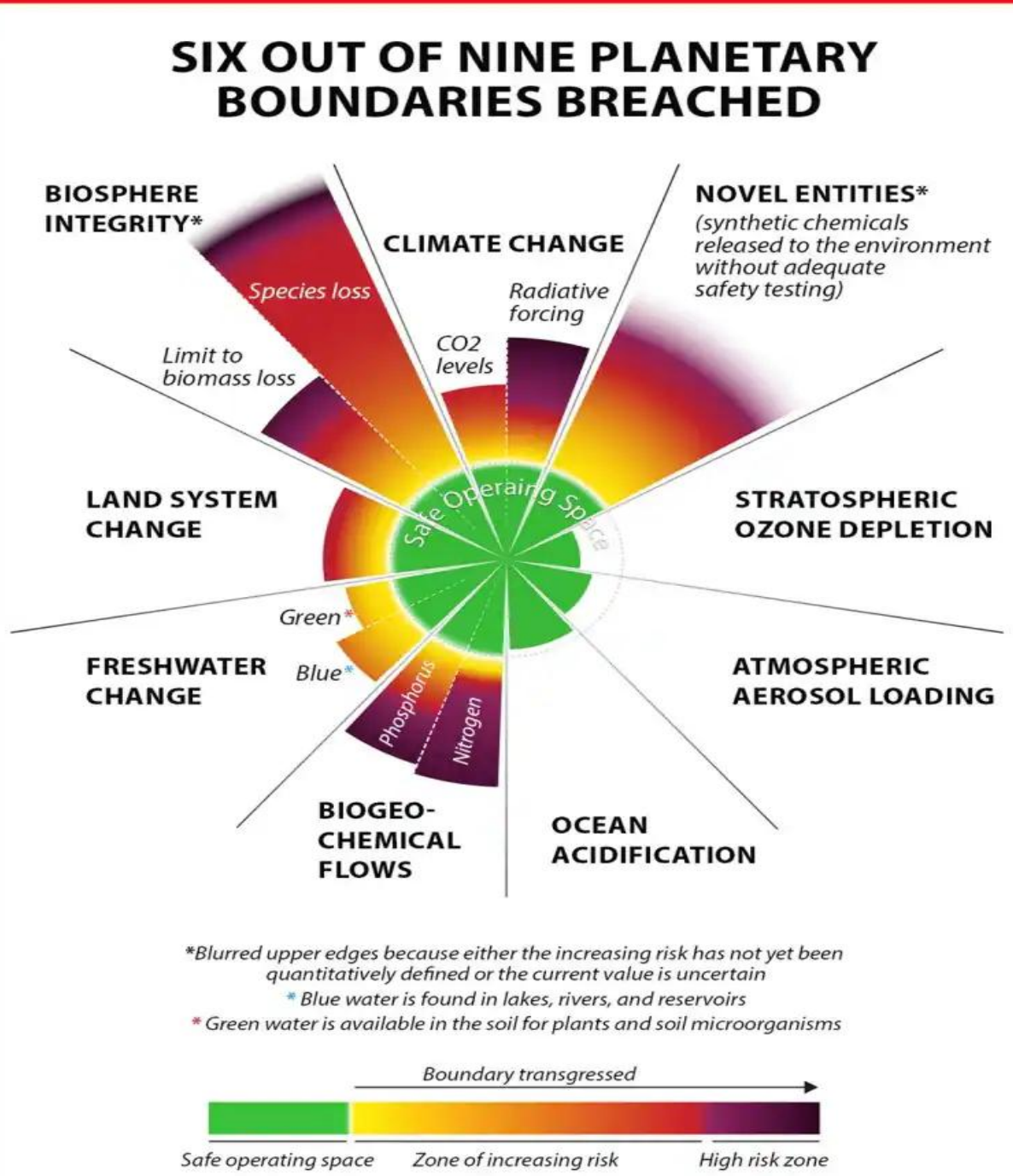
Source: NASA's Carbon Monitoring System (CMS); esri.com

Why SEA mangroves need great attention (more than ever)?

What are the major governance issues and challenges confronting the SEA mangroves?

How can we overcome these challenges?



WMO confirms 2024 as warmest year on record at about 1.55°C above pre-industrial level

PRESS RELEASE

10 January 2025

An international team of experts established by WMO has given an initial indication that long-term global warming as assessed in 2024 is currently about 1.3°C compared to the 1850-1900 baseline.

Sources: stockholmresilience.org; wmo.int

www.dw.com

CATASTROPHE | PHILIPPINES

Philippines: Sixth typhoon in a month brings deadly floods

11/18/2024

The Philippines is cleaning up after Super Typhoon Man-yi hit over the weekend, killing at least eight. Severe flooding is affecting some northern regions.

Super Typhoon Man-yi caused severe flooding in several regions

The Washington Post
Democracy Dies in Darkness

4 typhoons have hit the Philippines in just the past 10 days

It's the most active November on record after a slow start to the 2024 Pacific typhoon season that's now in hyper

4 min

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Trending Russia-Ukraine war War on Gaza Donald Trump West B

Malaysia, Thailand brace for more rains after floods kill more than 30

With tens of thousands already displaced, both countries set up shelters, rescue teams and evacuation plans in anticipation of further downpours.

Malaysian police transport residents on a boat through floodwaters after heavy rain in Tumpa, Kelantan state, November 30, 2024 [Mohd Rasfan/AFP]

aljazeera.com

Malaysia floods: Six months' worth of rain fell in five days across east coast, says PM Anwar

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A house that was partially destroyed after flood waters swept through Tumpat district in Kelantan, Malaysia.
PHOTO: REUTERS

IPCC AR6 (2021): HIGH CONFIDENCE on floods + storm surge

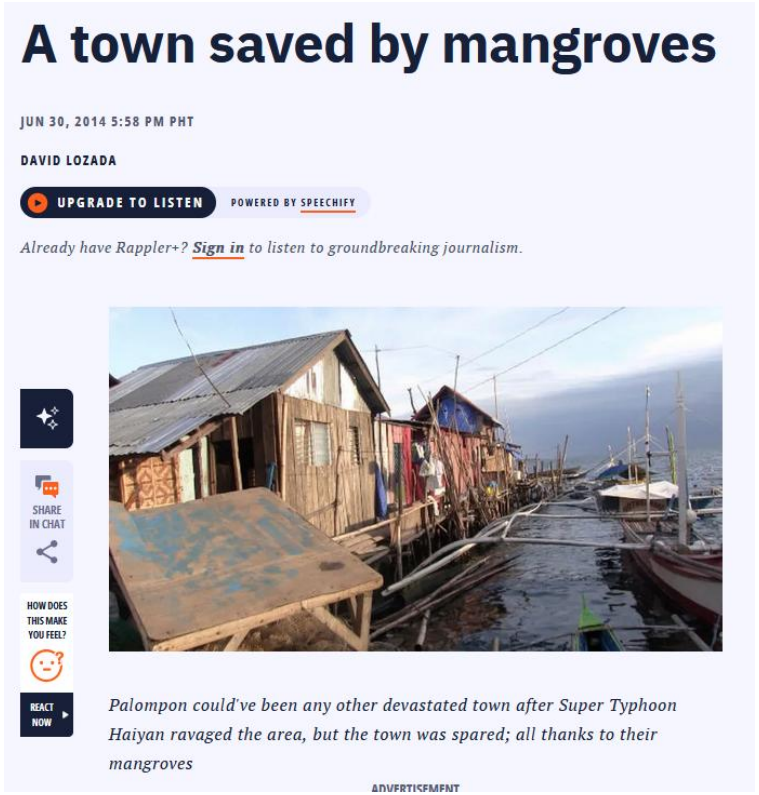
the combination of more frequent extreme sea level events (due to sea level rise and storm surge) and extreme rainfall/ riverflow events will make flooding more probable in coastal areas.

Five (5) countries in SEA made it to the Top 30 in the World Risk Index 2023

	Rank	Country	WorldRiskIndex	Exposure	Vulnerability	Susceptibility	Lack of Coping Capacities	Lack of Adaptive Capacities
√	1.	Philippines	46.86	39.99	54.92	51.21	58.84	54.98
√	2.	Indonesia	43.50	39.89	47.43	45.46	50.59	46.38
	3.	India	41.52	35.99	47.89	37.79	55.86	52.04
	4.	Mexico	38.17	50.08	29.09	44.78	12.28	44.76
	5.	Colombia	37.64	31.54	44.93	39.65	50.01	45.75
√	6.	Myanmar	36.16	22.43	58.28	52.14	58.83	64.54
	7.	Mozambique	34.61	18.10	66.17	65.78	64.15	68.65
	8.	Russian Federation	28.20	28.35	28.05	14.97	39.00	37.81
	9.	Bangladesh	27.29	16.57	44.93	35.30	57.88	44.39
	10.	China	27.10	64.59	11.37	14.75	11.54	8.63
	11.	Pakistan	26.45	13.11	53.38	40.23	60.92	62.06
	12.	Papua New Guinea	26.30	18.84	36.71	56.19	13.85	63.58
	13.	Peru	25.55	16.65	39.22	27.28	46.96	47.10
	14.	Somalia	25.09	8.55	73.63	67.49	82.11	72.02
	15.	Yemen	24.39	9.12	65.24	60.26	69.29	66.50
√	15.	Viet Nam	24.39	26.73	22.25	21.55	12.50	40.90
	17.	Madagascar	23.59	18.38	30.27	25.97	15.27	69.94
	18.	Ecuador	23.58	14.57	38.15	26.41	44.16	47.60
	19.	Bolivarian Republic of Venezuela	23.47	19.52	28.22	25.04	14.60	61.45
	20.	United States of America	22.47	39.59	12.75	11.16	5.71	32.54
	21.	Nicaragua	21.76	18.71	25.31	21.37	14.04	54.02
	22.	Australia	21.54	31.21	14.87	8.12	14.54	27.85
√	23.	Thailand	21.09	14.32	31.07	16.01	48.79	38.38
	24.	Japan	20.86	43.67	9.96	11.43	5.09	16.97
	25.	Iran (Islamic Republic of)	19.72	12.49	31.12	19.92	57.99	26.08
	26.	Canada	19.17	25.89	14.20	10.29	7.84	35.48
	27.	Panama	18.82	15.89	22.29	26.40	10.81	38.82
	28.	Egypt	17.76	10.74	29.38	11.85	46.49	46.04
	29.	Honduras	16.79	8.82	31.95	39.35	14.55	56.97
	30.	Turkey	16.17	8.90	29.38	12.63	48.58	41.34

Ref: Bündnis Entwicklung Hilft / IFHV (2023): WeltRisikoBericht 2023. Berlin: Bündnis Entwicklung Hilft.

Why restoring mangroves is immediate?



A town saved by mangroves

JUN 30, 2014 5:58 PM PHT

DAVID LOZADA

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Palompon could've been any other devastated town after Super Typhoon Haiyan ravaged the area, but the town was spared; all thanks to their mangroves

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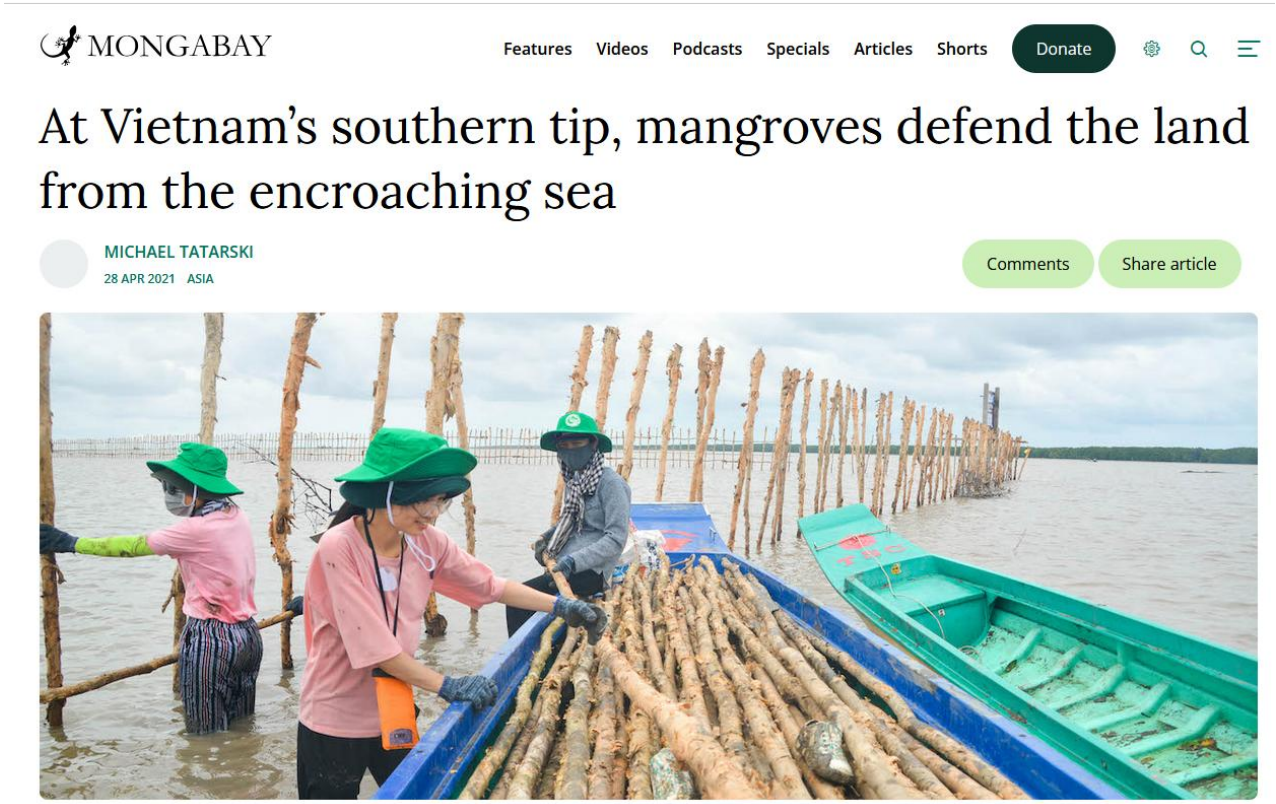

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At Vietnam's southern tip, mangroves defend the land from the encroaching sea

MICHAEL TATARSKI

28 APR 2021 ASIA

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1. To better adapt to the worsening CC impacts (particularly floods and storm surge)

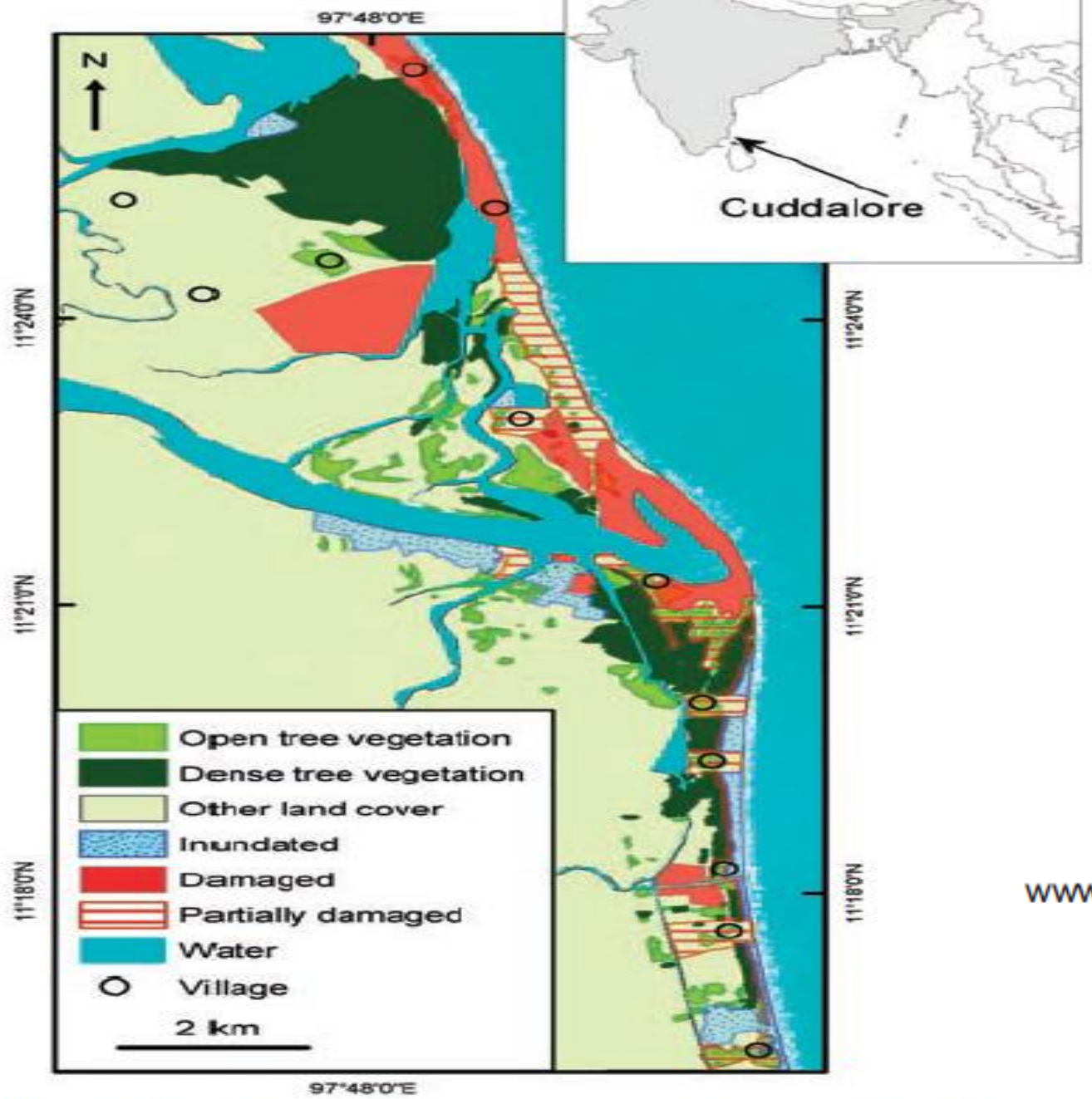
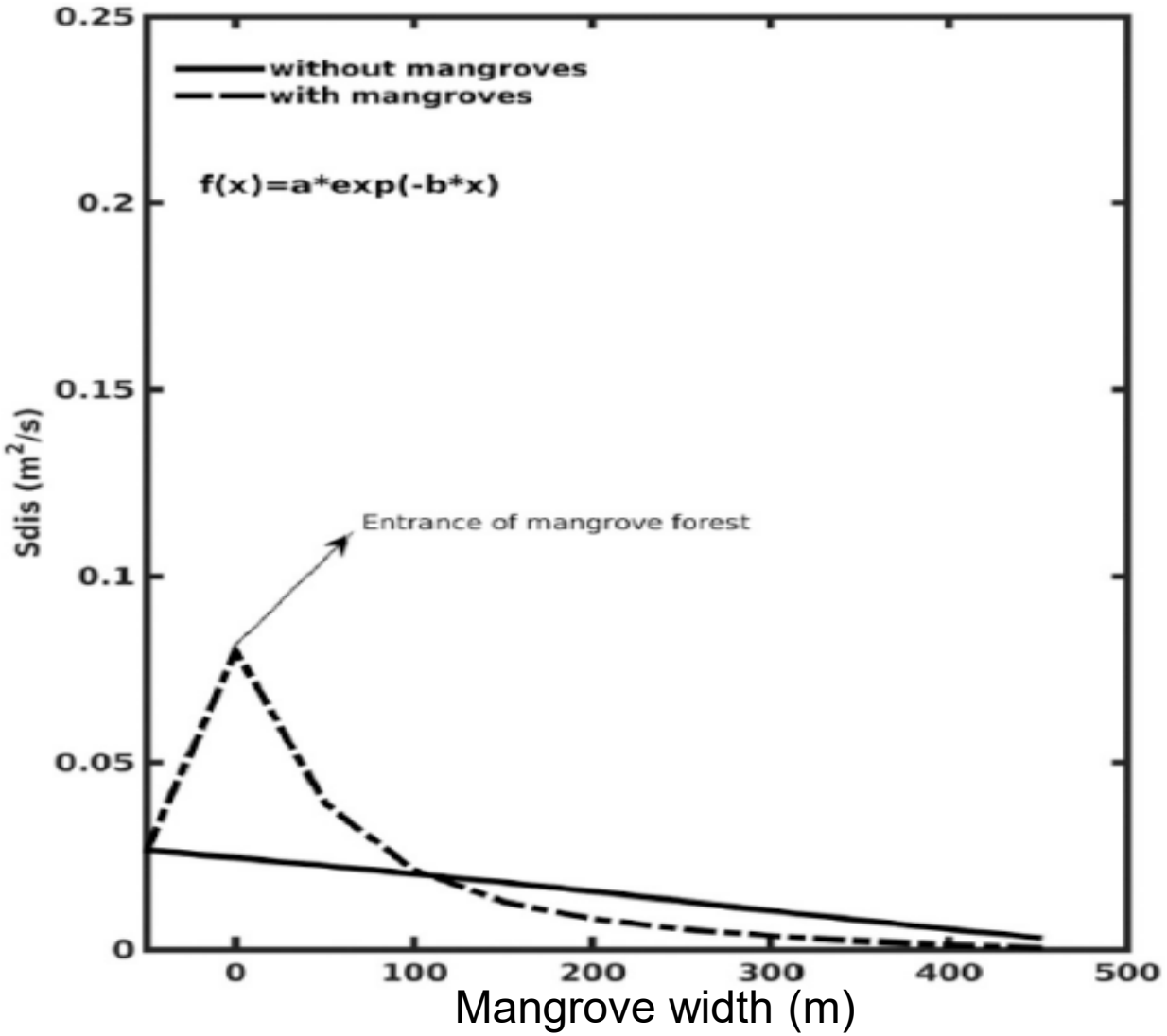


Fig. 1. Pre-tsunami tree vegetation cover and post-tsunami damages in Cuddalore District, Tamil Nadu, India.

The Asian Tsunami: A Protective Role for Coastal Vegetation

Finn Danielsen,[1*] Mikael K. Sørensen,[2] Mette F. Olwig,[2] Vaithilingam Selvam,[3] Faizal Parish,[4] Neil D. Burgess,[5,6] Tetsuya Hiraishi,[7] Vagarappa M. Karunagaran,[3] Michael S. Rasmussen,[2] Lars B. Hansen,[2] Alfredo Quarto,[8] Nyoman Suryadiputra[9]

www.sciencemag.org SCIENCE VOL 310 28 OCTOBER 2005



International Journal of Ocean and Climate Systems

Original Article

Wave attenuation in presence of mangroves: A sensitivity study for varying bottom slopes

The International Journal of Ocean and Climate Systems
2017, Vol. 8(3) 126–134

DOI: 10.1177/1759313117702919
journals.sagepub.com/home/ocs
SAGE

Parvathy K G and Prasad K Bhaskaran

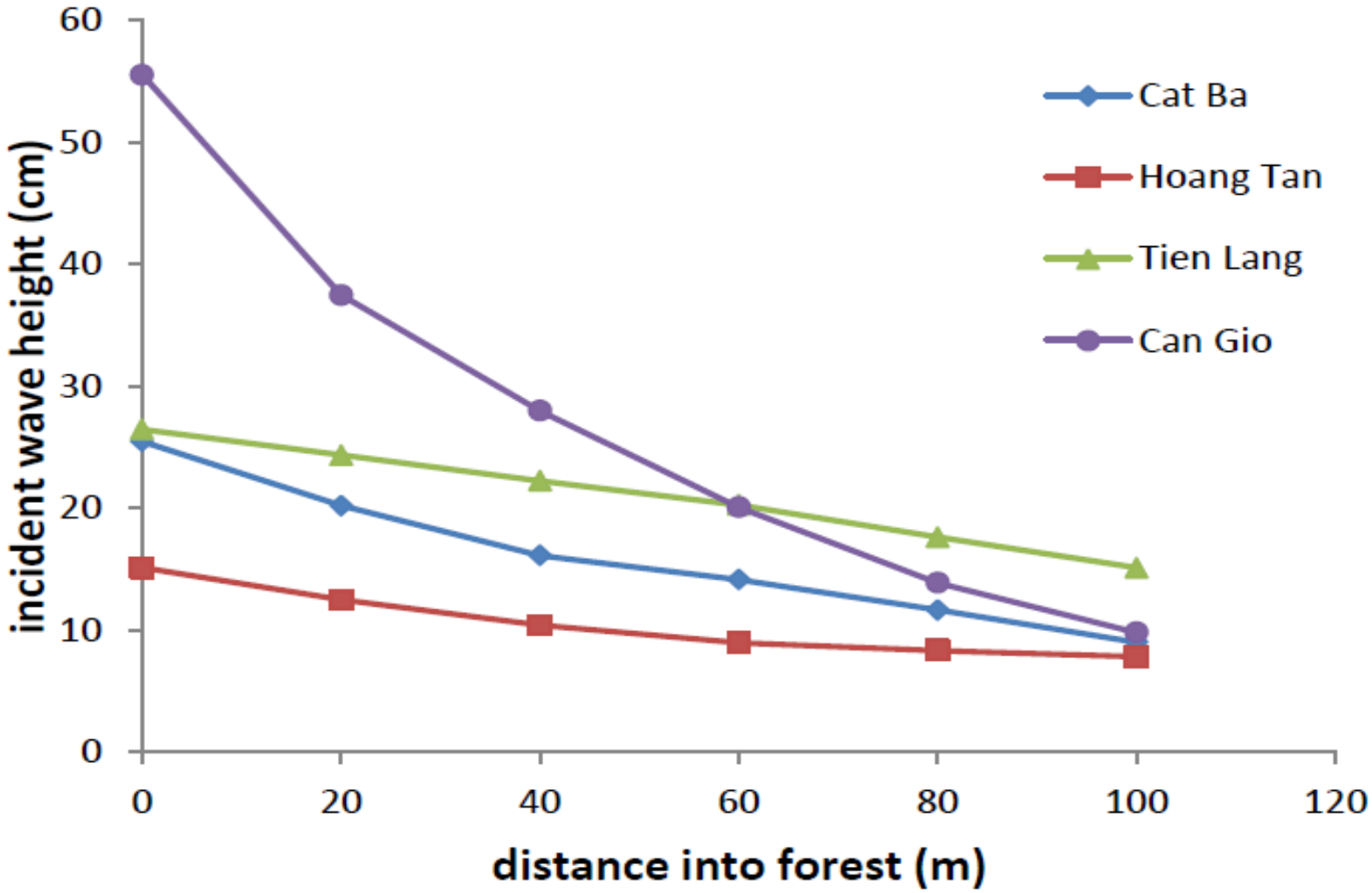
Abstract

Mangroves thrive in the intertidal areas (interface between land and sea) of tropical and sub-tropical belt and play an important role in overall attenuation of nearshore waves. Multiple interactions of waves with mangrove trunks and roots and bottom friction are the two primary mechanisms responsible for wave attenuation in mangrove forests. Earlier studies, comprising both analytical and experimental, reported an exponential decay in wave height for waves propagating over vegetation with idealized bottom topography and a few on sloping bottom. But hardly studies have attempted to characterize the wave attenuation by vegetation over varying seabed slopes since mangroves generally grow luxuriantly on gradual topography having large tidal amplitudes. Nowadays, several studies are being carried out on development of artificial mangroves to reduce the coastal hazard risks; thenceforth, there is an imperative requirement to study the wave damping characteristics of mangroves on varying seabed slopes. Consequently, this study performs

Dissipation on mild slope (left) and steep slope (right)

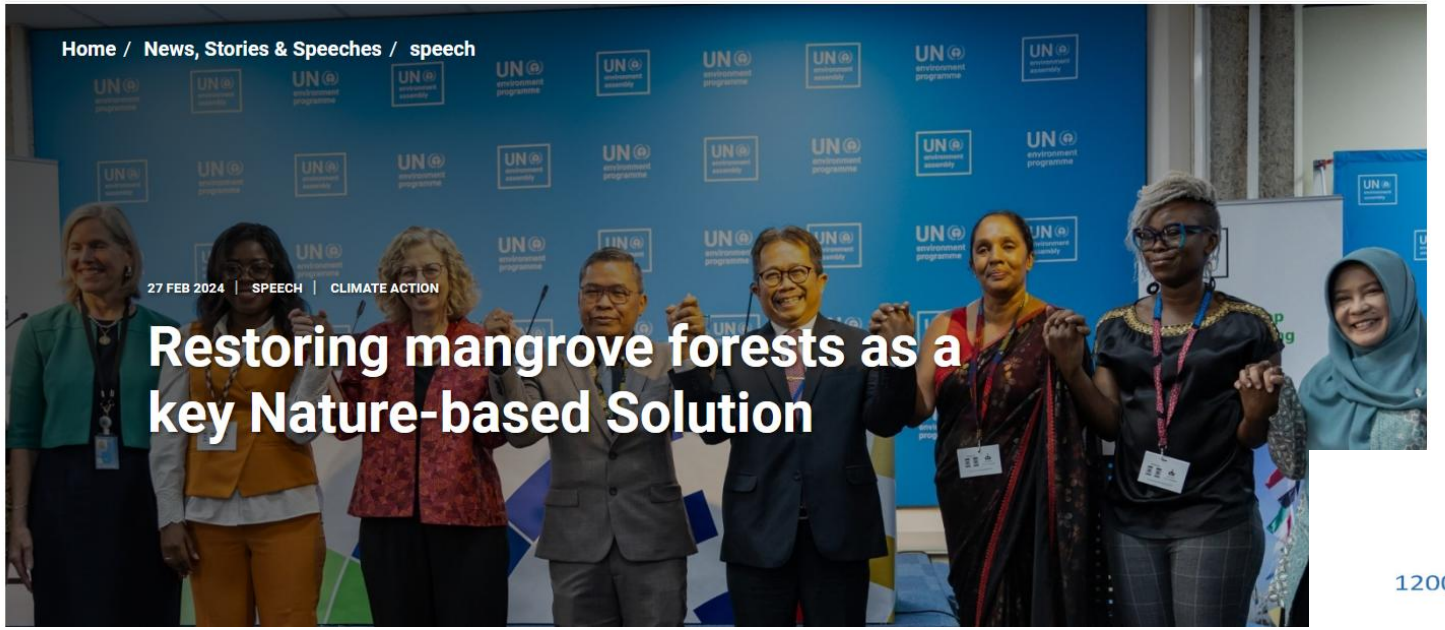
Significant wave force reduction

Parvathy and Prasad (2017)



Significant wave height reduction

Figure 4. The variation in wave height with distance travelled through mangrove forests in 4 sample locations in Vietnam, from Bao (2011). Regression equations for these 4 locations were as follows: Cat Ba: $H_x = 24.9\ e^{-0.01x}$, $R^2 = 0.99$; Hoang Tan: $H_x = 14.3\ e^{-0.007x}$, $R^2 = 0.97$; Tien Lang: $H_x = 27.2\ e^{-0.006x}$, $R^2 = 0.98$; and Can Gio: $H_x = 54.8\ e^{-0.02x}$, $R^2 = 0.99$ (Bao, 2011).



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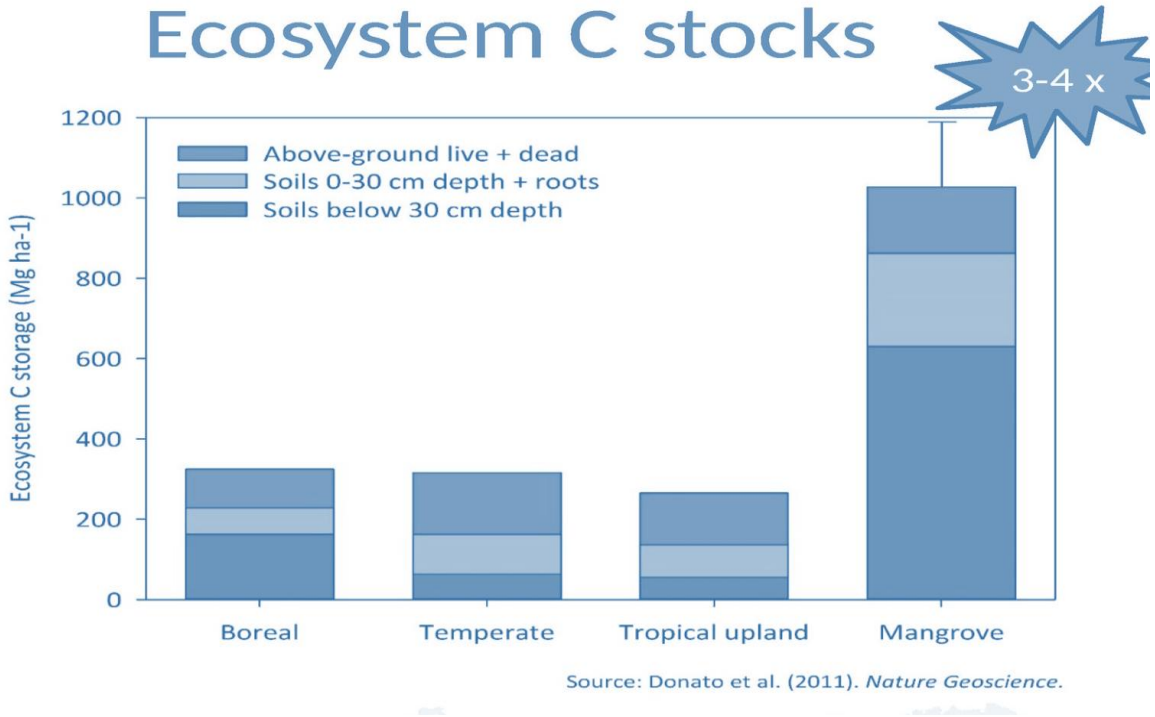
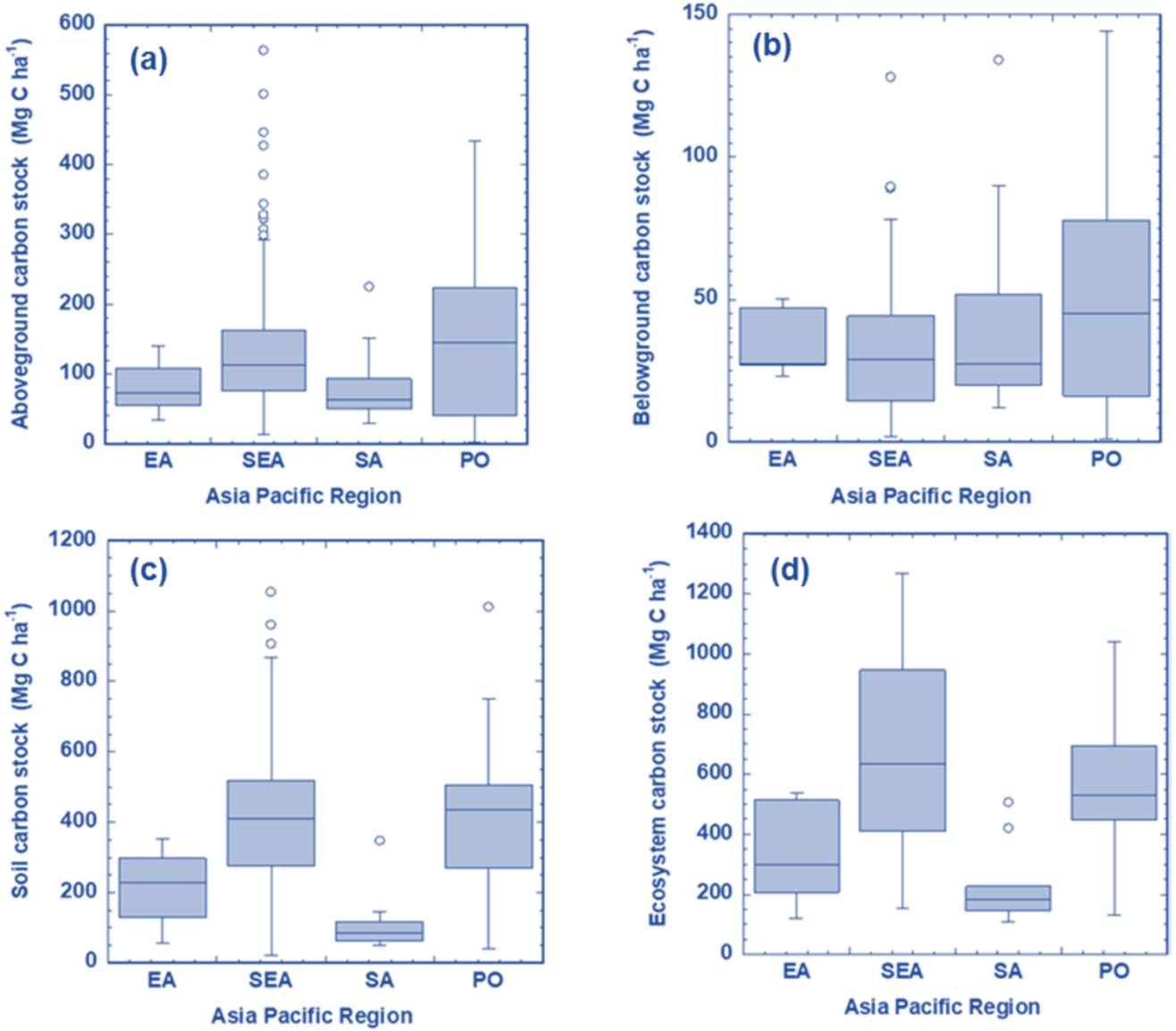


2. To mitigate climate change (Blue Carbon)



ENVIRONMENTAL RESEARCH
LETTERS

LETTER

Carbon stocks and fluxes in Asia-Pacific mangroves: current knowledge and gaps

Sahadev Sharma[1,*], Raghab Ray[2], Christopher Martius[3] and Daniel Murdiyarso[3,4]

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[2] Atmosphere and Ocean Research Institute, The University of Tokyo, Kashiwa, Chiba, Japan
[3] Center for International Forestry Research, Jl. CIFOR, Situgede, Bogor 16115, Indonesia
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E-mail: ssharma.shell@gmail.com

Keywords: blue carbon, stock, flux, biogeochemistry, Asia-Pacific mangroves, global climate change

Total mangrove area: 68 493 km2
Carbon stock range: 109 and 1269 Mg C ha^{-1}

Richer blue carbon stocks in SEA

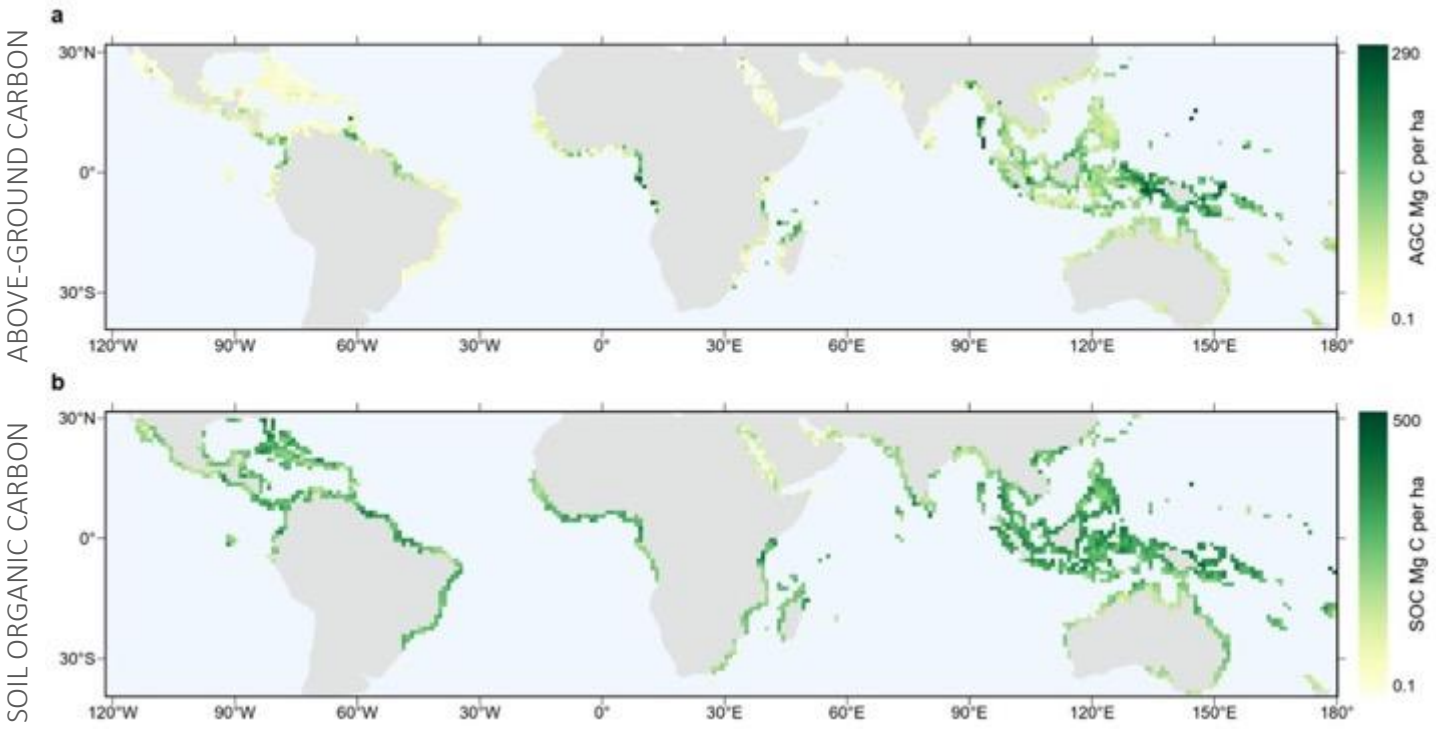
Figure : (a) aboveground carbon stocks, (b) belowground carbon stocks, (c) soil carbon stocks, and (d) ecosystem carbon stocks in the Asia-Pacific region (EA: East Asia, SEA: Southeast Asia, SA: South Asia and PO: Pacific Ocean).

https://doi.org/10.1088/1748-9326/acbf6c

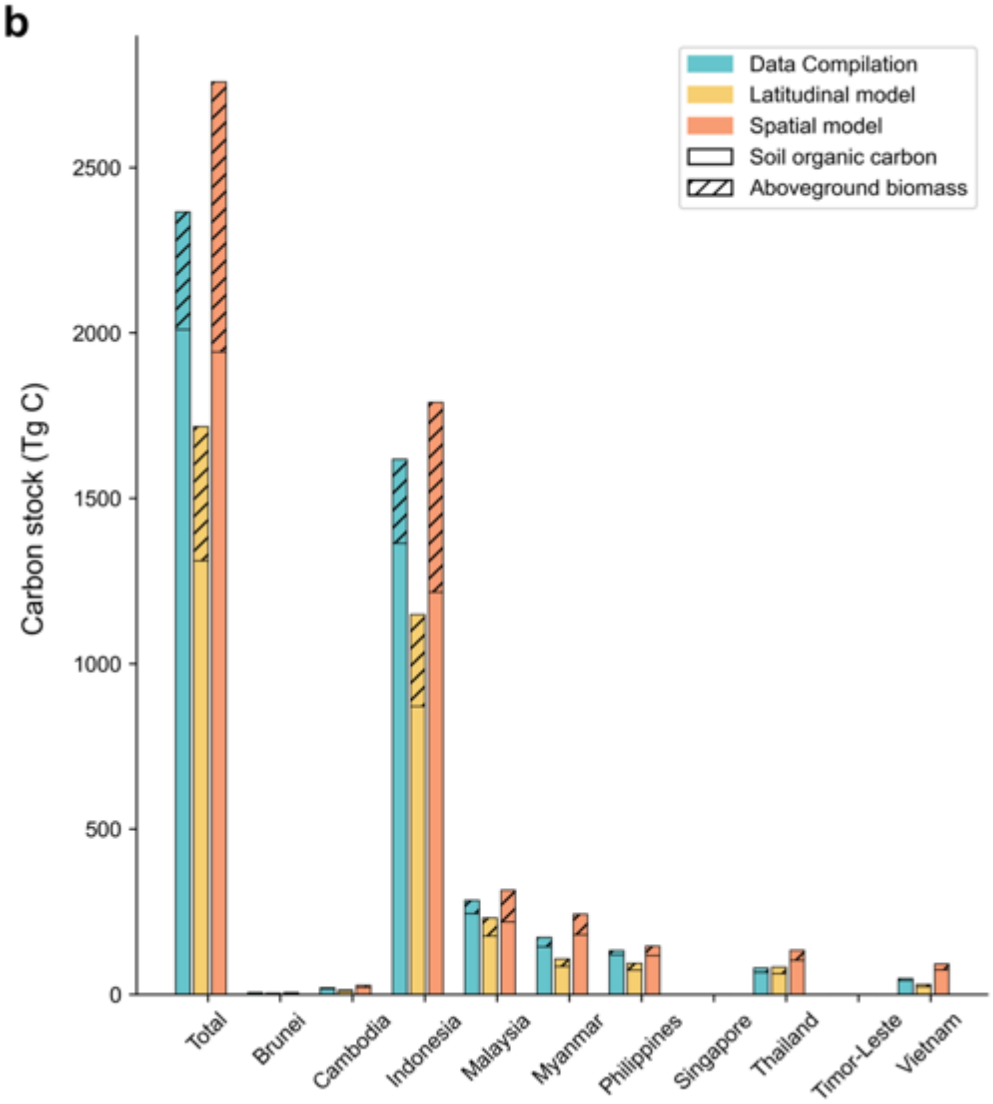
1. Why Southeast Asia? High carbon stocks

High rates of productivity translate to a global hotspot of aboveground and soil carbon stocks

Southeast Asia holds 1750-2750 Tg C (mostly Indonesia)



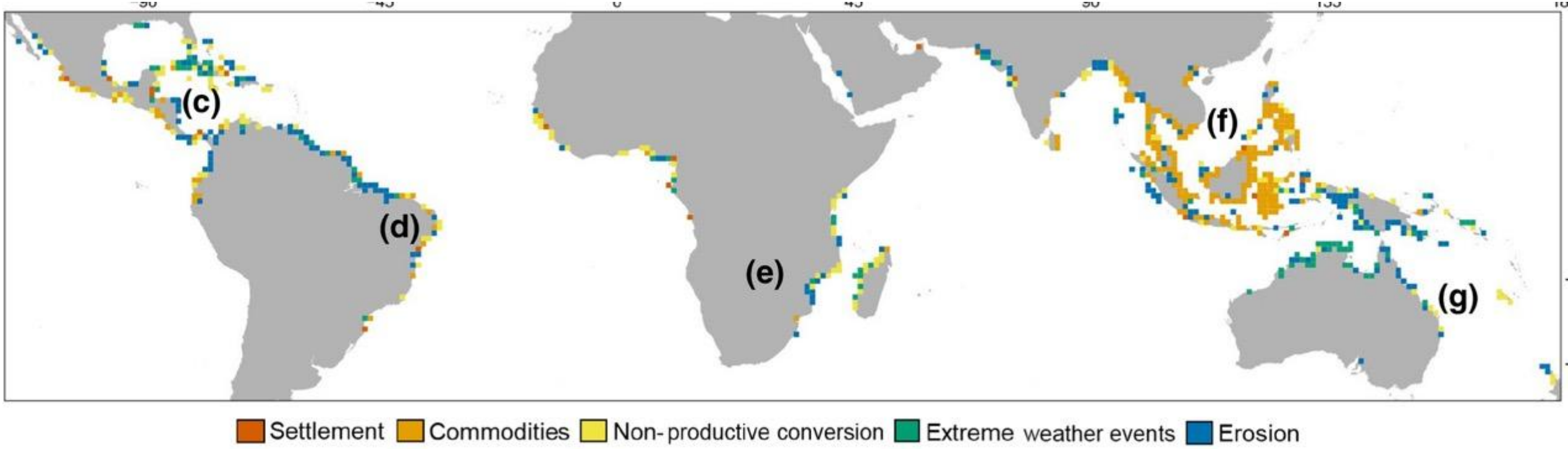
Friess et al. *in review*



Friess et al. *in review*

1. Why Southeast Asia? High threats

More potential for carbon additionality through avoided deforestation and restoration in Southeast Asia compared to other parts of the world



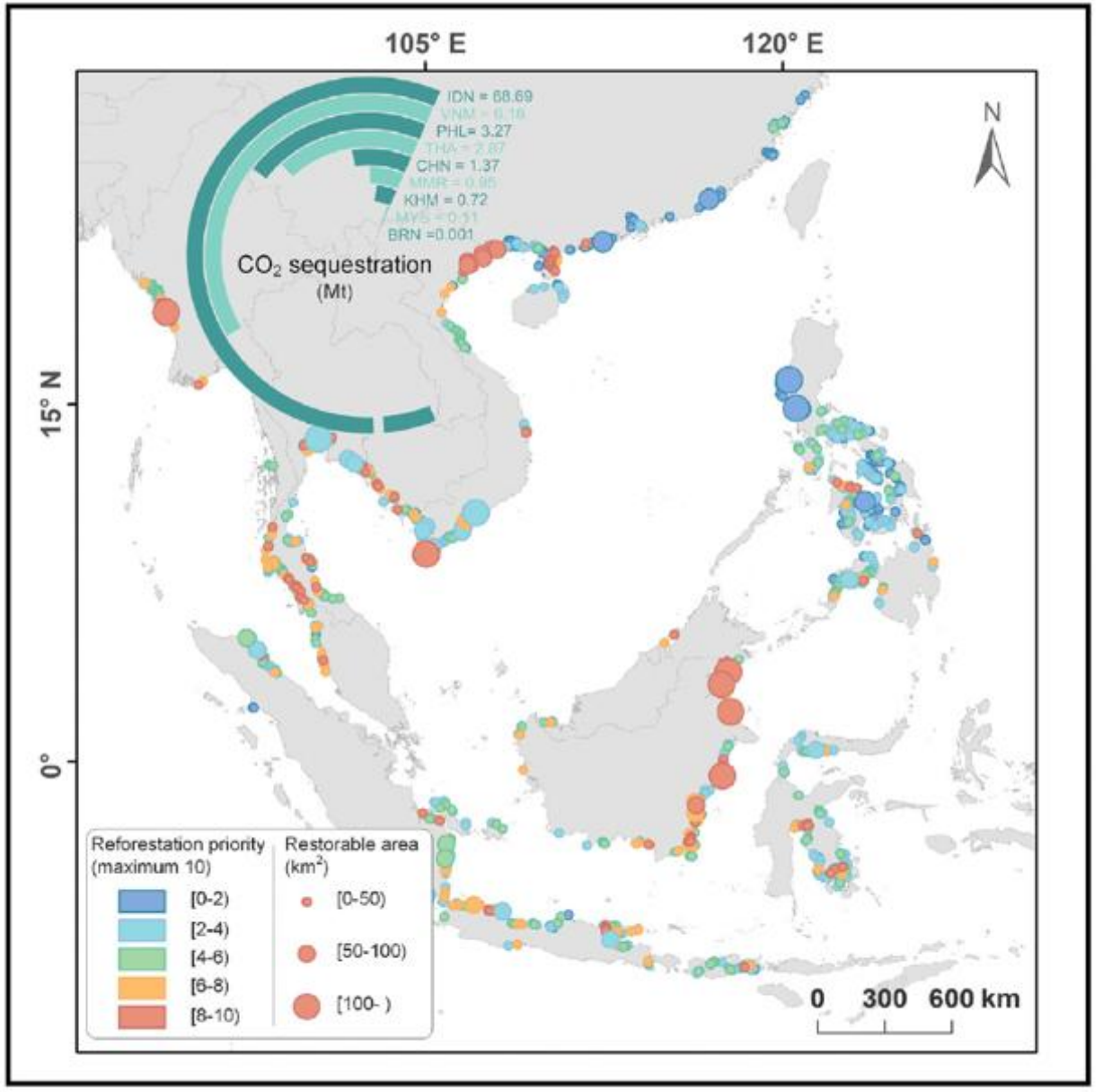
Goldberg et al. 2020. **Global Change Biology** 26, 5844-5855.

Source: D. Friess

2. Potential for restoration (commercial)

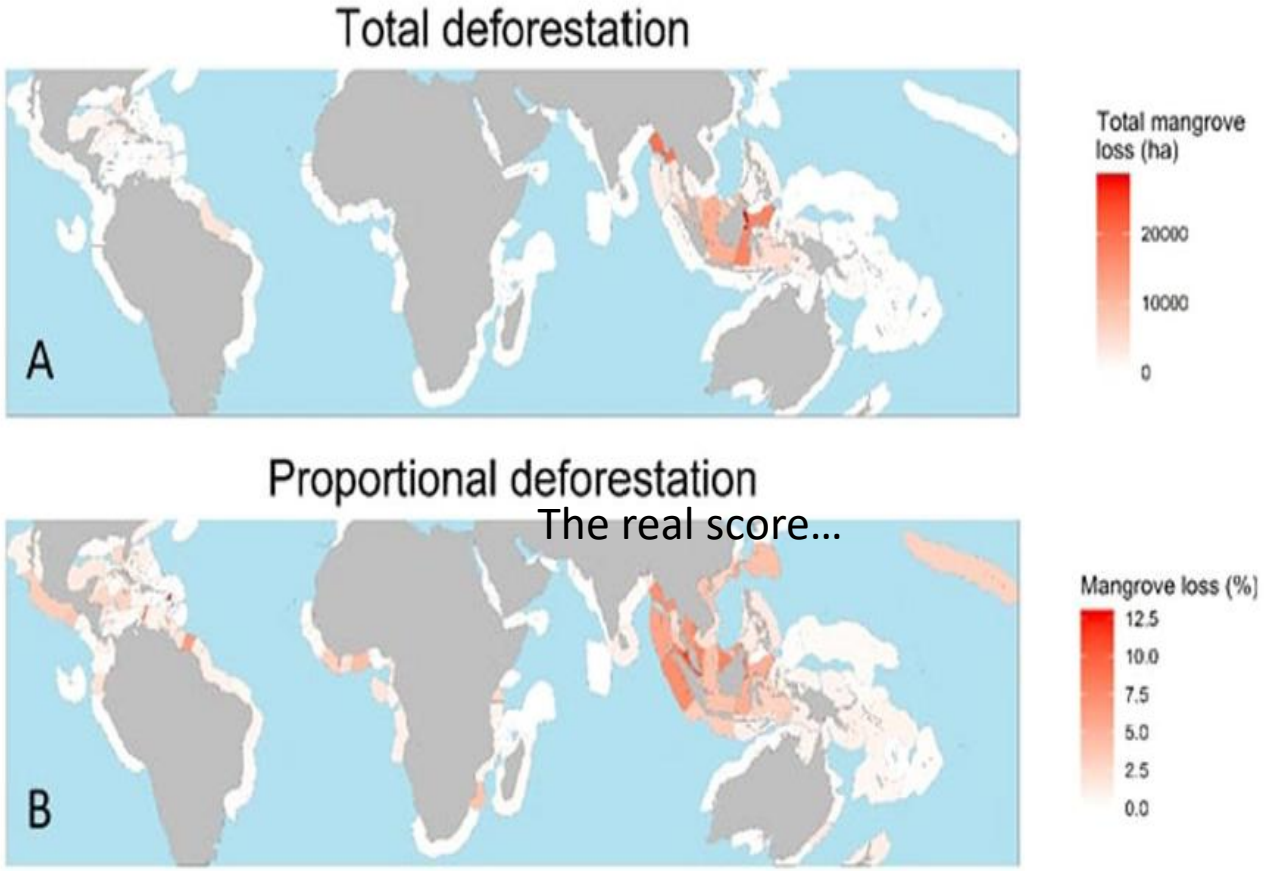
~100,000 ha of aquaculture ponds in Southeast Asia are restorable, leading to gains of 84 $MtCO_2$ – worth $638 million over 40 years

Our field studies in Indonesia show that mangroves restored in aquaculture ponds can sequester 27.6 tonnes of CO_2e ha^{-1} yr^{-1} (2-3 times other ecosystems)



Jiang et al. 2025. **One Earth** 8, 2024.11.0003

The real score…



Global mangrove area: 14.8 Mha (FAO 2023)

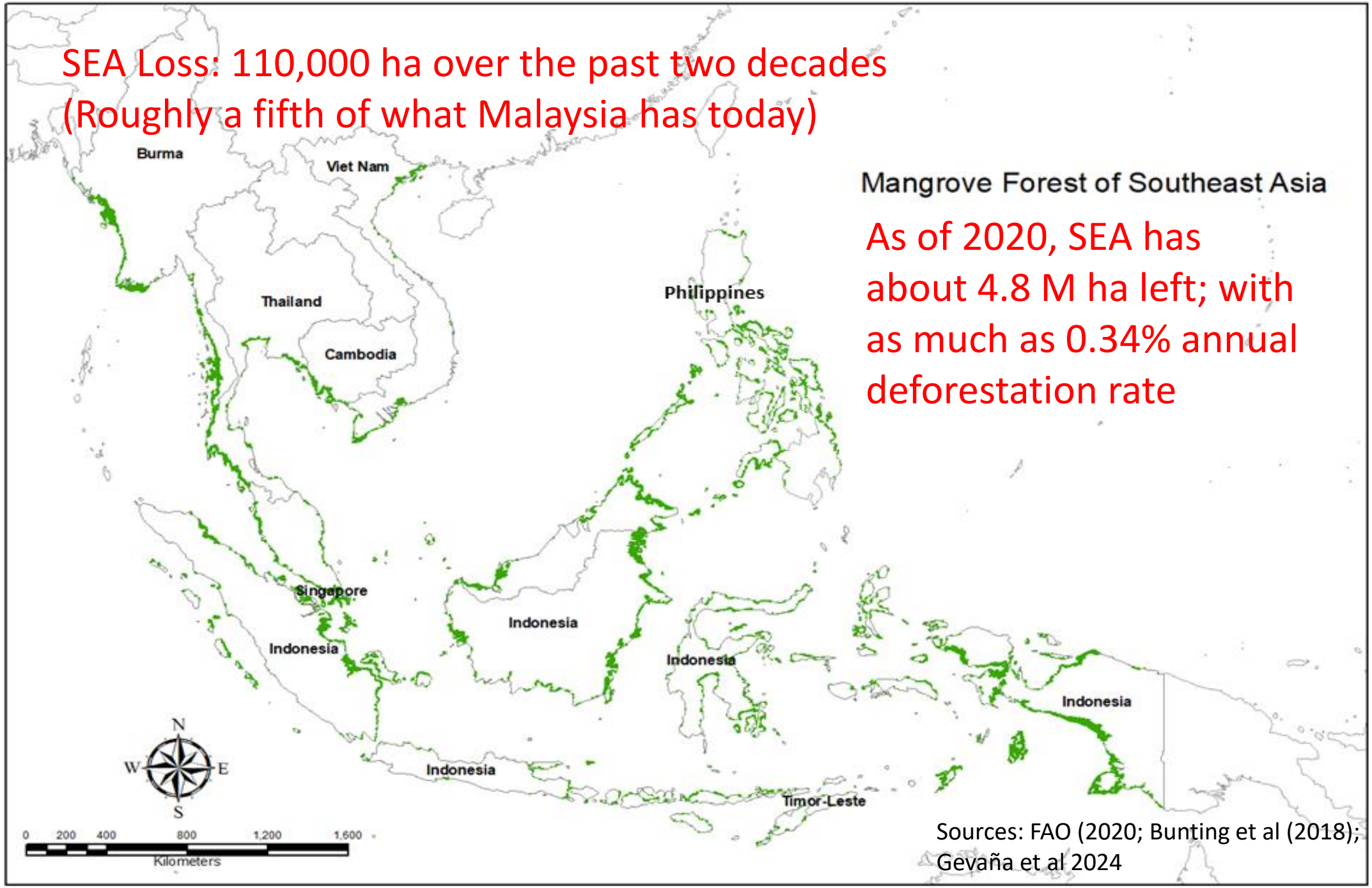
Deforestation rate: 21,000 ha/yr

Historically, mangroves were subject to high rates of deforestation of up to 3.6% per annum.

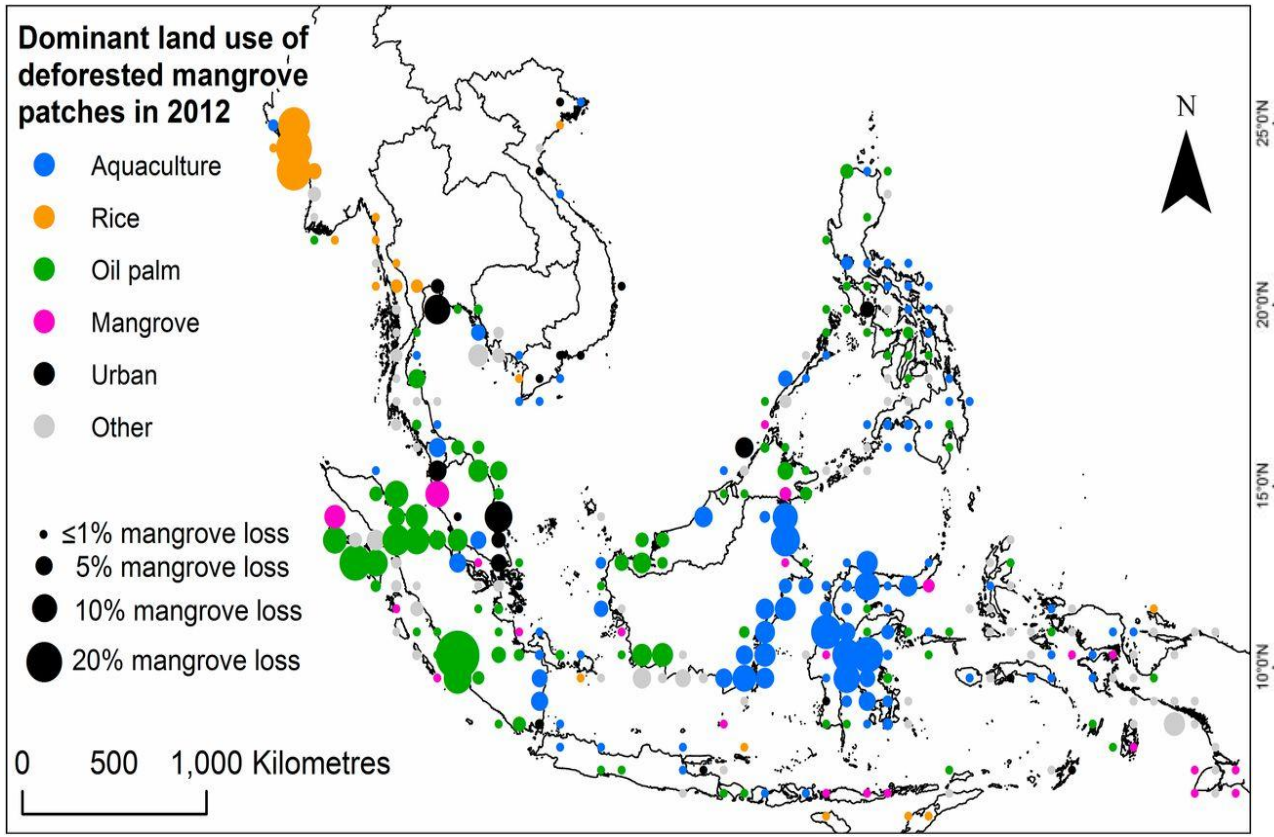
Good news: **the turn of the millennium global mangrove deforestation rates have slowed, with annual loss rates of 0.2–0.7%**

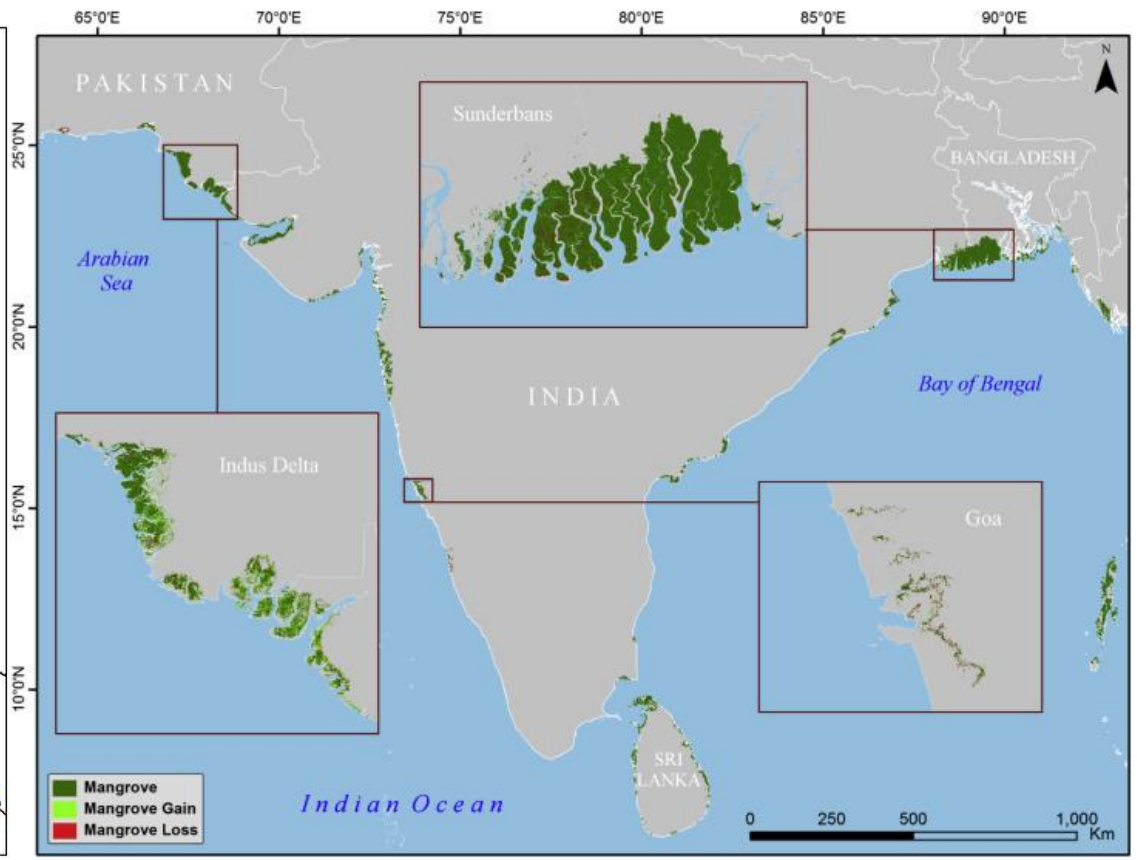
Source: Bryan-Brown et. al (2020): Scientific Reports | *(2020) 10:7117* | https://doi.org/10.1038/s41598-020-63880-1

SEA Loss: 110,000 ha over the past two decades
(Roughly a fifth of what Malaysia has today)



Increasing and improving efforts to detect, monitor and understand mangrove cover changes in the region and better





Ref: Richards and Fries (2016) doi: 10.1073/pnas.1510272113

Ref: Giri et al (2015) doi.org/10.1016/j.jenvman.2014.01.020

Mangrove deforestation > voluminous carbon emission

Major governance issues and challenges confronting the SEA mangrove BC?

Challenges to Mangrove Restoration and Rehabilitation in Asia-Pacific

Philippines · Malaysia · Indonesia · India · Japan · China · Vietnam · Bangladesh · Myanmar · Singapore · Fiji

Anthropogenic activities

- harvesting for domestic use
- bonsai-making and collecting bark as tanning agent
- pig raising
- trampling over seedlings and saplings from collecting edibles
- pollution
- illegal cutting, mangrove clearing / destruction for reclamation projects, aquaculture and salt farms
- grazing
- docking of boats
- risk of tapping mangrove resources for rayon in the future (previously tapped before)
- Land subsidence

Soil Erosion and Siltation

- results to massive losses in mangrove plantations and natural forests
- unsustainable agriculture practices and garbage pollution resulting to red-soil runoff
- Mining resulting to siltation

Land conversion

- Aquaculture
- Small-scale agriculture
- Lands for recreation, tourism and dams

Arm conflicts

- damages some mangrove sites

Policy and governance issues

- passive behavior of some LGUs re: mangrove rehabilitation
- unclear policy objectives; regional development strategies triggering mangrove deforestation
- weak law enforcement and compliance
- uncoordinated process for approvals and decisions on mangroves
- unclear or conflicting policy objectives
- Ministry of Forestry can only prosecute if an illegal activity is occurring

Non-native species invasion

- introduction of non-native diseases

Natural disturbances

- strong and frequent cyclones and typhoons, strong waves, storm surges, and abrasion
- pests and diseases, and natural predation
- species intolerance to salinity and tidal inundation
- flooding

Pool of knowledge

- Limited studies that assess the cause of degradation and insufficient communication
- Policy gaps requiring feasibility assessment, monitoring and enforcement through multi-disciplinary approaches

Urbanization

- Resettlements and construction of infrastructures, dikes and tide embankments
- Coastal reclamation and backfilling

Climate Change

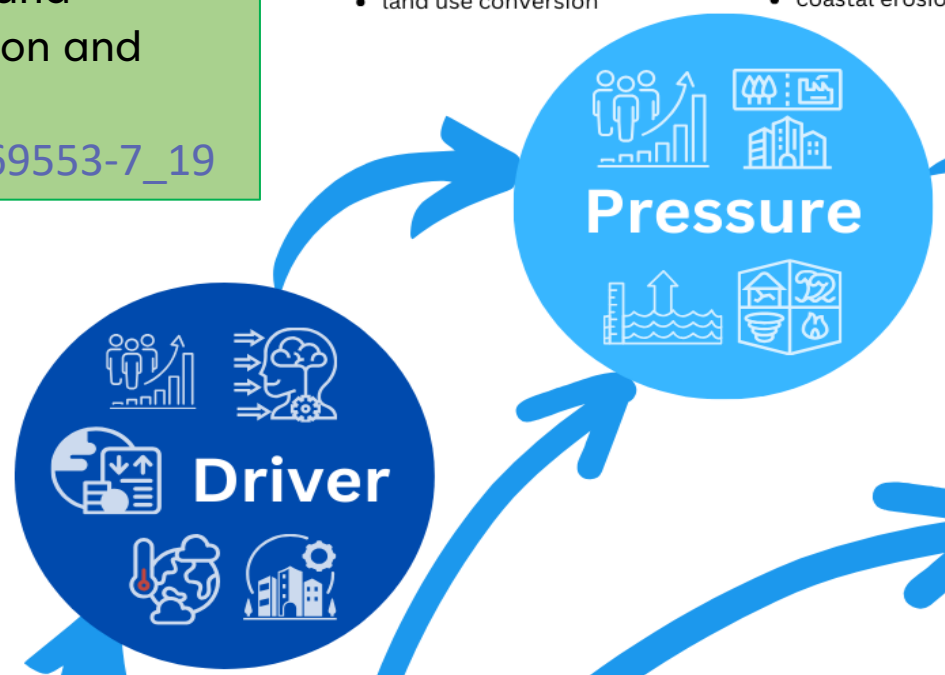
- Increased occurrence and intensity of cyclones on tropical coasts
- Sea level rise

Technical problems

- wrong choice of species for planting
- lack of labor and resources, and inappropriate use of financial resources
- costly reforestation on bare beaches and integration with human-made fish reefs
- low survival rate of seedlings
- planting malpractice - seafront and seagrass planting
- space unavailability
- CBFM participants in mangrove areas cannot avail incentives (such as land tenure) compared to CBFM participants of terrestrial forests
- Overlapping of ownership
- Ambiguity in land tenureship, accessibility and ownership rights to mangrove area & resources

Understanding the root causes of mangrove deforestation in SEA

Drivers, pressures, state, impacts, and responses to mangrove deforestation and degradation. Gevana et al (2024) https://doi.org/10.1007/978-3-031-69553-7_19



Pressure

Socio-economic Impacts
- coastal population growth
- overexploitation
- land use conversion

Bio-physical Impacts
- coastal development/ reclamation
- sea level rise
- coastal erosion

Driver

Socio-economic Impacts
- population
- local and national policies and institutions
- coastal land use plans
- local perceptions, culture and traditional knowledge

Bio-physical Impacts
- Habitat quality
- Geological hazards
- climate change

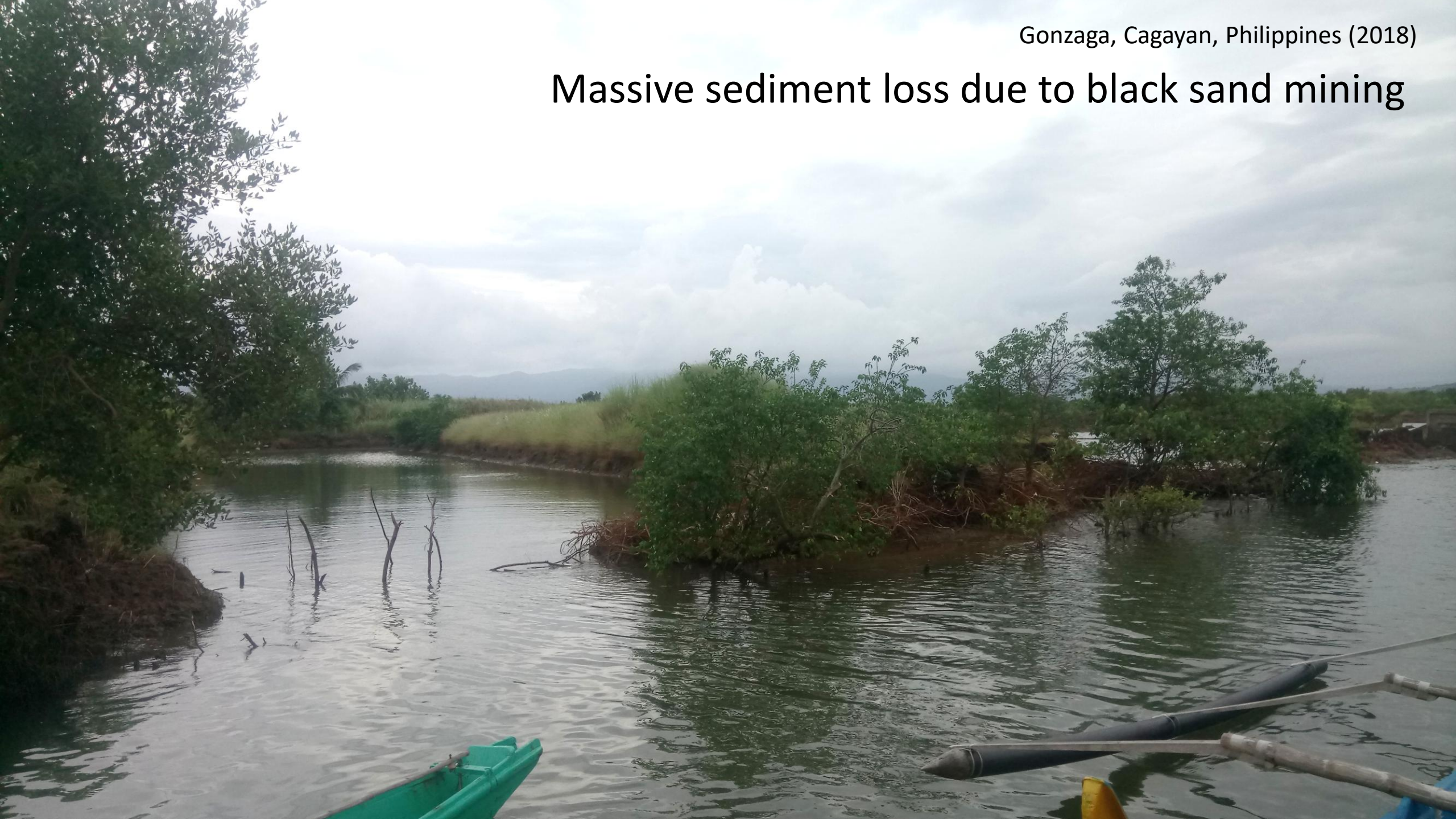
State
- Deforestation
- Degradation
- Biodiversity loss

Response
- Mangrove restoration and protection
- Community-based mangrove management
- Strengthening policies and local institution
- Securing local and international conservation funds
- Climate-proofing mangrove management plans

Impacts
- coastal vulnerability
- degraded ecosystem

Gonzaga, Cagayan, Philippines (2018)

Massive sediment loss due to black sand mining




Conversion to an oil palm plantation and road development hinder natural coastal sedimentation recharge


Loss`


Seawall disrupted hydrology,
displacing mangroves.


Myeik, Myanmar


Marinduque, Philippines

Too much gray!

Massive Sea wall
Source: Japan Times

Mangrove forest fire, is this possible?


Tanza Marine Tree Park, Navotas City


Erosion of mangrove fronts due to dredging for reclamation
1985
Imagery Date: 3/4/2018 14°41'02.28" N 120°55'26.70" E elev 0 m eye alt 572 m
Google Earth


Potential sediment loss
due to reclamation

Criterion C: Environmental Degradation

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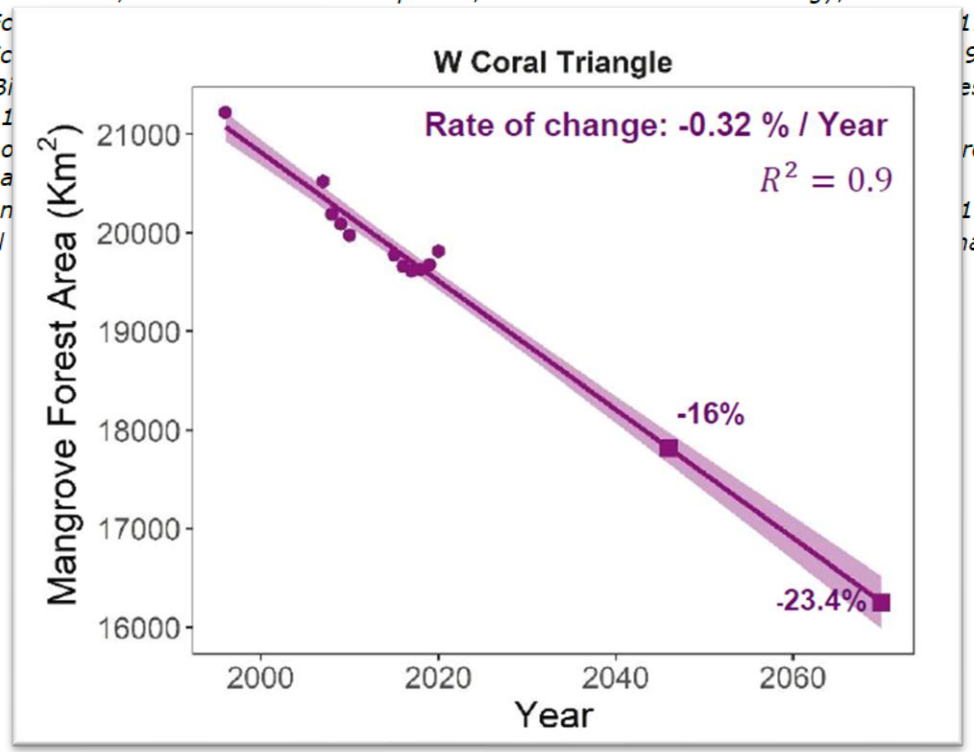
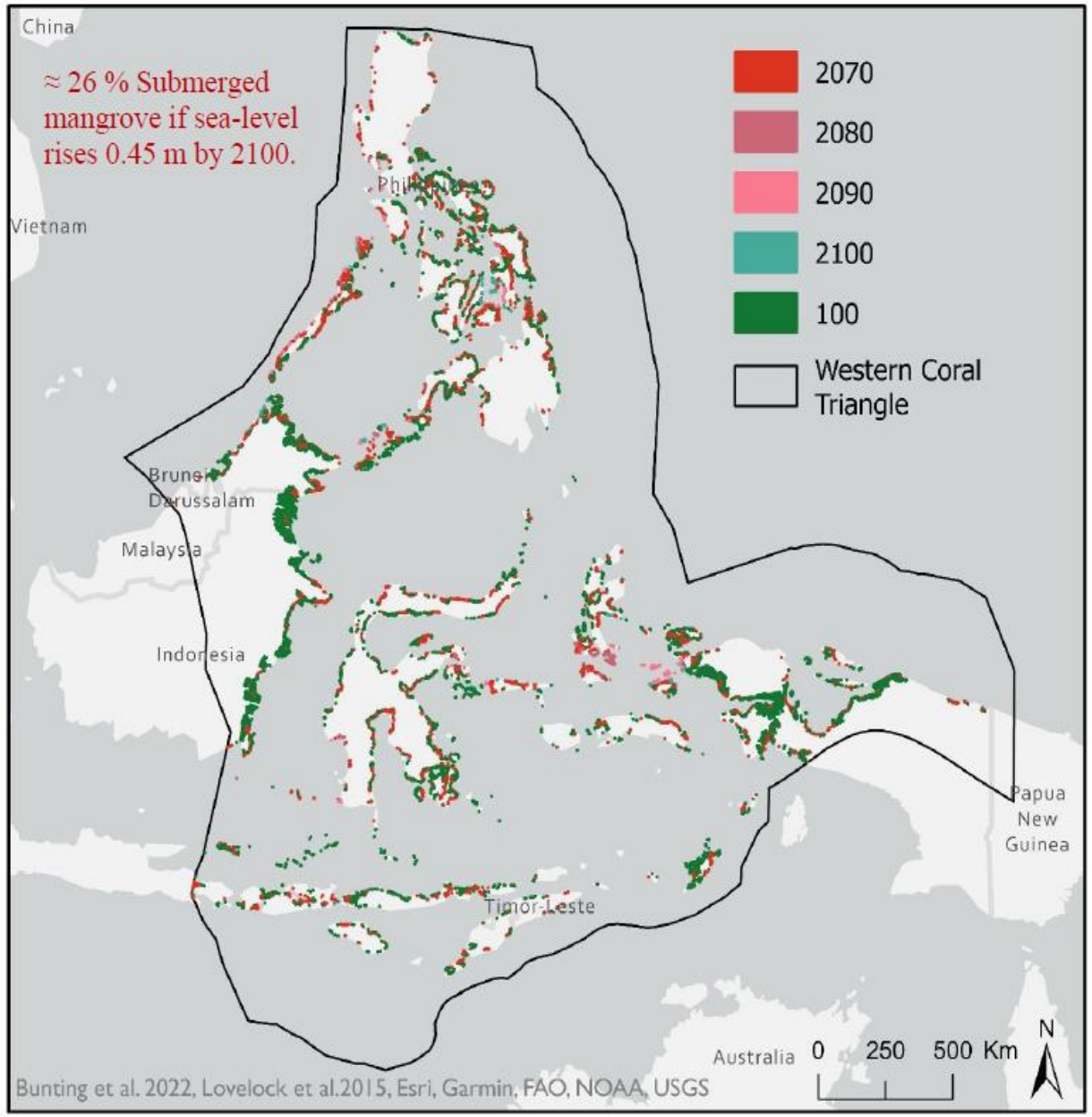
Mangroves of the Western Coral Tri

Donald J. Macintosh[1,2], Ena L. Suárez[3], Severino G. Salmo III[4], Dixon T. Ge
Frida Sidik[6], I Wayan Eka Dharmawan[6], Maeve Nightingale[7] & Marcos Vald

[1] School of Environment, Resources and Development, Asian Institute of Technology, Pathum Thani 12
[2] Red List of Ec 1196, S
[3] Red List of Ec 96, Swi
[4] Institute of Bi es Dilim
Quezon City 1
[5] Department o rces, Ur
Los Baños, La
[6] Research Cen 10340,
[7] International ailand.





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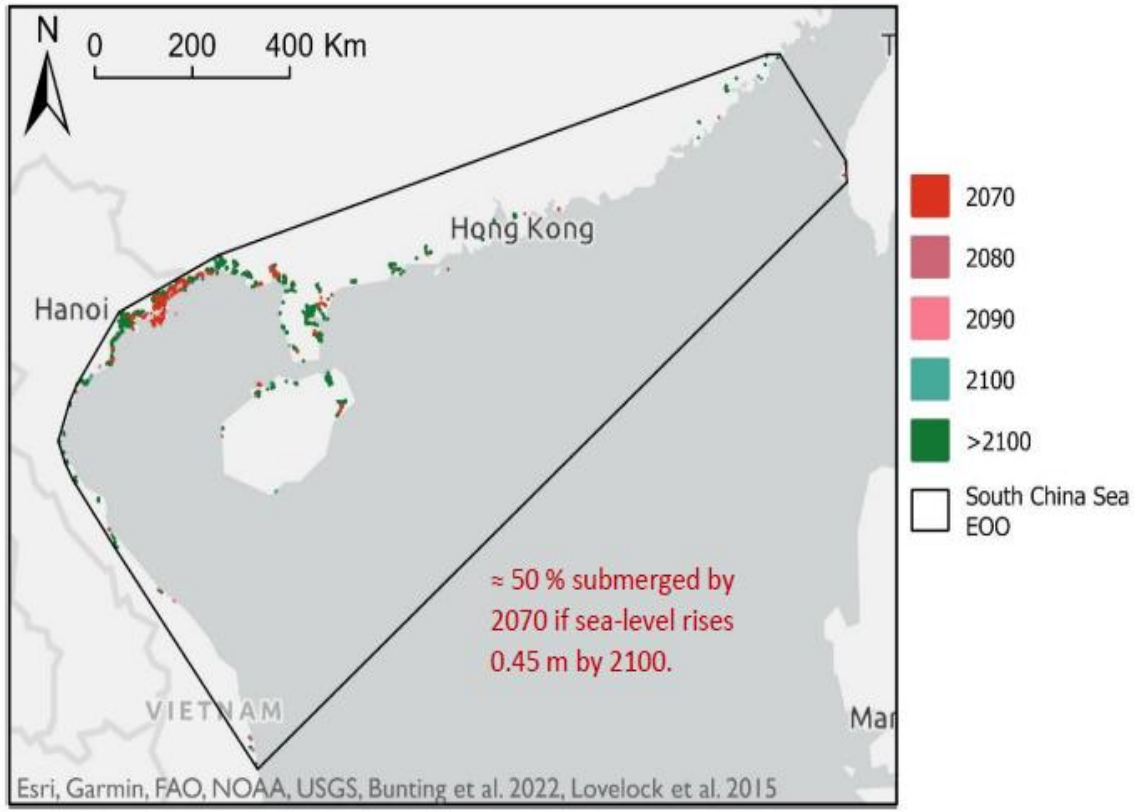
Mangroves of the South China Sea EN

Donald J. Macintosh[1,2], Ena L. Suárez[3], Luzhen Chen[4], Pham Hong Tinh[5], Maeve Nightingale[6] & Marcos Valderrábano[3]



Rate of change: -0.72% / yr

doi.org/10.32942/X2DW3F

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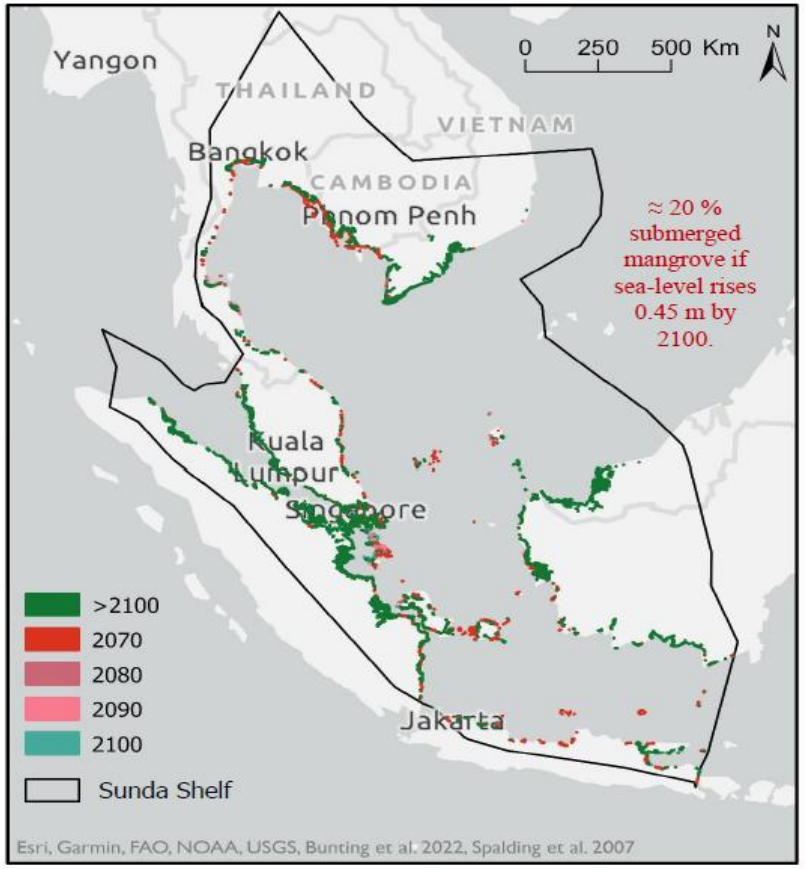
Mangroves of the Sunda Shelf VU

Donald J. Macintosh [1,2], Ena L. Suárez[3], Frida Sidik[4], Pham Trong Thinh[5], Gianluca Polgar[6], Maeve Nightingale[7] & Marcos Valderrábano[3]



Rate of change: -0.19% / yr

doi.org/10.32942/X2JK5B

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ECOSYSTEMS ASSESSMENTS

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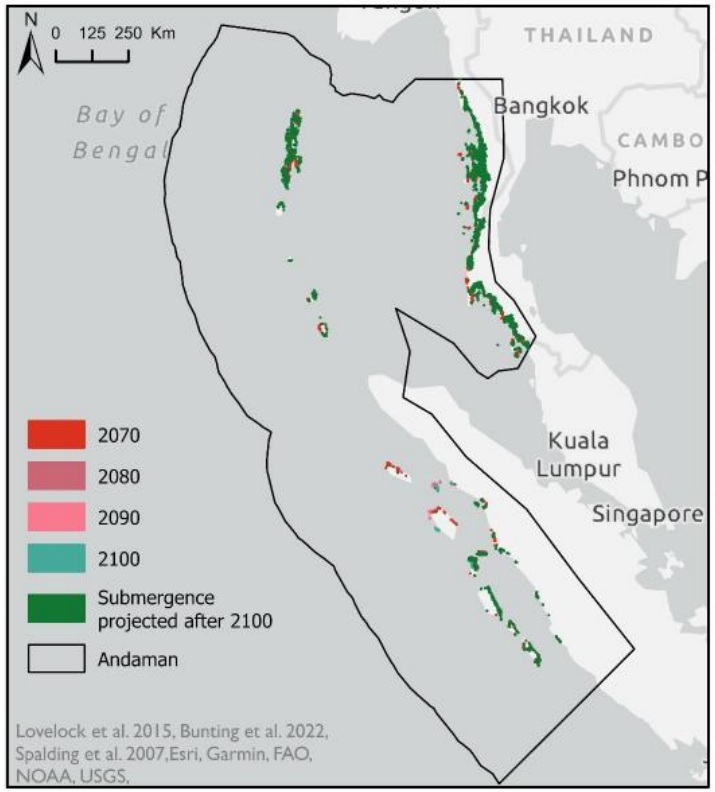
Mangroves of the Andaman LC

Donald J. Macintosh[1,2], Ena L. Suárez[3], Toe Aung[4], Daniel A. Friess[5], Maeve Nightingale[6] & Marcos Valderrábano[3]



≈ 21% submerged mangrove if sea - level rises 0.45 m by 2100.

Rate of change: -0.3% / yr

doi.org/10.32942/X2WW3

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ECOSYSTEMS ASSESSMENTS

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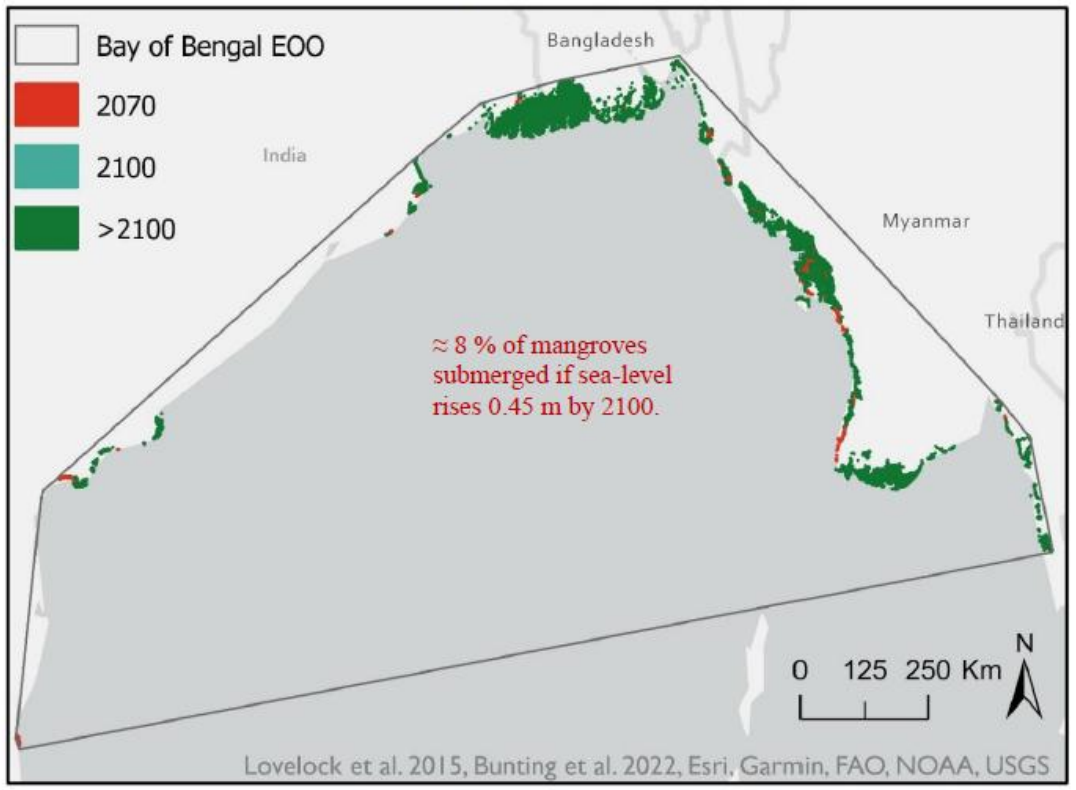
Mangroves of The Bay of Bengal LC

Donald J. Macintosh[1,2], Ena L. Suárez[3], Toe Aung[4], Daniel A. Friess[5], Calvin K. F. Lee[6], Mohammed Hossain[7], Maeve Nightingale[8] & Marcos Valderrábano[3]



Rate of change: -0.16% / yr

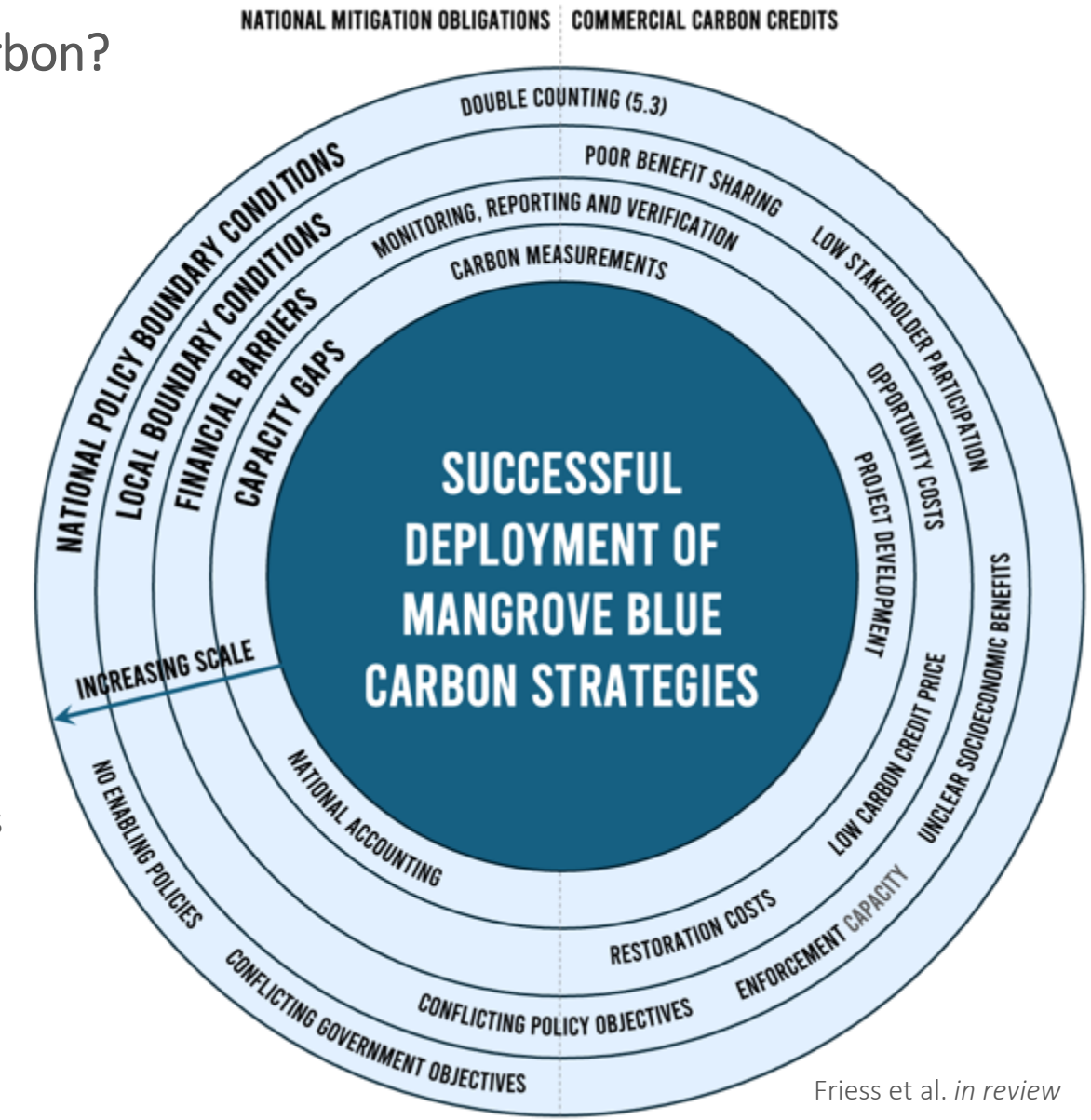
doi.org/10.32942/X2930F

Overcoming mangrove governance challenges

Barriers and constraints to blue carbon restoration in SEA

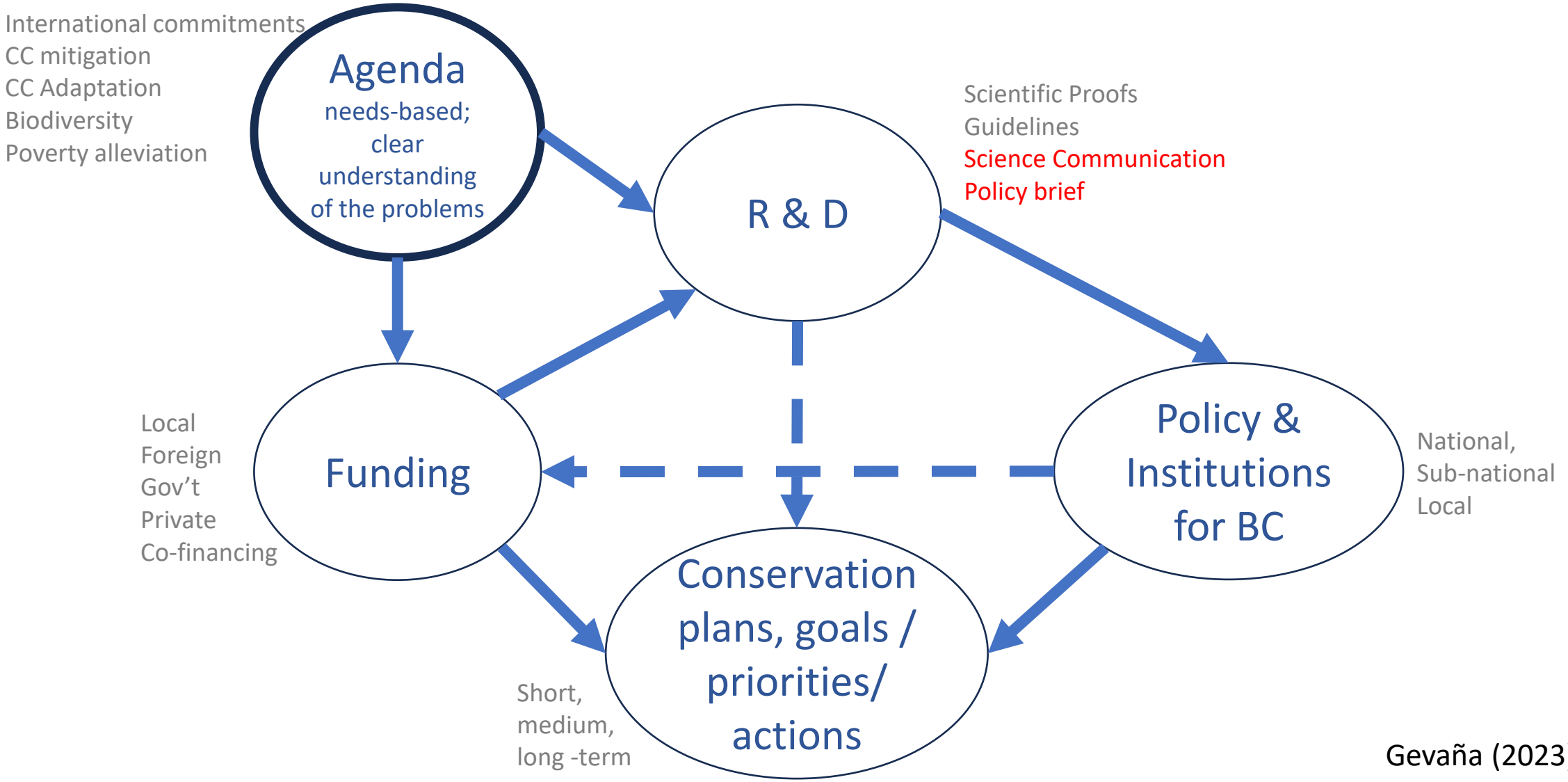
So why are we not meeting the high potential for blue carbon?

- Unclear *national* policies and conditions
  - Few national blue carbon policies
  - Federal/state clashes
- Unclear *local* policies and conditions
  - Poor coordination and resources
  - Unclear land tenure
- Conflicting national vs commercial accounting
  - Risk of double counting
  - Article 6 of the Paris Agreement still unclear
  - Indonesia and Vietnam paused carbon credit projects
- Financial barriers
  - Carbon credit verification is expensive
  - High opportunity costs of alternative land uses



Friess et al. *in review*

1. Come with clear mangrove restoration agenda.



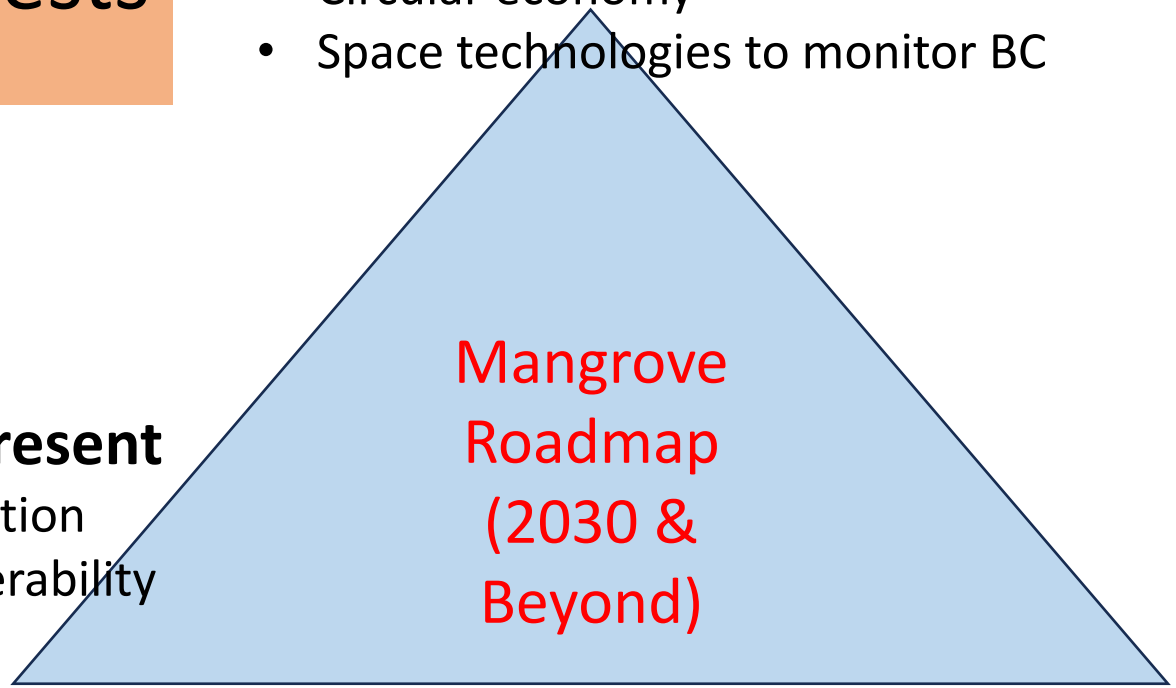
Gevaña (2023)

Futures triangle in managing the Southeast Asia Mangrove Forests

Gevana (2024)

Pull of the Future

- Adapting to sea level rise
- Carbon neutrality
- Green-gray technologies
- A.I; big data analytics
- Circular economy
- Space technologies to monitor BC

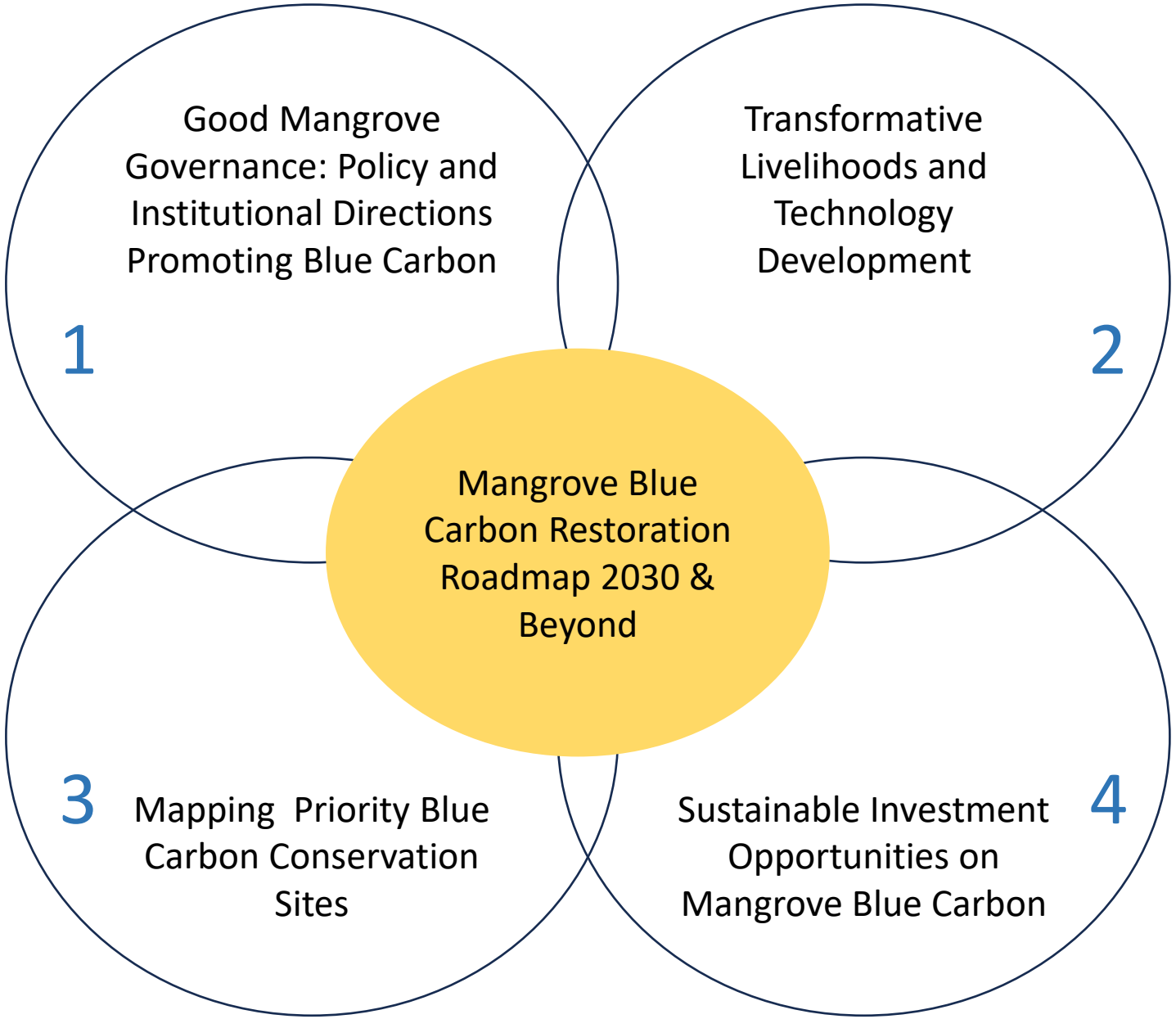


Push of the Present

- Growing coastal population
- Increasing coastal vulnerability
- NbS / BC Finance
- Geopolitics
- Need for climate change mitigation
- Biodiversity targets
- Increasing awareness about mangroves

Weight if the Past:

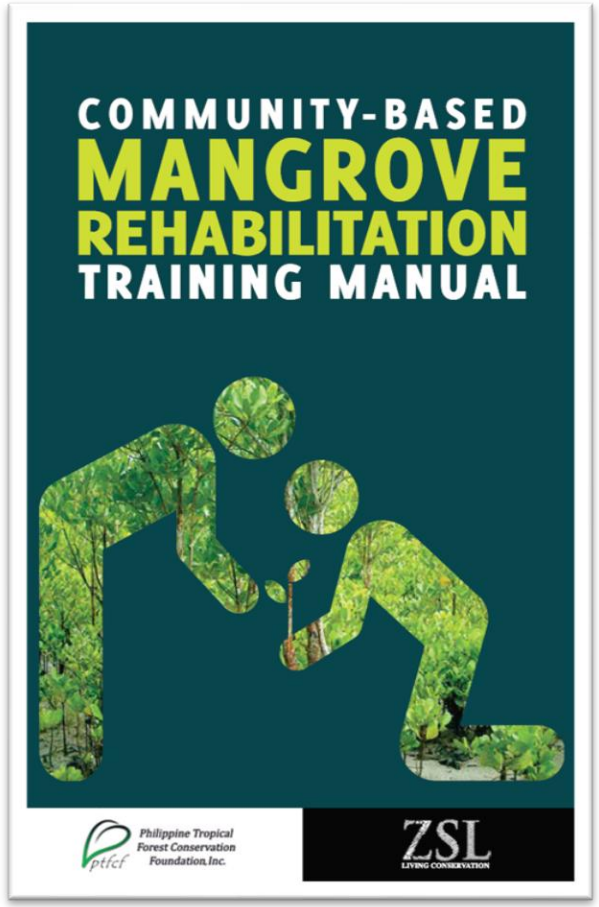
- Land use conversion leading to deforestation & biodiv loss
- Coastal ecosystem degradation
- Least prioritized mangrove conservation
- Tenurial issues
- Overlapping policies and mandates

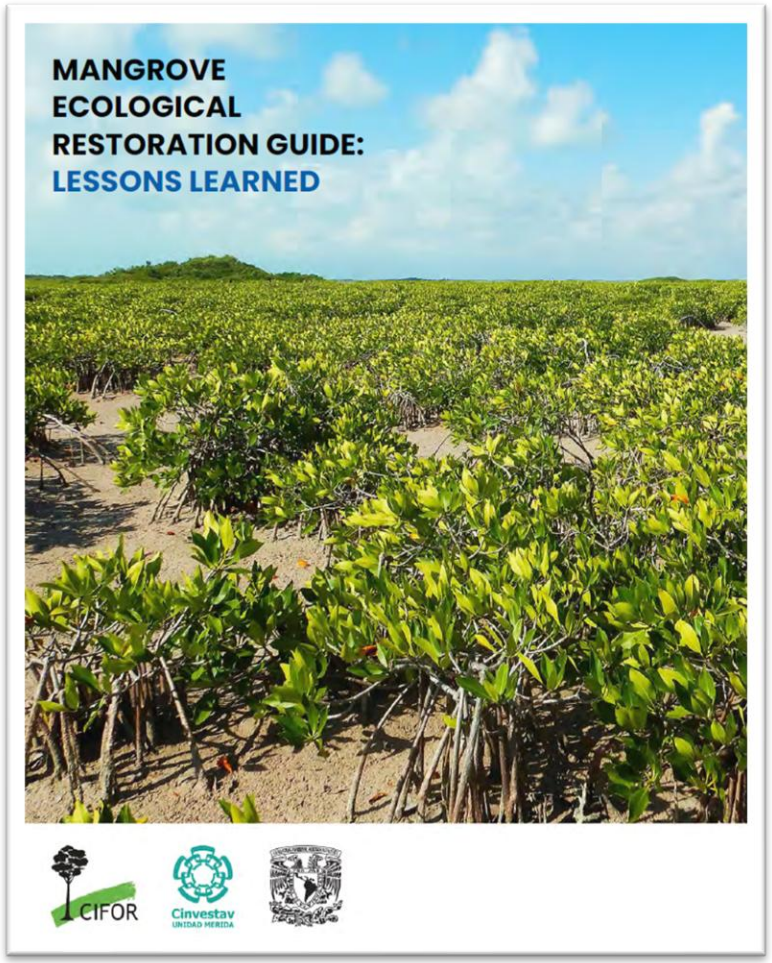


Mangrove Blue Carbon Roadmap 2030 & Beyond Framework

Gevana (2024)

Technical Guidelines for Effective Mangrove Restoration





2. A clear national (and local) policy basis to promote mangrove blue carbon conservation.

REPUBLIC OF THE PHILIPPINES
Nationally Determined Contribution
Communicated to the UNFCCC on 15 April 2021

The Republic of the Philippines submits its Nationally Determined Co
accordance with Decision 1/CP.21 of the Conference of Parties of
Framework Convention on Climate Change (UNFCCC).

Climate Change Mitigation

In terms of greenhouse gas (GHG) emissions, the Philippines emits an average of 1.98 metric tons of carbon dioxide equivalent per capita in 2020, or way below the global average of four (4) metric tons per capita.

The Philippines commits to a projected GHG emissions reduction and avoidance of 75%, of which 2.71% is unconditional [9] and 72.29% is conditional, [10] representing the country's ambition for GHG mitigation for the period 2020 to 2030 for the sectors of agriculture, wastes, industry, transport, and energy. [11] This commitment is referenced against a projected business-as-usual cumulative economy-wide emission of 3,340.3 $MtCO_2e$ [12] for the same period.

A clear national policy on NbS promotion is needed to make it as a priority

3. Translate **research** to **policies**, then policies to national and international **road map(s)** (SEA Mangrove Road Map)

Mangrove protection. Priority areas for strict conservation.

Mangrove restoration. Degraded areas ecologically suitable for bringing back mangroves (e.g. abandoned fishponds)

Cooperation and collaboration. Multi-stakeholder, multi-sectoral, local / international.

IBCSWG / Singapore / Oct 2023

CGSEA
CARBON GOVERNANCE IN SOUTHEAST ASIA

ARI
ASIA RESEARCH INSTITUTE
National University of Singapore

Carbon Governance In Southeast Asia (CGSEA)

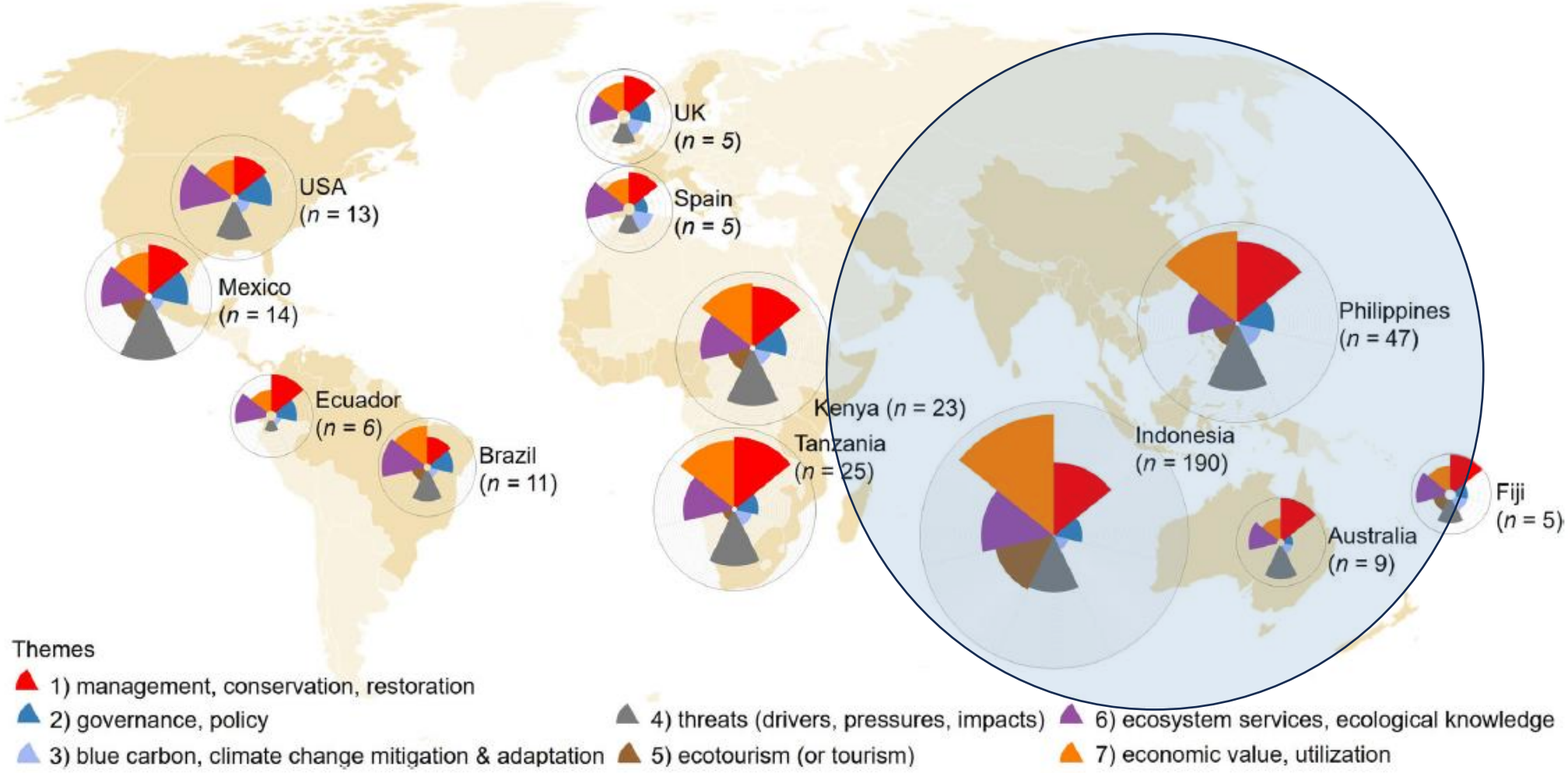


Fig. 4 Top two countries with the highest number of publications per continent, illustrating the frequency of each theme studied

There's a **growing interest on mangrove restoration for blue carbon.**

More published studies are in SEA, particularly Indonesia and Philippines

Quevedo et al 2025

GLOBAL MANGROVE ALLIANCE

GOAL:

to expand the global extent of mangrove habitat 20% by the year 2030.

Target for avoided loss: 168km^2 by 2030.

Target for restoration: 4,092km^2 by 2030.

Target doubling protection: 61,000km2

Why develop and institutionalize mangrove road maps (with maps and measurable targets)?

It ensures / secures non-negotiable mangrove restoration & conservation target areas on top of other coastal land use development plans.

It provides the proper allocation of conservation works on the ground, thereby avoiding duplication and competition among projects and funding.

30 x 30 (30% by Year 2030)

Serious conservation of 30% of Earth's land and sea by 2030 through protected areas and other conservation methods.

Additionally, the framework seeks nature-based contributions to global climate mitigation efforts to at least 10 GtCO2e per year.

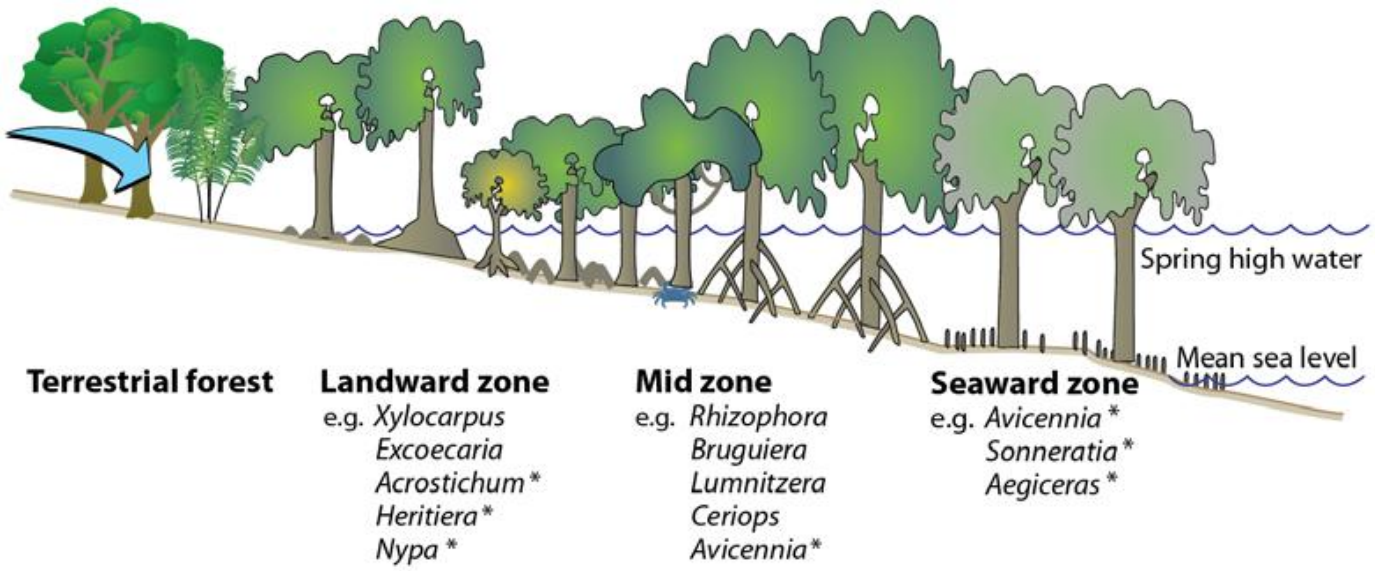
Target 3 of the Kunming-Montreal Global Biodiversity Framework

Let's target the **right restoration sites**.

Do the correct **site-species matching**.

Target abandoned fishponds. Avoid seagrass beds.

Promote aquasilviculture (mangrove-friendly designs) in existing fishponds.



Waycott et al (2011)

An integrated mangrove-aquaculture pond in the Mekong Delta, Vietnam.
D. Macintosh / cabidigitallibrary.org

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Article | Open access | Published: 10 February 2023

Mangrove reforestation provides greater blue carbon benefit than afforestation for mitigating global climate change

Shanshan Song, Yali Ding ✉, Wei Li ✉, Yuchen Meng, Jian Zhou, Ruikun Gou, Conghe Zhang, Shengbin Ye, Neil Saintilan, Ken W. Krauss, Stephen Crooks, Shuguo Lv & Guanghui Lin ✉

Nature Communications **14**, Article number: 756 (2023) | Cite this article

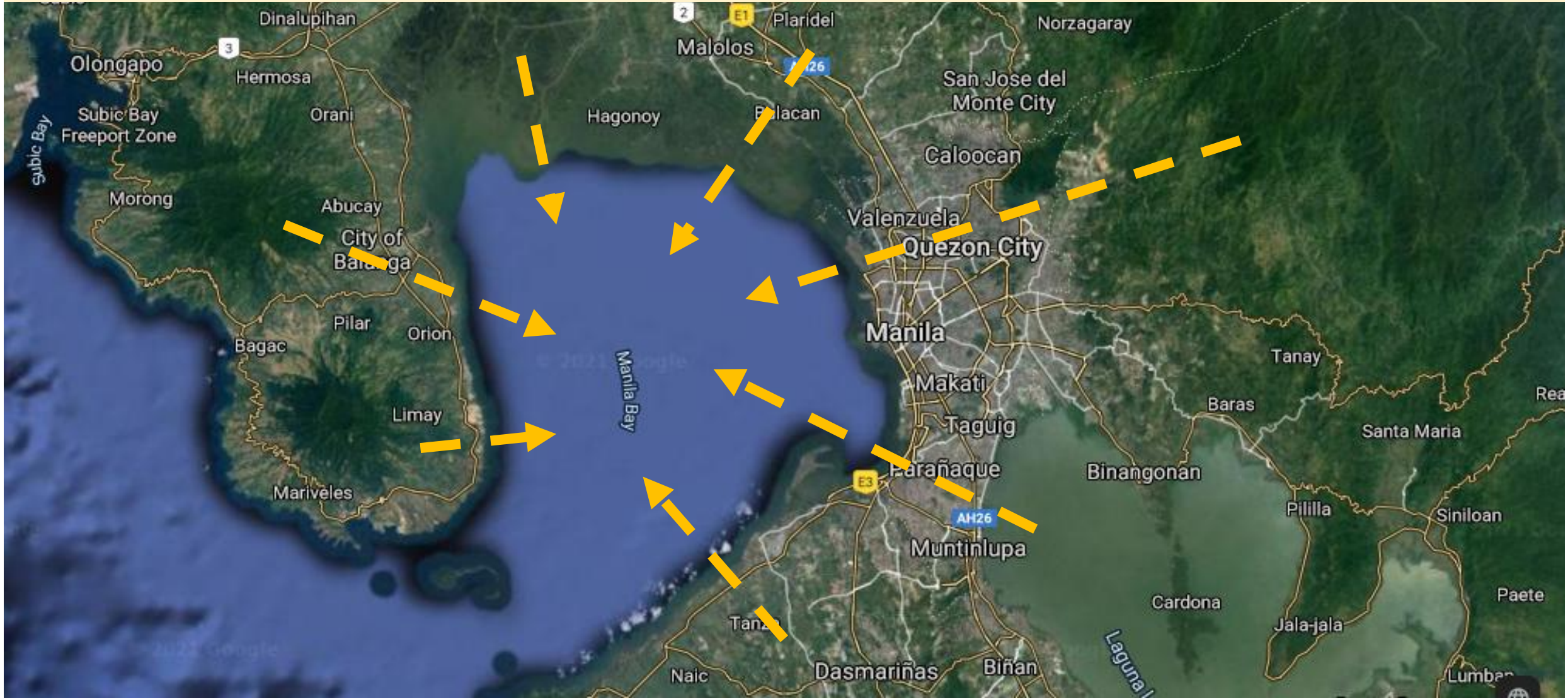
32k Accesses | **138** Altmetric | Metrics

nature.com / https://doi.org/10.1038/s41467-023-36477-1

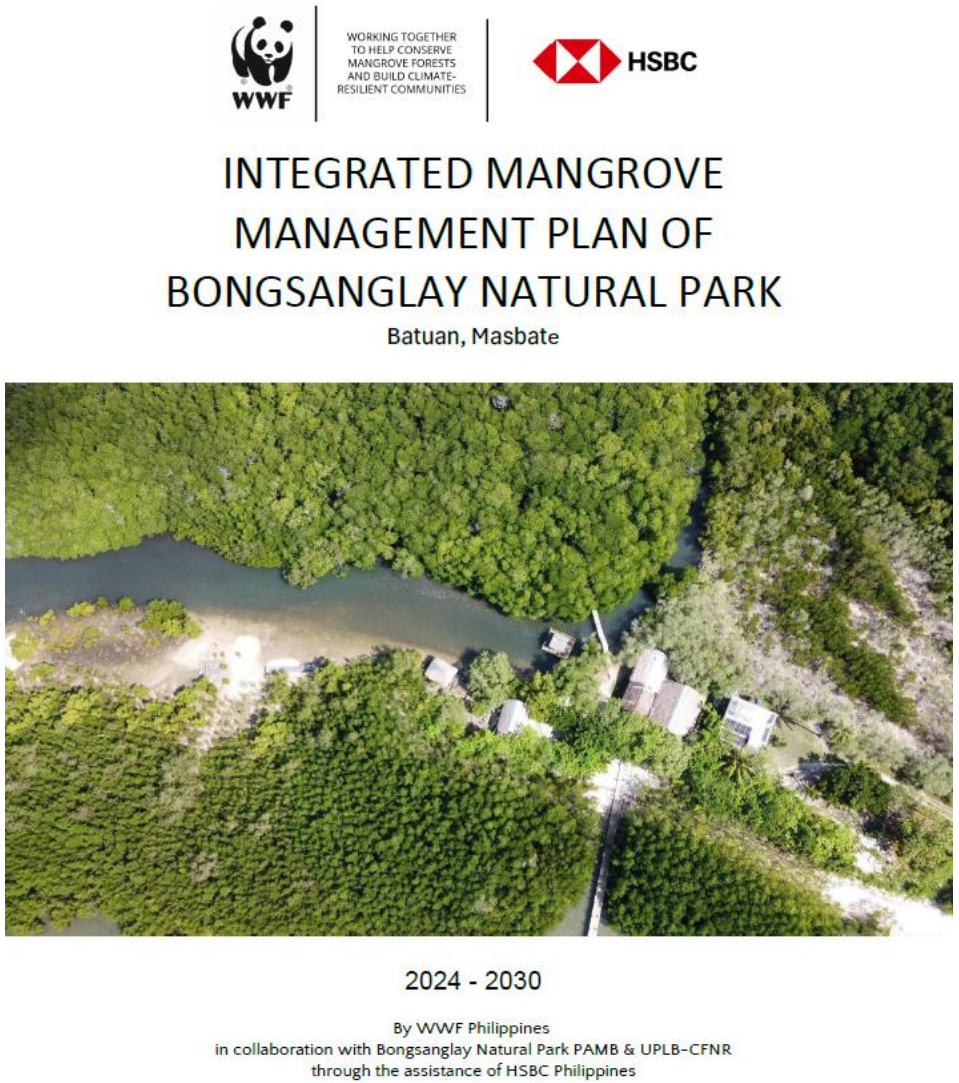
Reforestation of all physically feasible areas in the deforested mangrove regions of the world could promote the uptake of 671.5–688.8 Tg CO_2-eq globally over a 40-year period, 60% more than afforesting the same global area on tidal flats (more marginal sites)

4. Adopt an Integrated watershed (ridge-to-reef) based planning–

Mangrove conservation should be integral part of the broader landscape-seascape / watershed management



Developing an integrated mangrove management plan



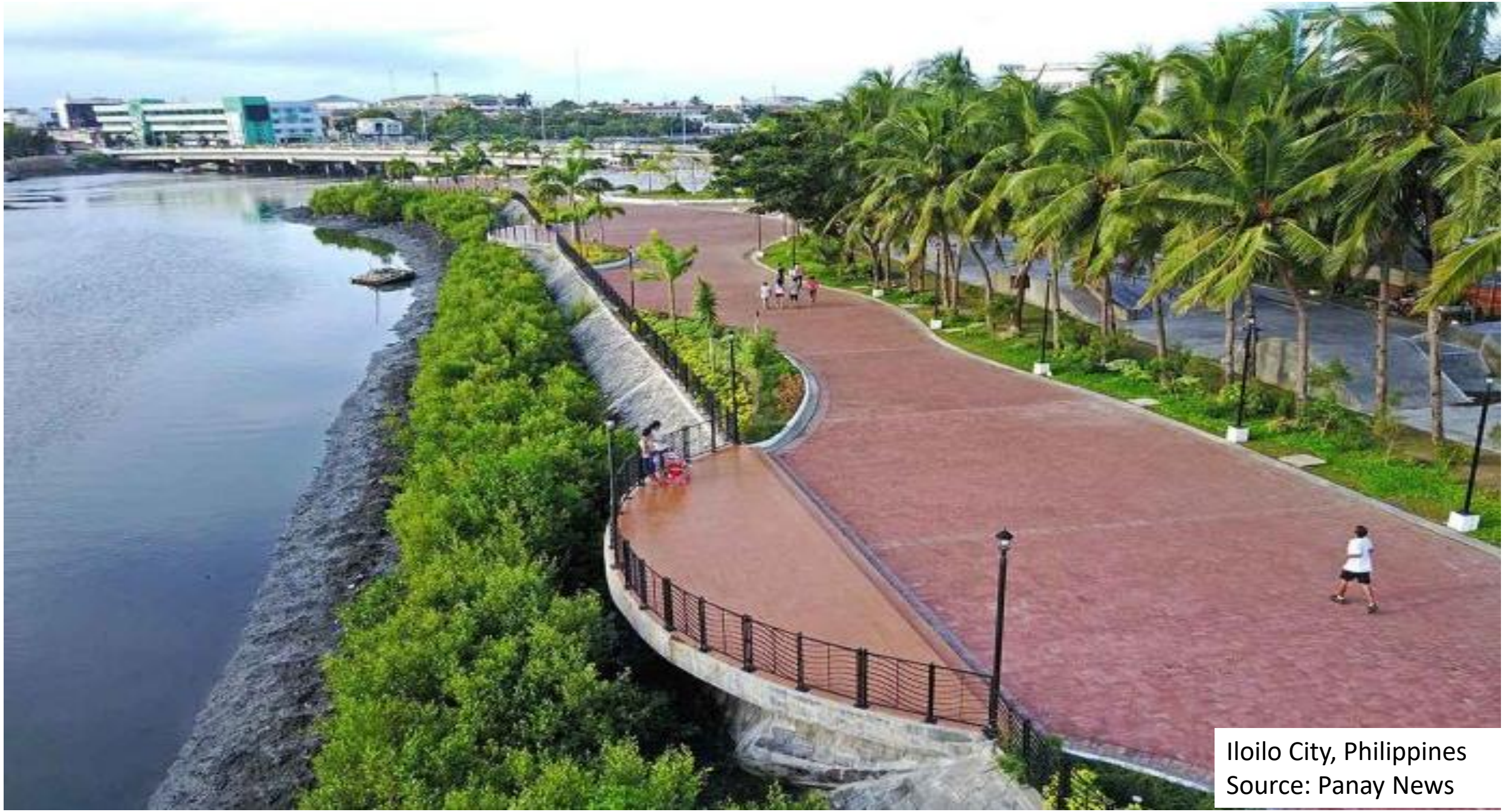
Key Principles:

1. Future-proofed
2. Holistic systems approach
3. Science-based & Interdisciplinary
4. Inclusive and participatory
5. Needs and demand responsive
6. Culture and gender sensitive

www.wwf.org.ph

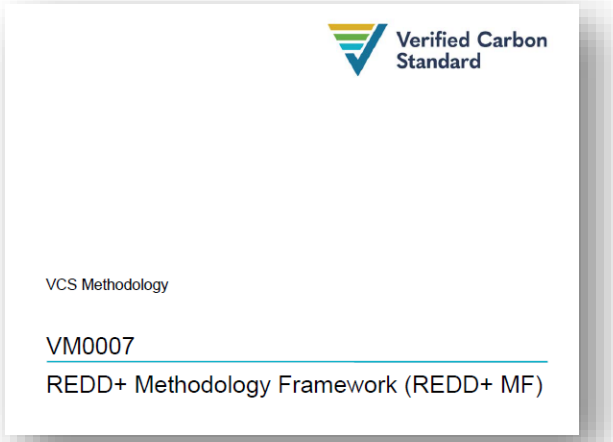
Recife City, Brazil
Source: iucn.org

Panama city
Source: Grid-Arendal

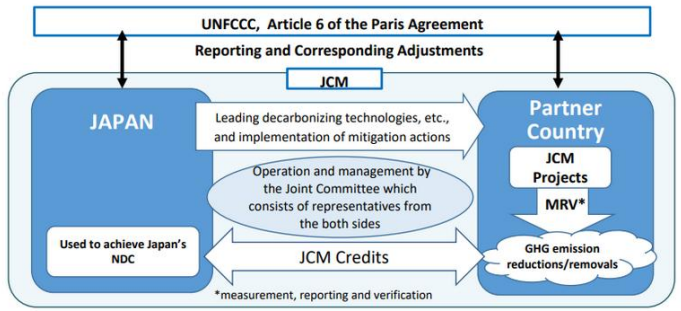


Iloilo City, Philippines
Source: Panay News

5. Manage the increasing interests / investments on mangrove restoration work.



JCM THE JOINT CREDITING MECHANISM



ISO 14064-2 for quantifying GHG emissions at the project level

We seemingly have limited and decreasing areas to restore, and they are competing with other development interests.

It is important to know our restoration / conservation criteria and objectives well.

6. Manage expectation; focus on creating tangible and lasting (economic) benefits for the local communities

Contents lists available at ScienceDirect

Environmental Science and Policy

journal homepage: www.elsevier.com/locate/envsci

A materialist-idealist divide? Policy and practice in participatory mangrove rehabilitation in the Philippines

Clarissa D. Ruzol*, April Charmaine D. Camacho, Lorena L. Sabino, Josephine E. Garcia, Dixon T. Gevaña, Leni D. Camacho

Department of Social Forestry and Forest Governance, College of Forestry and Natural Resources, University of the Philippines Los Baños, Philippines

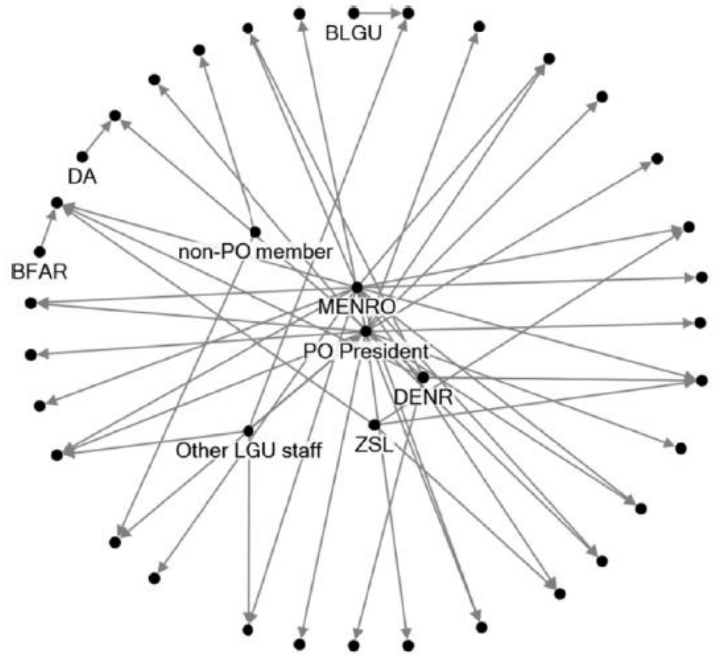


Fig. 3. Mangrove information network among members of the people's organization in the Katunggan Ecopark.

Long-term sustainability would come to emerge when tangible benefits are perceived as instrumental to human wellbeing.

Policies should look beyond the conventional measures of success and consider the transforming network among interest groups.

Measure and re-orient project / policy success in terms of transformative changes.

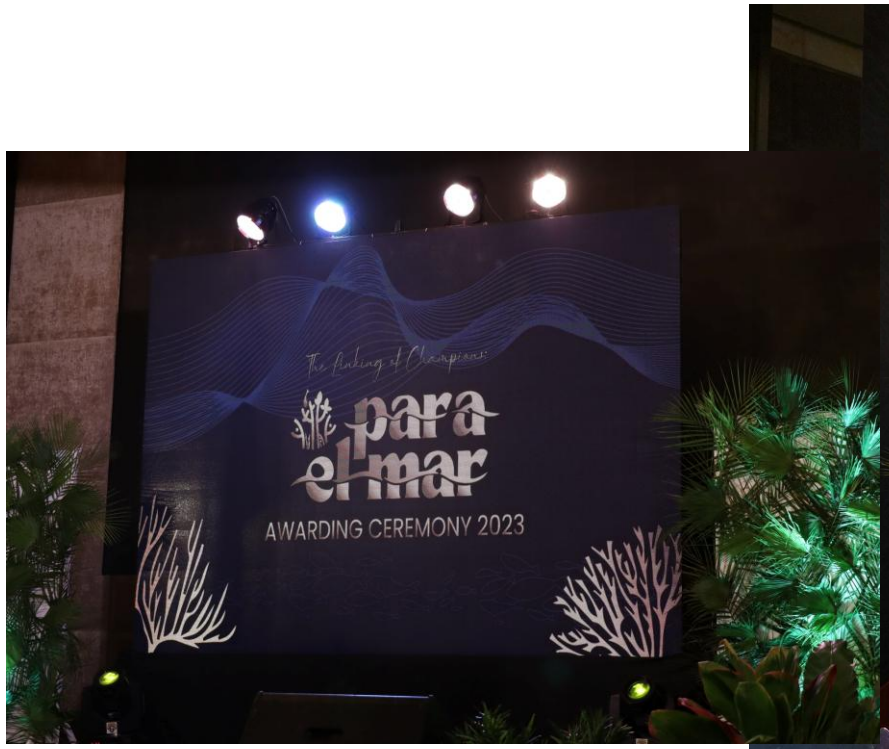
- Strengthened rights
- Increased / renewed collaborations or partnerships among stakeholders.
- Enriched culture and traditions
- Improved income and livelihoods
- Assured multi-generational interests and commitment to conserve mangroves (particularly among the youth)

https://www.springerprofessional.de/en/climate-change-resiliency-through-mangrove-conservation-the-case/19096374


Bohol, Philippines
Infanta, Quezon, Philippines


Ajuy, Iloilo (2018)

6. Sustain and promote local mangrove initiatives and champions.



Dedicated to our future generation and those who will stand up and commit for the cause of ensuring healthy mangroves and planet, for a greener and resilient future.

Banacon Island / Gevana (2013)

Thank you.

To God be the glory.

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