SEARCA Professorial Chair Lecture Series 2026-2027
12 November 2026 / Drilon Hall, SEARCA

An Interdisciplinary Approach to Mangrove Conservation and Local Livelihood Development in Southeast Asia (SEA): Challenges and Opportunities for Collaborative Blue Carbon Governance

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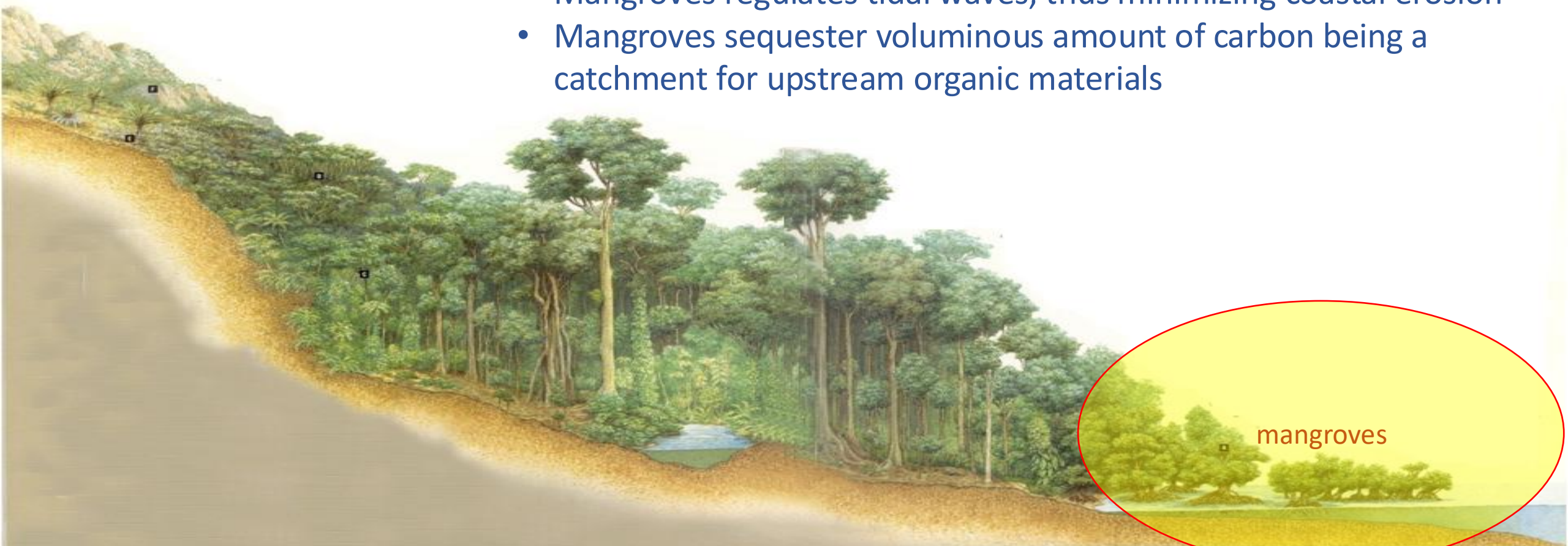

Araceli Island, Northern Palawan

Mangroves link people, landscape and seascape



Everything is connected

- Upland forests capture rainwater, recharge ground water
- Good upland cover keeps soil from eroding, keeps healthy habitat
  - Eroded sediment are trapped and filtered by mangroves thus protecting coral reefs
  - Mangroves regulates tidal waves, thus minimizing coastal erosion
  - Mangroves sequester voluminous amount of carbon being a catchment for upstream organic materials



Outline

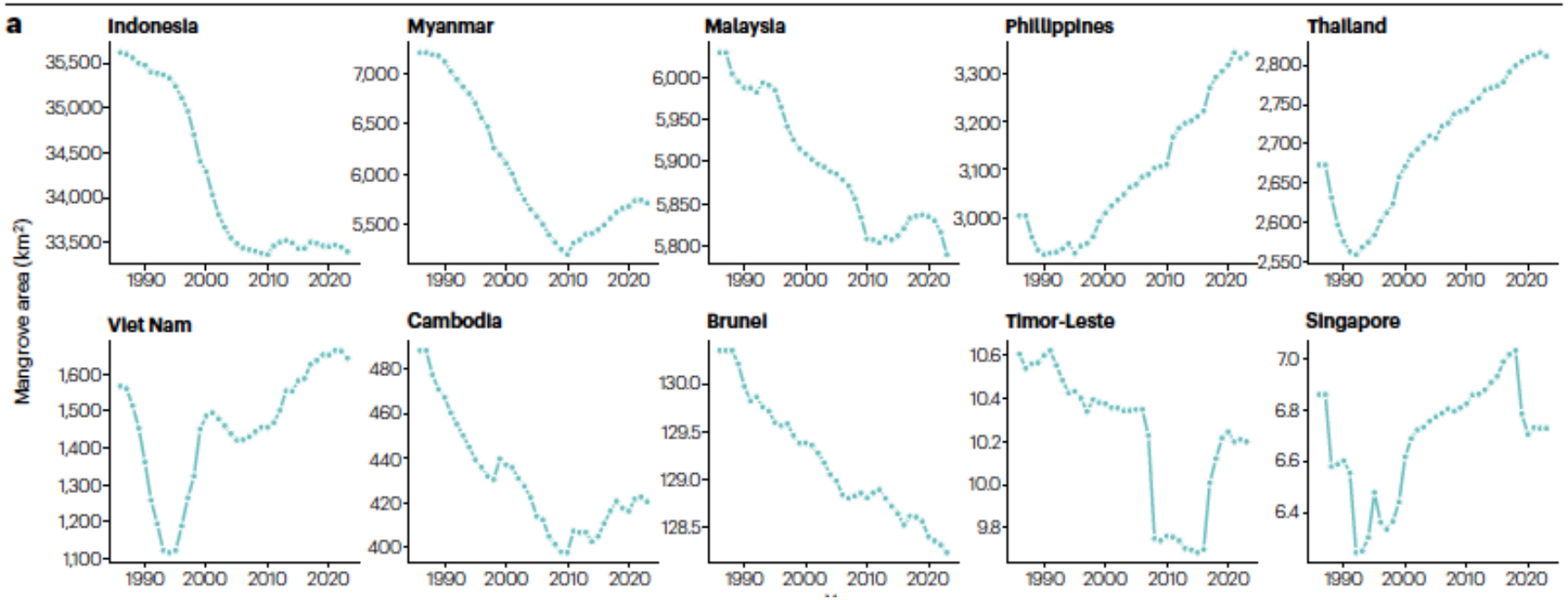
1. State of the Southeast Asia Mangroves
2. Mangroves and Climate Change
3. Saving mangroves, working together, benefiting people: Interdisciplinary to Transdisciplinary Approaches
4. The Future is Local (Strengthening collaborative local mangrove governance)
5. Southeast Asia’s bests

I. A glimpse of the Southeast Asia Mangroves

Spans to 5.4 million hectares, and shares 34.5% of the global cover.

Shelters 47 of the 70 known mangrove species globally.

A biodiversity hotspot with 0.34% annual deforestation (110,000 ha loss over the past two decades) with five species marked as critically endangered and endangered



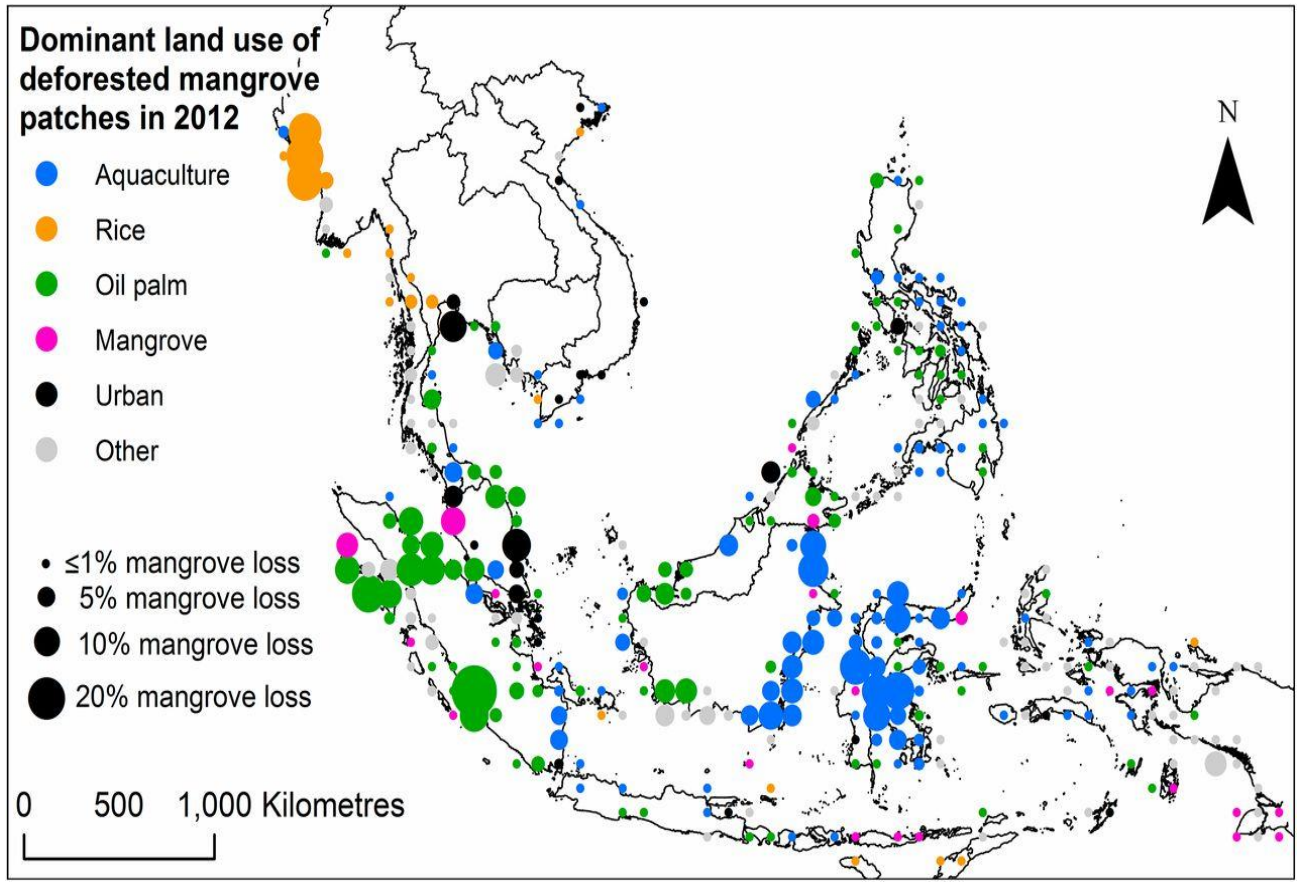
Mangrove cover trend in Southeast Asia

Global Cover: 14.7 M ha

Loss rate: 21,200 ha

Source: Friess et al (2026); FAO (2020); Bunting et al (2018); Gevaña et al 2024, ACB

Mangrove Deforestation Hotspots

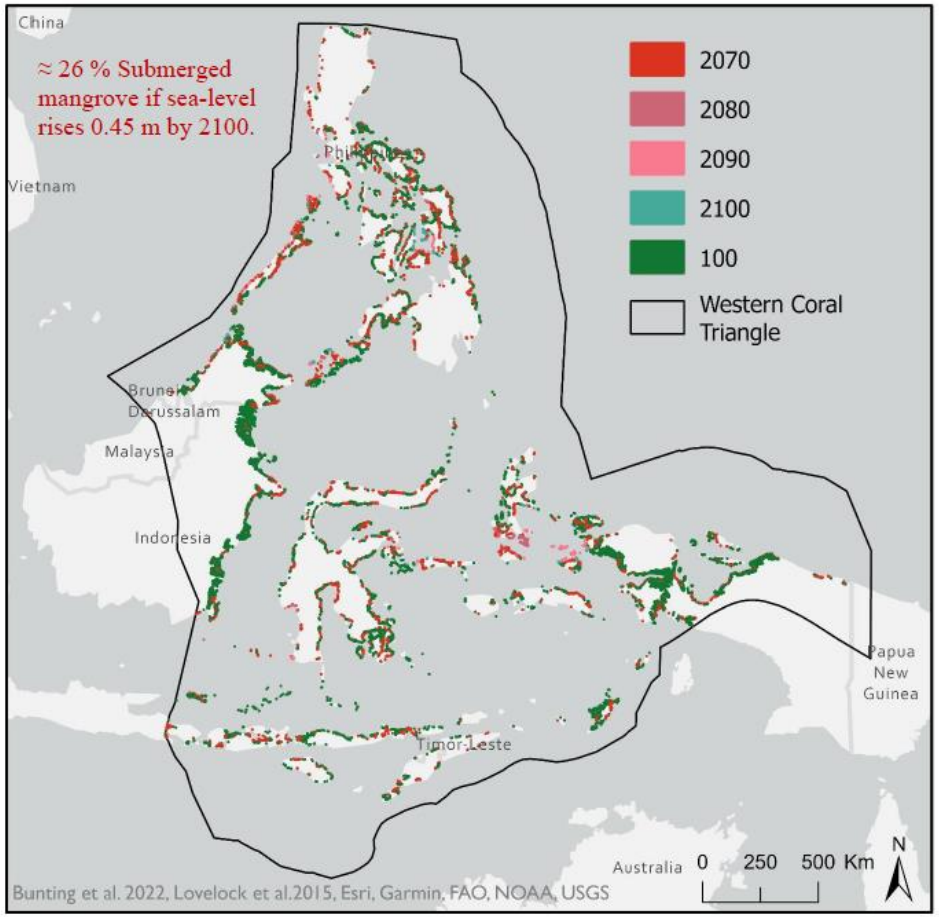


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Mangroves of the Western Coral Triangle VU

Donald J. Macintosh[1,2], Ena L. Suárez[3], Severino G. Salmo III[4], Dixon T. Gevaña[5], Frida Sidik[6], I Wayan Eka Dharmawan[6], Maeve Nightingale[7] & Marcos Valderrábano[3]



Ref: Richards and Fries (2016), Macintosh et al (2013)

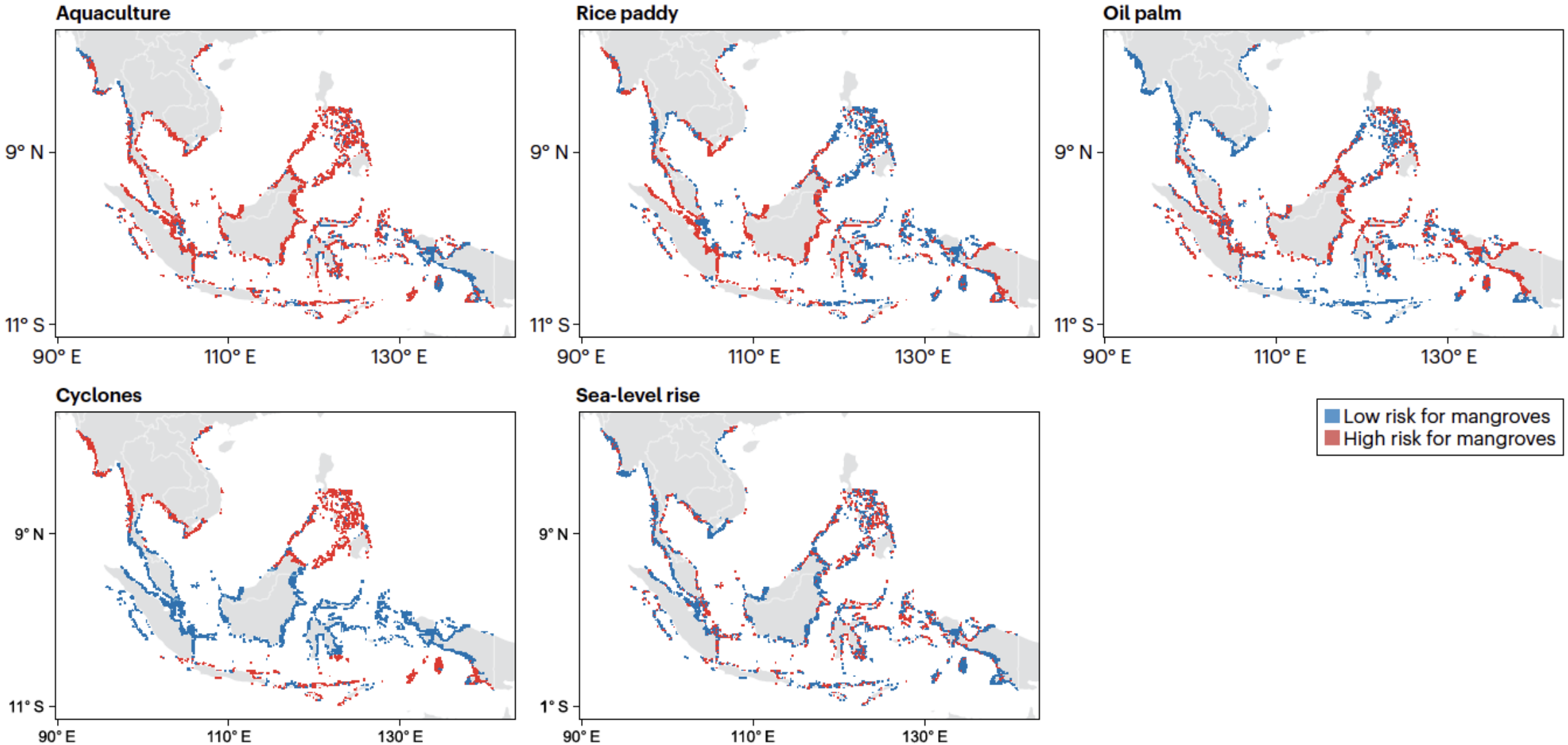


Fig. 4 | Projected future land use and climate change risks to carbon permanence in Southeast Asia's mangroves. Mangrove blue carbon resources in Southeast Asia will continue to face a range of stressors in the future, including threats related to direct anthropogenic land use conversion (for example, aquaculture, rice paddy and oil palm) or climate change-linked stressors (such as increased cyclone activity and sea-level rise)[104].

Source: Friess et al (2026)

Table 2 | Barriers currently constraining blue carbon implementation in Southeast Asia, and ongoing or proposed solutions to address them

Category	Barrier	Solutions and examples to build on
Unclear national policies and conditions	Conflicting government mandates	Cross-government mangrove management committees to coordinate amongst Ministries and Agencies, such as the National Blue Carbon Action Partnership (Philippines and Indonesia), the National Mangrove Working Group Kelompok Kerja Mangrove Nasional (Indonesia)[69] and the former Peatland and Mangrove Restoration Agency (Indonesia)
	Few enabling policies	Creation of national mangrove policies and regulations such as the Roadmap and National Action Plan of Blue Carbon Ecosystem Conservation and Management, and the cross-sectoral National Strategy for Mangrove Ecosystem Management (Indonesia) Creation of national government blue carbon road maps such as in the Philippines[144]
Conflicting national and commercial accounting	Double counting	To avoid double counting between national carbon accounts and (internationally sold) commercial carbon credits, countries buying or selling carbon credits will have to initiate a Corresponding Adjustment under the Paris Agreement Some countries such as Indonesia[158] and Viet Nam[159] have previously paused carbon credit sales, although this creates regulatory uncertainty in markets The creation of new domestic carbon markets in Indonesia and Thailand minimizes the sale of carbon credits overseas Examples of legislation and regulation to address double counting exist in the region, such as Decree No. 112/2026/NĐ-CP and Decree No. 180/2026/NĐ-CP Art. 9 (Viet Nam)
	Management responsibility	Clear policies and regulations are required on carbon ownership and management responsibilities between the state and commercial companies or landowners; e.g., carbon rights are not defined explicitly in Viet Nam, but the owner of the emission reduction is formally recognized by relevant stakeholders (Decree No. 180/2026/NĐ-CP Art. 3.4)
Unclear local policies and conditions	Conflicting policy objectives	Unified local policies will help create local enabling conditions for blue carbon projects Establishment of subnational coordination in blue carbon ecosystem conservation and management under the Blue Carbon Roadmap and National Action Plan (Indonesia)
	Poor benefit sharing	Requires national-level regulations that clearly define benefit-sharing arrangements, such as Decree No. 180/2026/NĐ-CP and Decree No. 107/2022/NĐ-CP (Viet Nam) or DENR Administrative Order 2026-05 (the Philippines) Guidelines exist that prioritize equitable and transparent benefit sharing in blue carbon projects[191]
	Low stakeholder participation	In many countries, several laws already exist that should ensure community involvement in decision-making[168,169] Increased community participation and management is essential for successful blue carbon management in Southeast Asia[220], and guidelines exist that prioritize blue carbon projects with clear community inclusion[191,221]
	Low enforcement capacity	Stronger funding and support needed from national levels[221]

Source: Friess et al (2026)

Table 2 | Barriers currently constraining blue carbon implementation in Southeast Asia, and ongoing or proposed solutions to address them

Category	Barrier	Solutions and examples to build on
Unclear land tenure and carbon rights	Unclear land ownership	Agrarian reform initiatives such as the Social Forestry Program (Indonesia)[172] or the Community-based Forest Management Policy and One-Tenure Policy (Philippines) provide stronger decentralized land rights Customary rights can be mapped and valued within land ownership agreements
	Benefit-sharing challenges	Requires national-level regulations that clearly define benefit-sharing arrangements, such as Decree No. 180/2026/NĐ-CP (Viet Nam) Guidelines exist that prioritize equitable and transparent benefit sharing in blue carbon projects[191]
	Unclear carbon ownership	Legislation is required that clarifies carbon ownership in coastal lands, such as DENR Administrative Order 2026-05 (the Philippines) Legislation can decouple carbon rights from land/property ownership
Financial barriers	Monitoring, reporting and verification	Several start-up companies have been established in the region that promise to reduce costs through remote sensing and AI of mangrove blue carbon[222,223] Some commercial blue carbon credit methodologies such as Isometric have introduced more flexible data requirements Create region-specific modelling approaches to carbon credit verification, as is done in Australia[178]
	Opportunity costs	Stacking or bundling multiple ecosystem service credits may raise the total price of a credit above the opportunity cost of an alternative land use
	Restoration costs	Stacking or bundling multiple ecosystem service credits may raise the total price of a credit above the restoration cost of a project Improved technology for restoring and monitoring mangrove forests (e.g., drones) may reduce some costs under some circumstances
	Low carbon credit price	Stacking or bundling multiple ecosystem service credits may make the total credit price more financially viable Laws or market regulations can force minimum credit prices, e.g., Decree No. 180/2026/NĐ-CP Art. 7 (Viet Nam) Blended finance models may help make projects financially viable[182,224]
Capacity gaps	Carbon measurements	Several blue carbon manuals now exist Several groups undertake national and regional trainings for blue carbon methodologies
	Project development	Groups such as the International Blue Carbon Institute (based in Singapore) have been established to provide capacity building for project developers The Singapore government has supported Accelerator and Innovation Challenges to support project development[225]
	National accounting	Groups such as the International Blue Carbon Institute (based in Singapore) have been established to provide capacity building for national governments Several guidance documents exist to provide guidance for the inclusion of blue carbon in NDCs Some countries have established research programmes to support data collection for NGHGIs, such as the Marine Climate Change Science (MCCS) Programme/BlueCarbonSG (Singapore)

Source: Friess et al (2026)

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

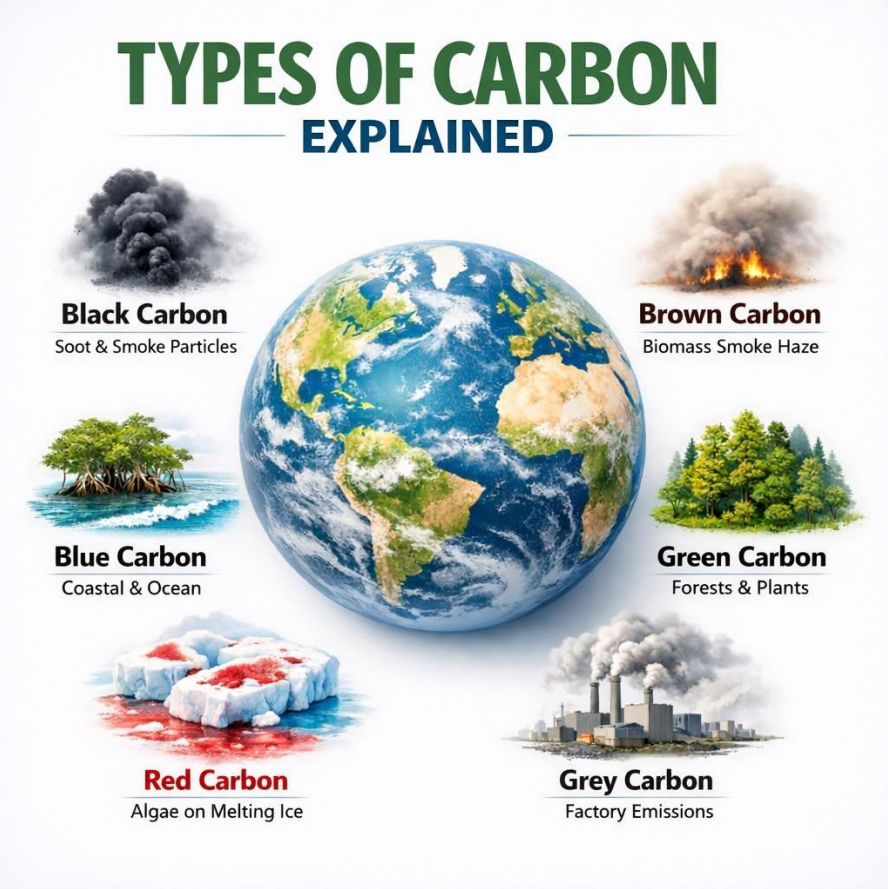
- wrong choice of species for planting
- lack of labor and resources, and inappropriate use of financial resources
- costly reforestation on bare beaches and integration with human-made fish reefs
- low survival rate of seedlings
- planting malpractice - seafront and seagrass planting
- space unavailability
- 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

II.A. Mangroves and Climate Change (Blue Carbon Powerhouse)

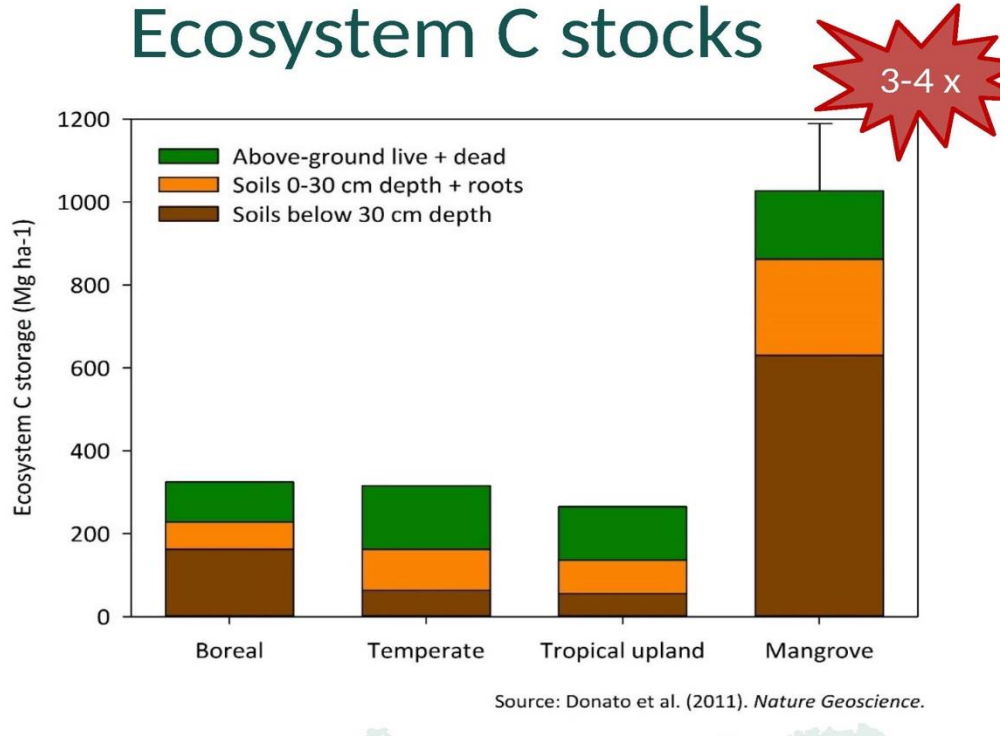
Blue Carbon

Carbon sequestered, stored and released from coastal ecosystems namely: salt marsh, seagrass meadows and mangroves

(IUCN, 2012)



Source: SDG Talks / Syntrain



Cited by: Murdiyarso (2017)

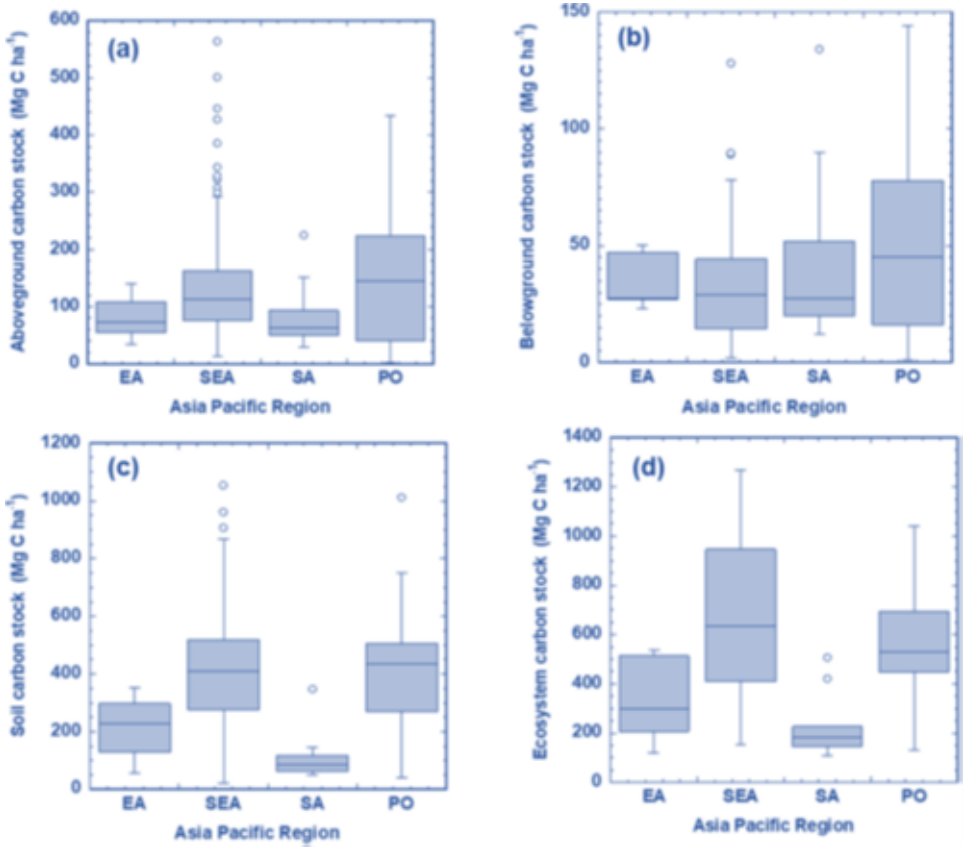


Figure : (a) aboveground carbon stocks, (b) belowground carbon stocks, (c) soil carbon stocks, and (d) ecosystem carbon stocks in the Asia-Pacific region (EA: East Asia, SEA: Southeast Asia, SA: South Asia and PO: Pacific Ocean).

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

Carbon stock range: 109 and 1269 Mg C ha^{-1}

Richest blue carbon stocks in SEA

nature reviews earth & environment https://doi.org/10.1038/s43017-026-00838-3

Review article Check for updates

Mangrove blue carbon in Southeast Asia

Daniel A. Friess[1], Radhika Bhargava Gajre[2], A. Aldrie Amir[3], Virni B. Arifanti[4], Toe Aung[5], Preeyaphat Chaiklang[6,7], Dixon T. Gevaña[8], San San Htay[9], Soon Loong Lee[10], Kay Khaing Lwin[11], Domingos Mook[12], Chhinh Nyda[13], Uday Pimple[14], Jay Mar D. Quevedo[15], Severino G. Salmo III[16], Sigit D. Sasmito[17,18], Zoë I. Shribman[1], Frida Sidik[4], Hien Thuc Trinh[19,20], Truong Van Vinh[21], Tuan Quoc Vo[22] & Zhen Zhang[1]

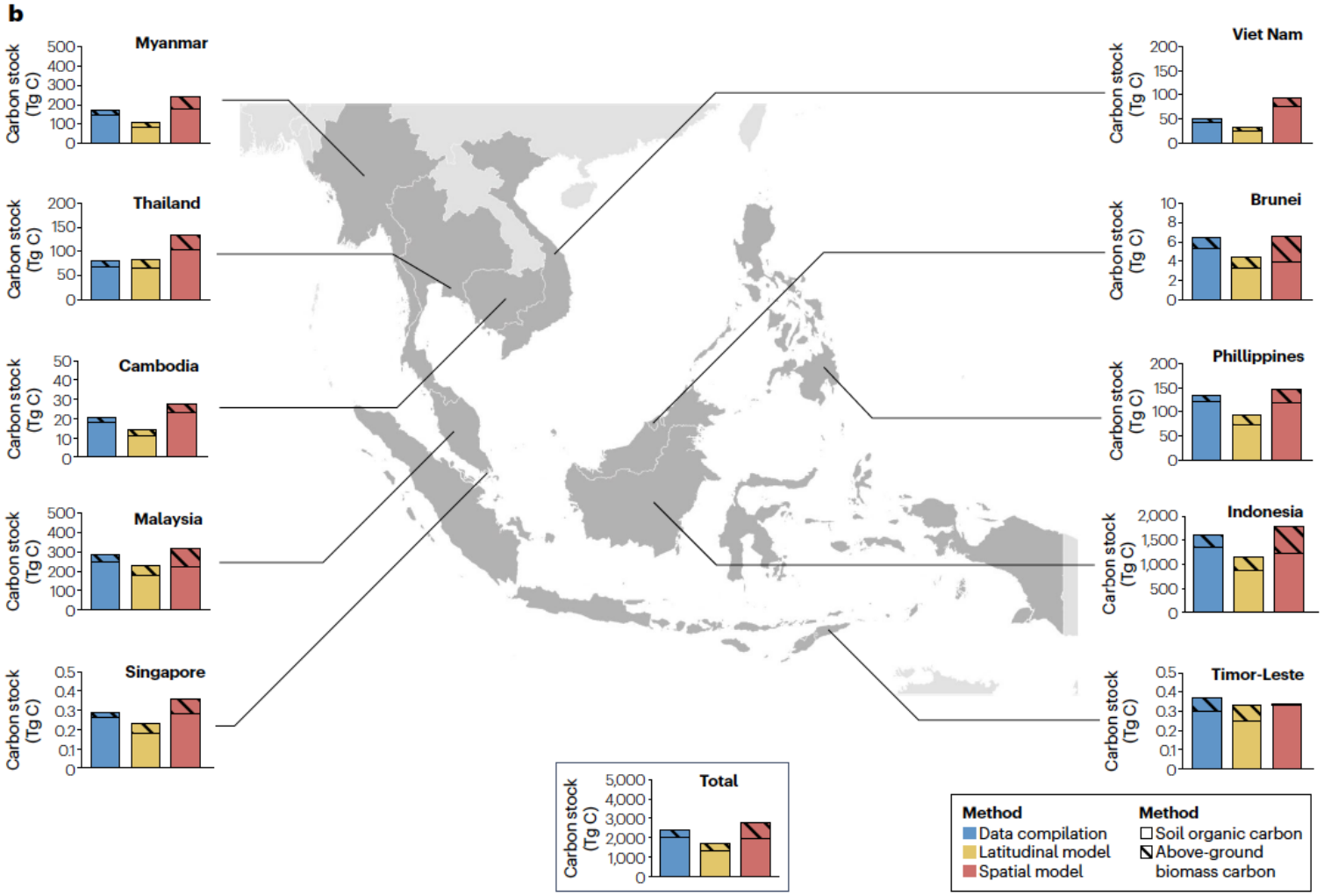


Fig. 3 | Status of mangroves in Southeast Asia and their blue carbon stocks. **a**, Mangrove extent in most countries in Southeast Asia has either stabilized or increased from 2000 to 2010, compared with historical deforestation[11]. **b**, Mangrove carbon stocks in Southeast Asia vary per country, by method of estimation, and whether derived from the compilation of various data[47], latitudinal models[29] or spatial models[26,36]. Shown here are global assessments of mangrove carbon stocks, which allows methodological comparability between countries, although it should be acknowledged that country-specific data might be more accurate.

Mangrove conservation in Southeast Asia can avoid 13.53 Tg CO2e per year of emissions from land use change

And sequester 0.96 Tg CO2e per year through restoration.

This could solve only 1.2% of the SEA net annual emission in FOLU sector (~1200 Tg CO2e per year)

Combined terrestrial and coastal forest restoration must be done.

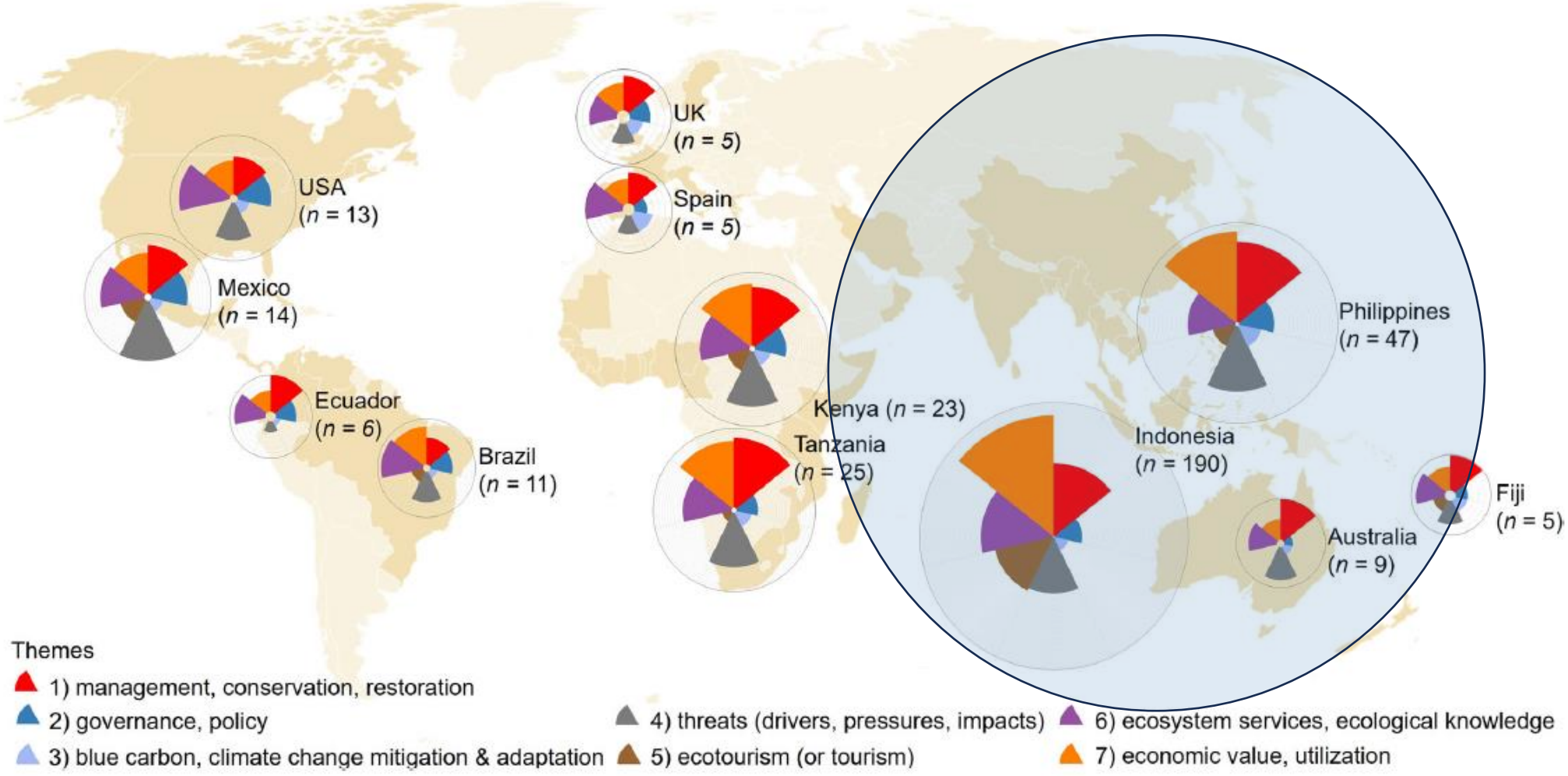


Fig. 4 Top two countries with the highest number of publications per continent, illustrating the frequency of each theme studied

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

II.A. Mangroves and Climate Change (Coastal shields)

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THE WRAP

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MIDDLE EAST

SAKSIKA Mannuel
GAYA HID

DISASTER RECOVERY

A town saved by mangroves

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

When Haiyan struck, Palompon faced storm surges of up to 3.6 meters high. The highest structures in the town's shoreline were only 2 stories (approximately 6.6 meters) tall.

A mangrove plantation, located in an island a few hundred meters from the shoreline buffered the full impact of the waves.

"The mangroves saved us," Oñate said.



Five (5) countries in SEA made it to the Top 20 in the World Risk Index 2026

	RANK	COUNTRY	WORLDRISKINDEX	EXPOSURE	VULNERABILITY	STORM-RISKINDEX	STORM-RISKRANK
√	1	Philippines	46.69	40.76	53.49	69.27	1
	2	India	44.97	40.83	49.54	11.99	14
√	3	Indonesia	44.63	39.78	50.08	11.69	15
	4	Colombia	39.80	31.59	50.14	10.88	17
	5	Mexico	39.18	50.69	30.28	47.40	2
√	6	Myanmar	37.51	22.44	62.70	13.39	13
	7	Mozambique	30.92	14.69	65.09	13.72	12
	8	Russian Federation	30.58	28.37	32.97	8.86	23
	9	China	29.54	71.06	12.28	30.38	6
	10	Somalia	29.12	11.94	71.00	0.84	71
	11	Honduras	27.68	21.89	34.99	10.04	18
	12	Papua New Guinea	27.64	21.20	36.04	2.33	53
	13	Pakistan	27.03	13.91	52.53	2.99	50
	14	Bangladesh	25.70	15.91	41.51	11.18	16
	15	Yemen	25.18	9.36	67.75	0.82	77
√	16	Viet Nam	24.83	26.12	23.60	8.82	24
	17	United States of America	24.17	39.78	14.69	29.29	8
	18	Madagascar	24.16	19.10	30.57	44.99	3
	19	Japan	22.69	43.35	11.88	31.78	5
	20	Nicaragua	22.63	22.79	22.48	7.67	28

Ref: Bündnis Entwicklung Hilft / IFHV (2020): WeltRisikoBericht 2020. Berlin: Bündnis Entwicklung Hilft.

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



ALJAZEERA News Middle East Explained Opinion Sport Video

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.

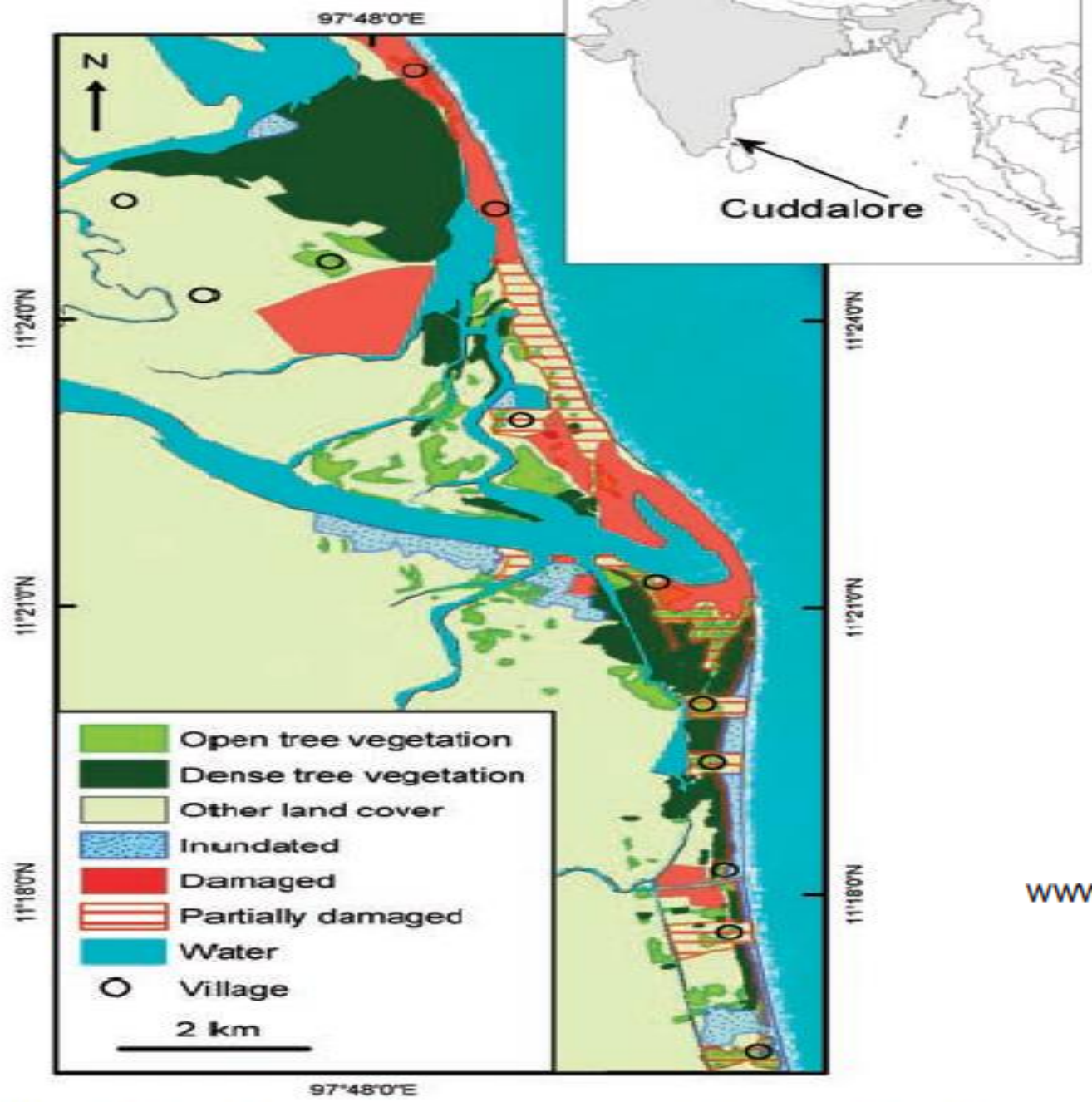
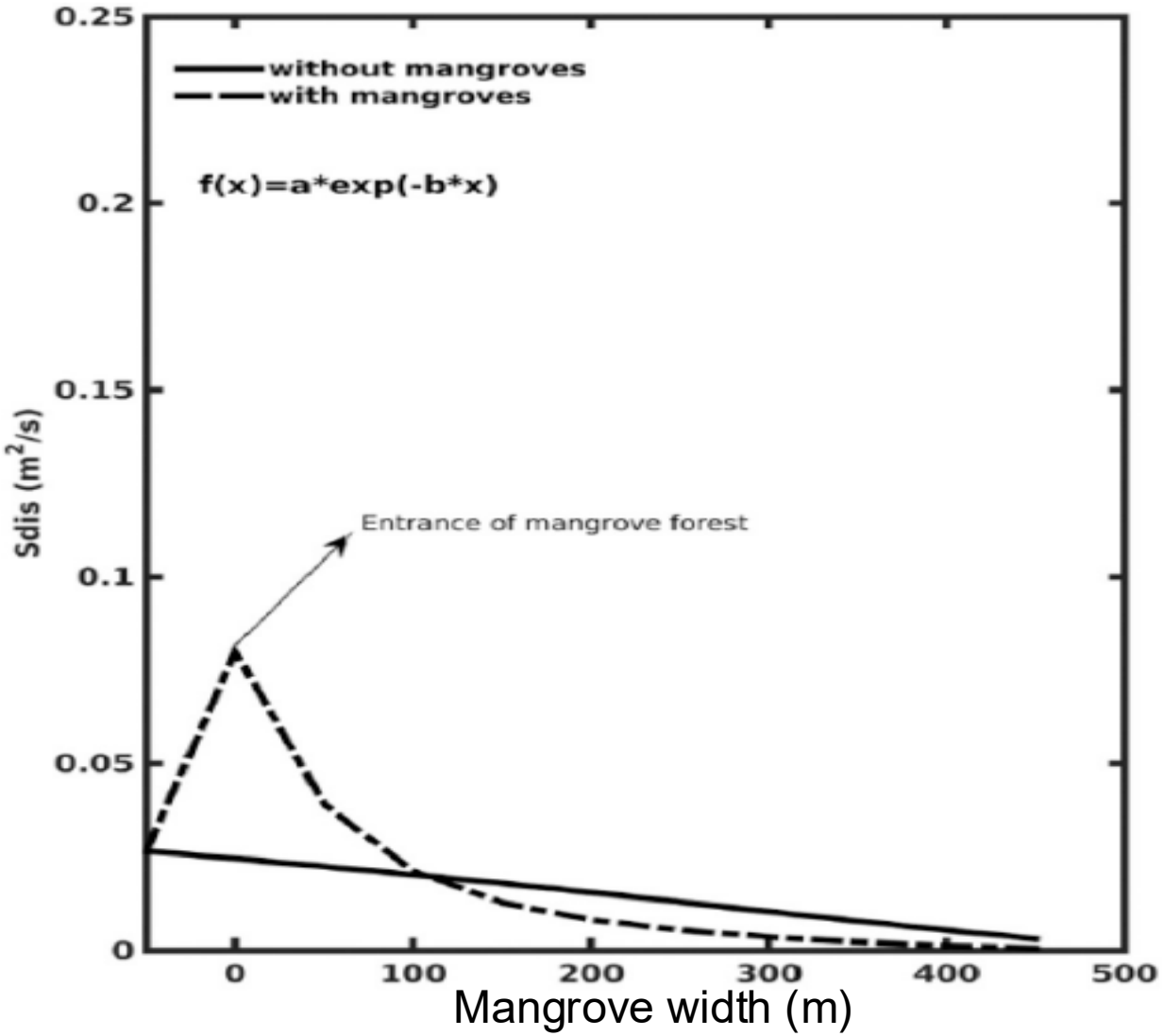


Fig. 1. Pre-tsunami tree vegetation cover and post-tsunami damages in Cuddalore District, Tamil Nadu, India.

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

The International Journal of Ocean and Climate Systems
2017, Vol. 8(3) 126–134
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Wave attenuation in presence of mangroves: A sensitivity study for varying bottom slopes

Parvathy K G and Prasad K Bhaskaran

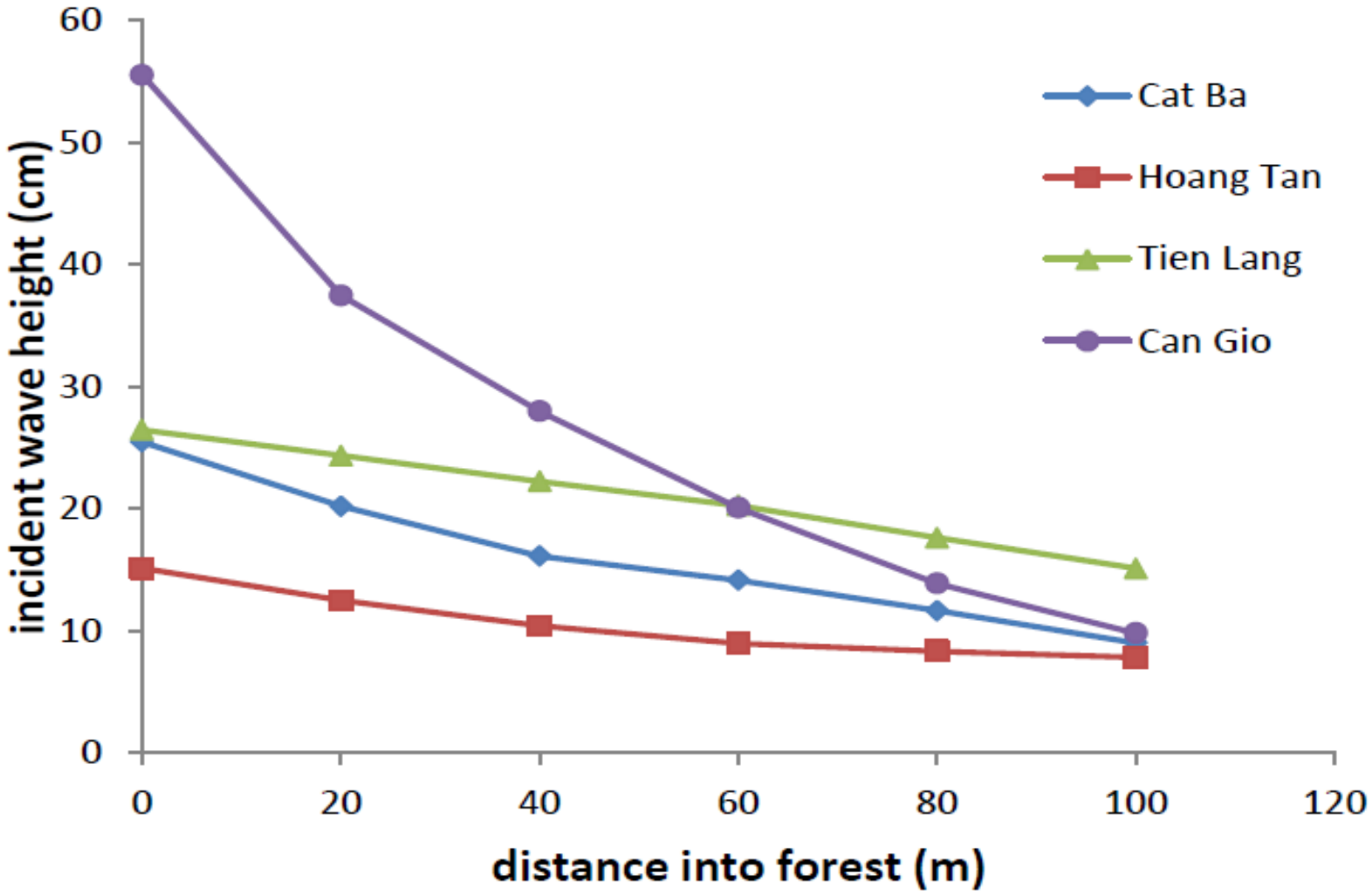
Abstract

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).

III. Saving mangroves, working together, benefiting people:
Interdisciplinary to Transdisciplinary Approach to Mangrove Management

Integrate

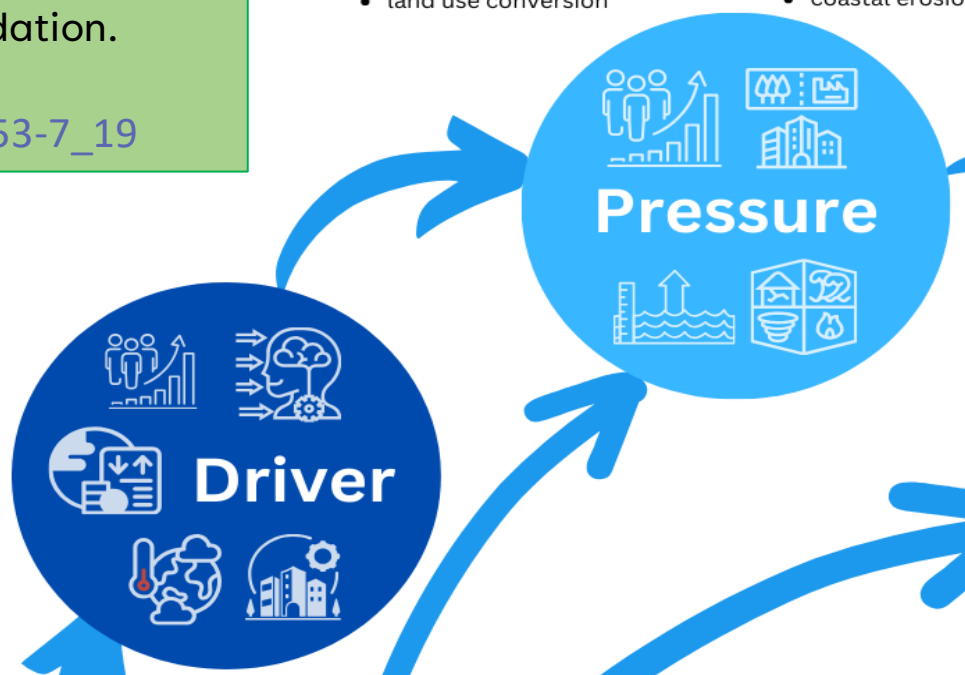
Co-create

Innovate

Advocate

Understanding the root causes of mangrove deforestation in Southeast Asia

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

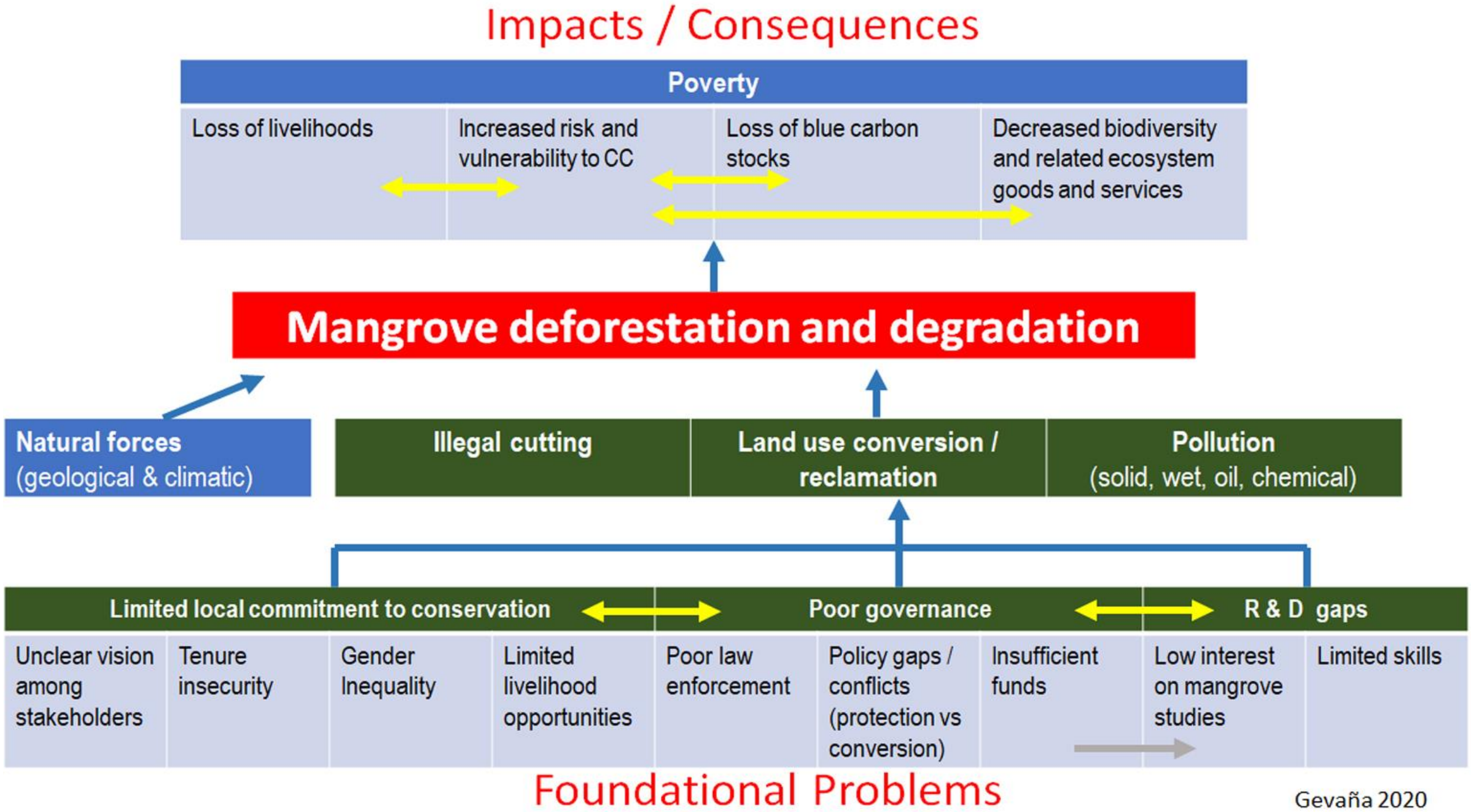
- Deforestation
- Degradation
- Biodiversity loss

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


Impacts / Consequences
Poverty
Loss of livelihoods
Increased risk and vulnerability to CC
Loss of blue carbon stocks
Decreased biodiversity and related ecosystem goods and services
Mangrove deforestation and degradation
Natural forces (geological & climatic)
Illegal cutting
Land use conversion / reclamation
Pollution (solid, wet, oil, chemical)
Limited local commitment to conservation
Poor governance
R & D gaps
Unclear vision among stakeholders
Tenure insecurity
Gender Inequality
Limited livelihood opportunities
Poor law enforcement
Policy gaps / conflicts (protection vs conversion)
Insufficient funds
Low interest on mangrove studies
Limited skills
Foundational Problems
Gevaña 2020

Philippines

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Regional Studies in Marine Science

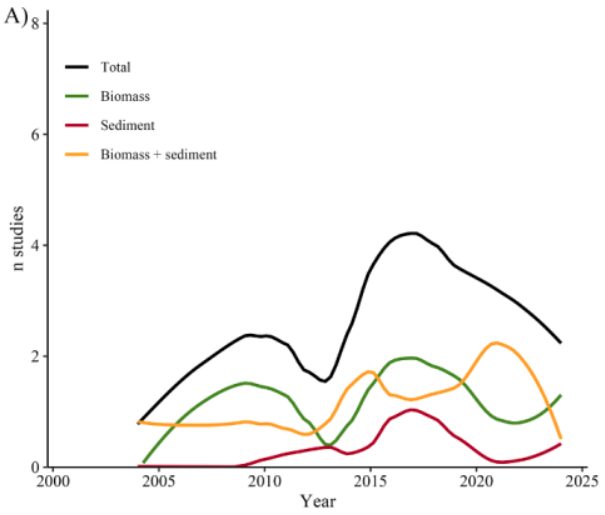
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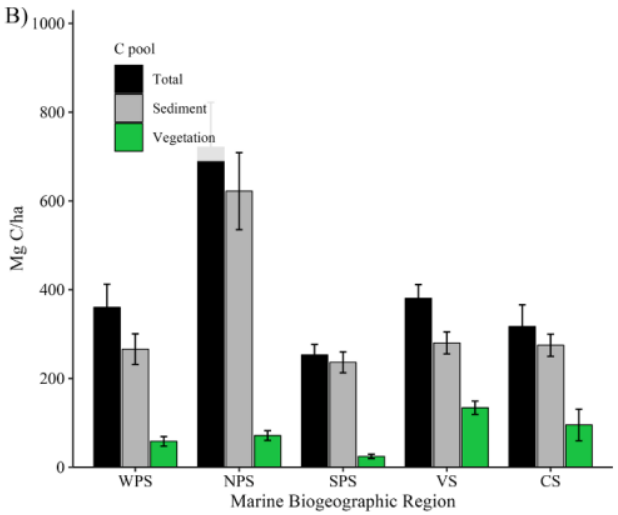
State of the Philippine mangroves: A review on current status and recommendations for achieving biodiversity and "blue carbon" targets

Severino G. Salmo III [a,*], Maria Elisa B. Gerona-Daga [b], Dixon T. Gevaña [c]

[a] Institute of Biology, University of the Philippines Diliman, Quezon City, 1101, Philippines
[b] Department of Biology and Environmental Science, University of the Philippines Tacloban, Tacloban City, 6500, Philippines
[c] Department of Social Forestry and Forest Governance, College of Forestry and Natural Resources, University of the Philippines Los Baños, Laguna, 4030, Philippines

Average BC stocks:
406.29 ± 51.34 Mg C/ha





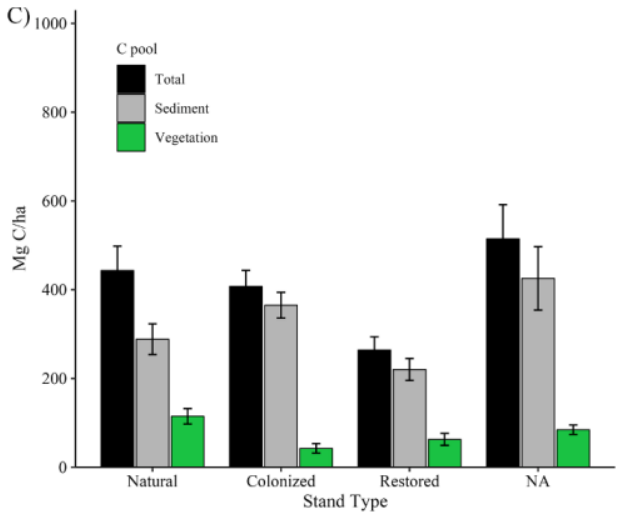
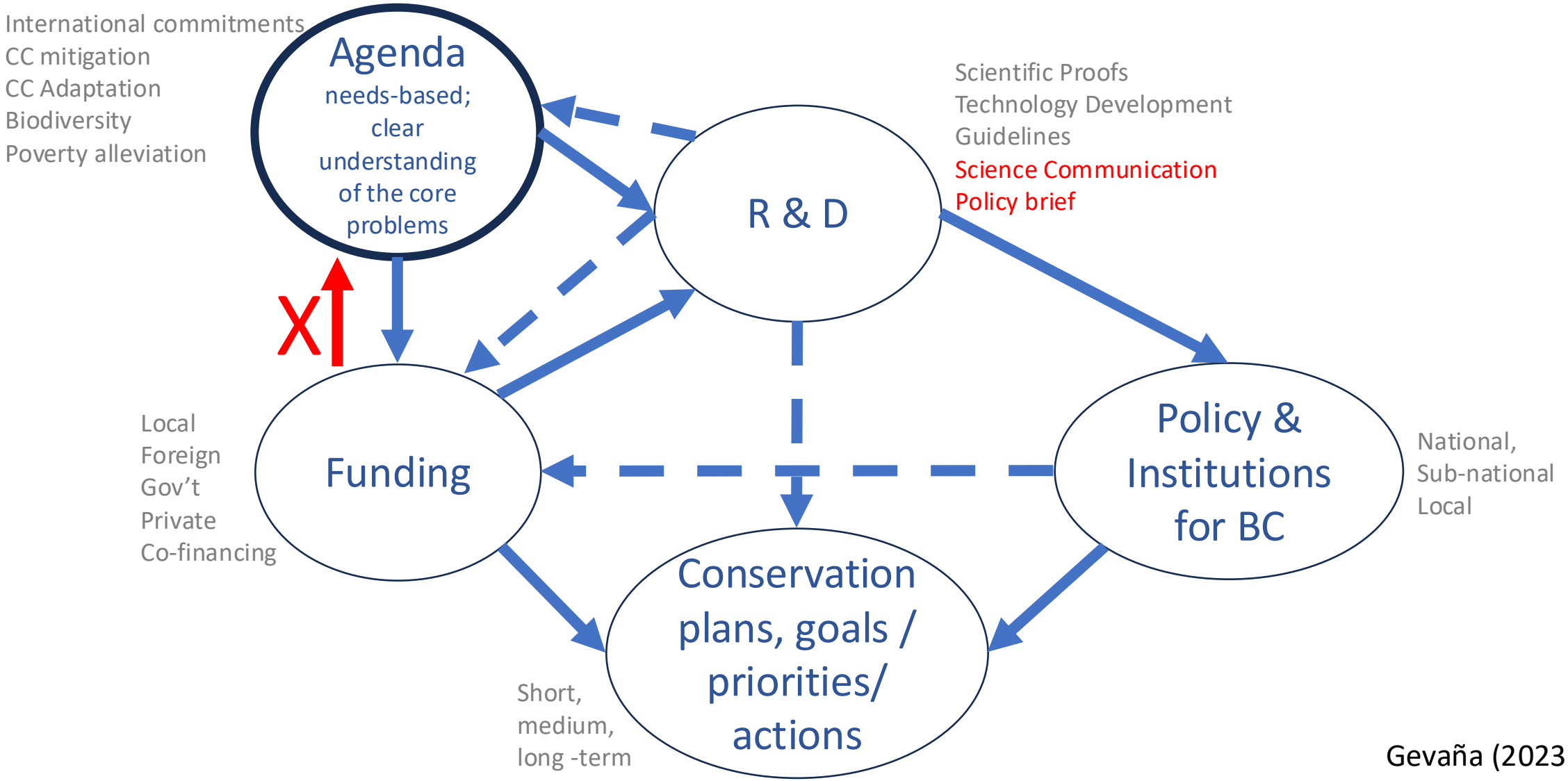


Table 1
Summary of the targets, best practices, and challenges in Philippine NBSAPs and recommendations for the next revision in response to the needs for the biodiversity and blue carbon targets for Philippine mangroves.

Title/ Implementation Year	Philippine Biodiversity: An Assessment and Action Plan (1997)	Philippine Biodiversity Conservation Priority-Setting Program (2000)	Philippine Biodiversity Strategy and Action Plan (2015–2028)	NBSAP v4 (adapted from the Kunming-Montreal Global Biodiversity Framework; 2025)
Authors/ Convenors	DENR, UNEP	DENR-PAEB, CI-PH, UP CIDS	DENR-BMB, GEF, FPE, UNDO	DENR-BMB
Main targets	• Expand biodiversity knowledge, • Enhance conservation efforts, • Formulate integrated policies and legislative frameworks, • Strengthen capacity for implementation, • Mobilize IECs, • Advocate strong international cooperation	Harmonize research with conservation needs, Strengthen PAs, Institutionalize biodiversity corridors, Develop a national constituency for biodiversity conservation	1) Develop a comprehensive ecosystem-based framework focusing on thematic areas, 2) Establish conservation targets and indicators to address and reduce pressures to biodiversity, Highlight best practices of local communities and different sectors	1) Integrate biodiversity in all policies, regulations, planning and development, EIA, and national accounting 2) Eliminate/reform incentives and subsidies that are harmful for biodiversity 3) Strengthen capacity-building and development, Promote innovations 4) Promote innovations and scientific cooperation, 5) Ensure that decision makers, practitioners, and the public are well-informed with the best available data, Ensure effective mechanism for planning, monitoring, reporting, and review
Best practices	Institutionalized and gained support from executive administration through Malacanang Order No. 289	1) Reassessed and updated biogeographic regions 2) Identified biodiversity corridors, Developed a map depicting the Philippine Biodiversity Conservation Priorities	1) Adapted Multilateral Environmental Agreements (MEAs) into its targets 2) Provided a cost analyses (w/ policy and governance frameworks) Drafted a comprehensive implementation plan (institutional scheme, M&E, data management)	
Challenges	1) Lack of implementing mechanism for tasking, funding source, institutional arrangement, monitoring scheme 2) Inadequate capacity for implementation Lack of geographically specific priorities	1) Lack of clear-cut monitoring and information mechanisms 2) Lack of involvement and capacitation from LGUs and communities Lack of coordination between agencies and other proponents to address overlaps and conflicting actions	1) Lack of regular data updating and management (Phil-CHM lacks systematic and standardized data) No reports if targets have been met, lack of reporting of indicators	1) Conflicting / overlapping priorities among decision makers 2) Lack of capacity to facilitate regular M&E 3) Lack of coordination between stakeholders 4) Lack of baseline data Lack of funding towards innovations, new technologies

Mangrove plans and programs must be responsive to clear (science / evidenced-based) agenda.



Gevaña (2023)

i. Integrate

Interdisciplinary Approach

Experts / specialists (of various fields / discipline) coming together to describe the problem/s, combining their methods, ideas, and knowledge to solve a multi-faceted, dynamic and complex problem/s.

Key People in Mangrove Conservation Planning / Policy Development:

1. Ecologist / Forester
2. Marine Scientist
3. Hydrologist
4. Climate Scientist
5. Economist / Finance Specialist
6. Sociologist / Anthropologist
7. Governance / Policy Analyst
8. Livelihood and Entrepreneur Specialist
9. Agriculturist / Fisheries Specialist

Others: Soil scientist, entomologist, Civil Engineer

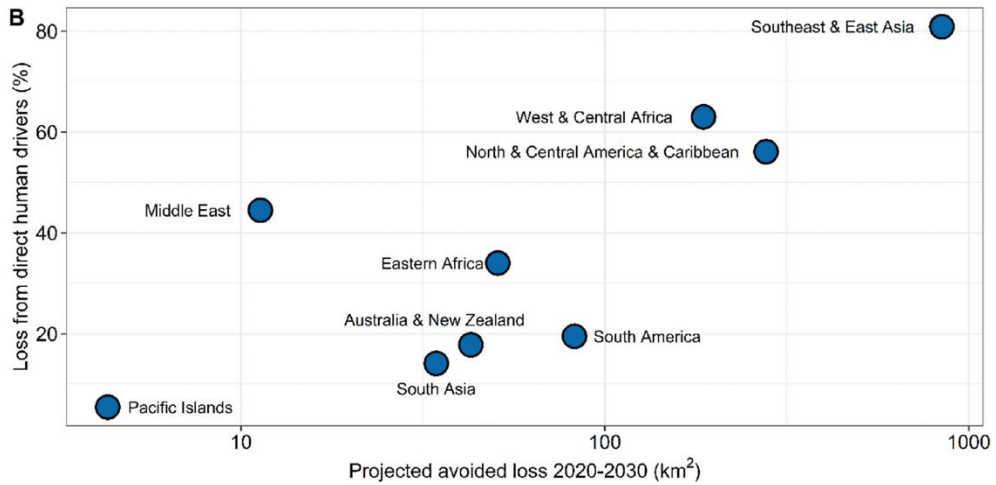
Ambio
https://doi.org/10.1007/s13280-026-02481-0

KUNGL. VETENSKAPS-AKADEMIEN
THE ROYAL SWEDISH ACADEMY OF SCIENCES

PERSPECTIVE

Ambitious goals for global mangrove conservation and restoration

Mark D. Spalding, Steven W. J. Canty, Christopher J. Brown, Fernanda Achete, Gabin Agblonon, Khalid Hamid Ahmed Mohammed, Syed Ali Mohamed, Nessrine Alzahlawi, Virni B. Arifanti, Sreejith Kalpuzha Ashtamoorthy, Apri Susanto Astra, William E. N. Austin, Salomão O. Bandeira, Daniel T. I. Bayley, Mark A. Beeston, Ignace Beguin Billecocq, Sophie L. P. Benbow, Jewel N. Beneby, Nimai Bera, Anete Berzina-Rodrigo, Punyasloke Bhadury, Rebeca Biancardi Aleu, Nadia Desiree Bood, Wilder J. Borrero Avellaneda, Pete Bunting, Annadel S. Cabanban, Miguel Cañedo-Argüelles, Gustavo A. Castellanos-Galindo, Benjamin Christ, Alvise Dabalà, Craig Dahlgren, Ajanta Dey, Mauricio Diazgranados, Maria C. Diazgranados, Cheryl L. Doughty, Clare Duncan, Valentine Ebua, Melanie M. Esch, Lola Fatoyinbo, Andrés Fraiz-Toma, Daniel A. Friess, Samir Raj Gandhi, Dixon T. Gevaña, Anwesha Ghosh, Ajay Raghunath Govale, K. Anggi Hapsari, R. Taufan Harisam, Jorge A. Herrera-Silveira, Amandine Hersant, Lammert Hilarides, Jennifer F. Howard, Muhammad Ilman, Rashema T. Ingraham, Loureene A. Jones, Vinaya Kozhapalli, Emily C. Landis, Marice Leal, Miao Li, Kate E. Longley-Wood, Catherine E. Lovelock, George W. Maina, Orion S. McCarthy, Laura A. Michie, Nicolas Moity, Julio Montes de Oca, José F. Moreira-Ramírez, Hannah K. Morrissette, Brad Oberle, Samuel Appiah Ofori, Francis A. Okalo, Maria Josella M. Pangilinan, Shrutika Parihar, Jaime Polania, Fernanda T. Ramírez-Aguilera, Juan J. Robalino, Kristina L. Rodriguez, Stefanie M. Rog, Farhah N. Rosli, Christopher Roy, Mohammad Rozaimi, Nirupama Saini, Severino III G. Salmo, Jude Ikenna Samuelson, Behara Satyanarayana, Dharmendra G. Shah, Nirmal Shah, Christine C. Shepard, Christopher Sheridan, Krista D. Sherman, Frida Sidik, Michael Sievers, Jennifer Simonjan, Stefanie Simpson, Heather A. Stewart, Luis Suárez, Jennifer Tabola, Nathan Thomas, Jessica Paula Rose Thorn, Susanna Tol, Mohammad Main Uddin, Alexandra A. E. Valla, Pieter van Eijk, Anuradha Venkatraman, Jaramar Villarreal-Rosas, Jessica Lauren Williams, Dominic C. J. Wodehouse, Linda Wong, Martin Zimmer, Thomas A. Worthington



- **Halt loss.** Reduce mangrove losses driven by direct human actions to zero;
- **Restore half.** Restore mangroves to cover at least half of all recent loss; and to
- **Double protection.** Ensure long-term secure protection of mangroves, doubling where feasible, with a minimum of 30% in all countries (Leal and Spalding 2022).

Table 1 Estimated potential "secured" or "restored" total mangrove ecosystem carbon stock at the regional scale assuming success of the three described Goals. Restored carbon gains are estimated totals 40 years after successful restoration with lower and upper 95% probabilities in parentheses (further details in Supplementary Information)

Region	Halt loss–secured carbon (Mt)	Restore half–secured carbon (Mt)	Restore half–restored carbon (Mt)	Double protection–secured carbon (Mt)
Australia & New Zealand	0.47 (0.23–0.78)	6.70 (6.68–6.72)	0.29 (0.09–0.73)	115.48 (41.98–209.4)
Eastern Africa	0.63 (0.25–1.21)	3.51 (3.50–3.52)	0.43 (0.16–0.75)	55.03 (15.19–120)
Middle East	0.05 (0.02–0.09)	0.61 (0.60–0.62)	0.03 (0.01–0.06)	0.90 (0.35–1.56)
North & Central America & Caribbean	3.50 (0.96–6.54)	12.89 (12.87–12.91)	1.99 (0.93–3.03)	143.27 (31.97–283.83)
Pacific Islands	0.06 (0.03–0.12)	1.26 (1.26–1.27)	0.14 (0.06–0.27)	58.96 (16.95–122.14)
South America	1.32 (0.36–2.67)	9.80 (9.79–9.81)	2.11 (1.29–3.07)	125.40 (26.92–262.8)
South Asia	0.31 (0.18–0.46)	3.32 (3.31–3.32)	0.44 (0.21–0.71)	25.14 (12.16–39.77)
Southeast & East Asia	18.62 (6.29–37.69)	27.37 (27.31–27.42)	16.72 (11.68–22)	481.89 (117.67–1035.23)
West & Central Africa	2.45 (1.33–3.64)	5.88 (5.88–5.89)	1.04 (0.41–1.71)	190.00 (91.04–295.33)
Grand total	27.42 (9.65–53.20)	71.33 (71.19–71.47)	23.2 (14.83–32.34)	1196.07 (354.22–2370.05)



IBCSWG / Singapore / Oct 2023



ASEAN-Korea Cooperation Project (2022)

APN Science Bulletin 10 (1)
www.apn-gcr.org/bulletin

Sustainable mangrove rehabilitation: Lessons and insights from community-based management in the Philippines and Myanmar

Leni D. Camacho [a *], Dixon T. Gevaña [a], Lorena L. Sabino [a], Clarissa D. Ruzol [a], Josephine E. Garcia [a], April Charmaine D. Camacho [a], Thaung Naing Oo [b], Aye Chan Maung [b], K. G. Saxena [c], Luohui Liang [d], Evonne Yiu [d], and Kazuhiko Takeuchi [d]

[a] *University of the Philippines Los Baños, Philippines*
[b] *Forest Research Institute, Myanmar*
[c] *Jawaharlal Nehru University, India*
[d] *United Nations University Institute for the Advanced Study of Sustainability, Japan*
[*] *Corresponding author. Email: ldcamacho@up.edu.ph*

KEYWORDS

Community, Mangrove, Participatory, Sustainable rehabilitation

APN Science Bulletin 7 (1)
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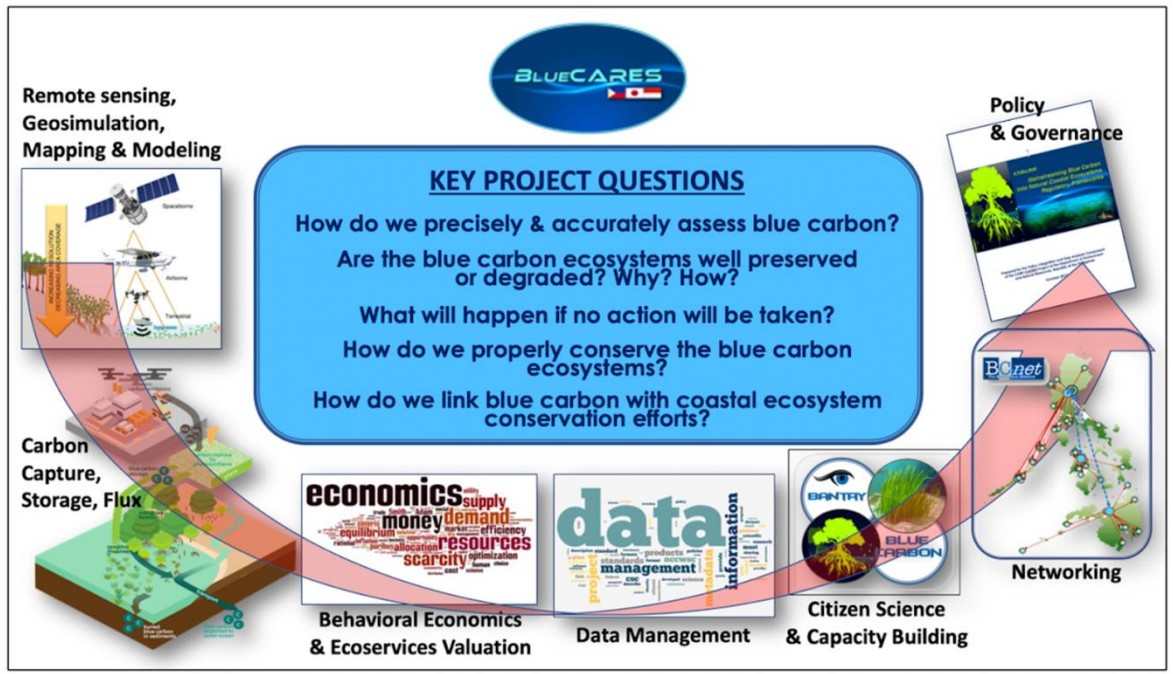
Coastal forest management in the face of global change: Experience of four Asian countries

Luohui Liang[a*], Evonne Yiu[a], Leni D. Camacho[b], Dixon T Gevaña[c], Thaung Naing Oo[d], Chaw Chaw Sein[e], Bixia Chen[d], Yuei Nakama[d], K. G. Saxena[e], Kazuhiko Takeuchi[a] and Akira Nagata[a]

[a] *United Nations University Institute for the Advanced Study of Sustainability(UNU-IAS), Jingumae, Shibuya-ku, Tokyo 150-8925, Japan*
[b] *University of the Philippines Los Baños, Laguna 4031, Philippines*
[c] *Forest Research Institute, Yezin, Nay Pyi Taw, Myanmar*
[d] *University of the Ryukyus, Senbaru, Nishihara, Okinawa, 903-0213, Japan*
[e] *Jawaharlal Nehru University, New Delhi 110067, India*
[*] *Corresponding author. Email: liang@unu.edu*

Carbon Governance In Southeast Asia (CGSEA)



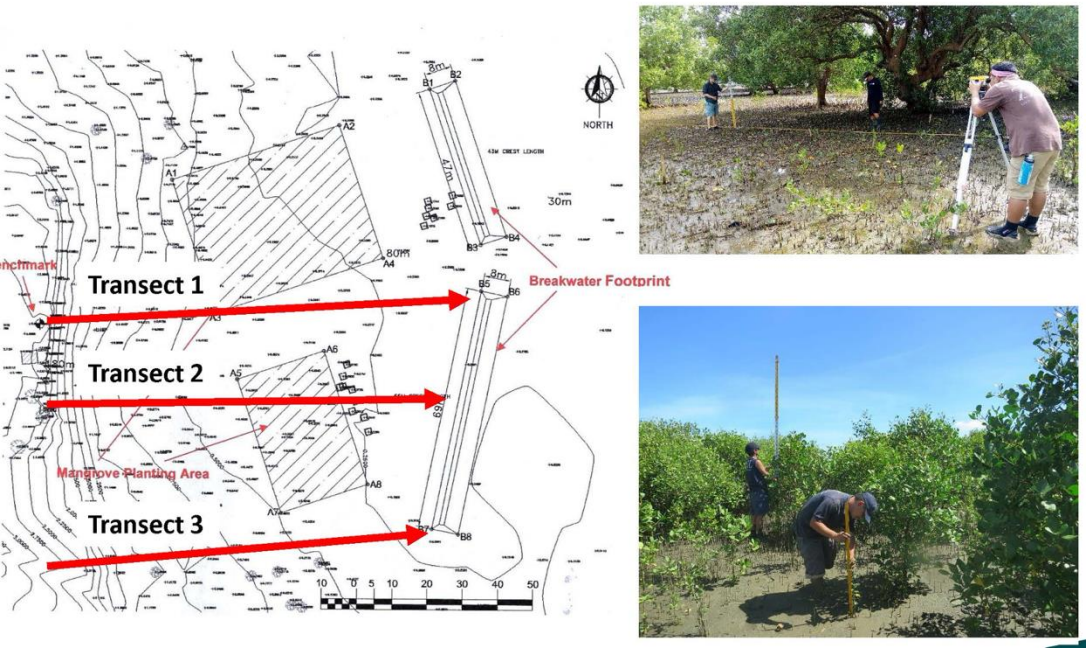




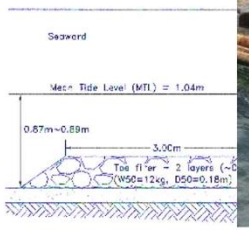


Source Blue Cares; PEMSEA

Monitoring of sediment accretion and mangrove survival and growth

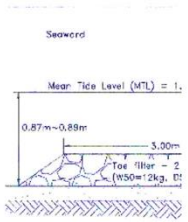


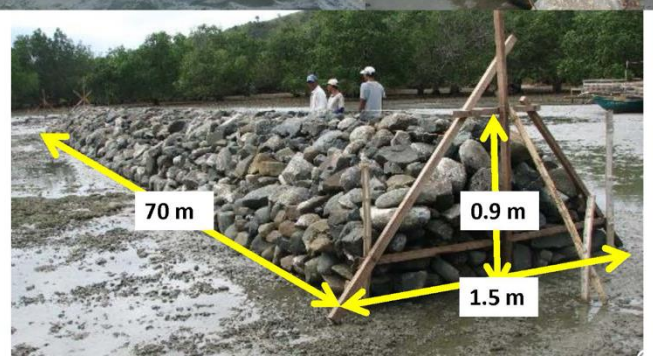
Breakwater design















Successful Green-Gray Mangrove Restoration Story in Ajuy Iloilo
Breakwater Design to address coastal erosion problem
Led by ZSL-Philippines

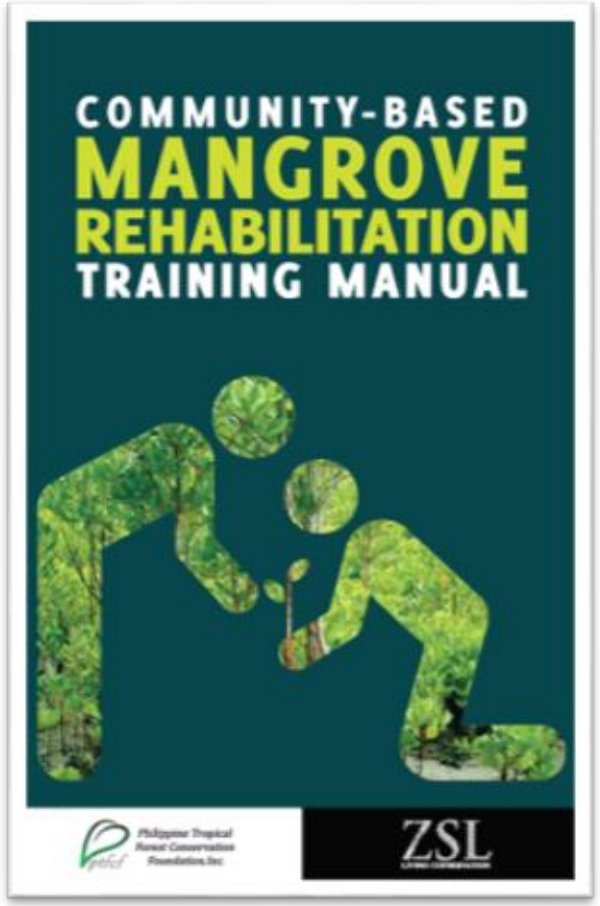
Interdisciplinary Team:

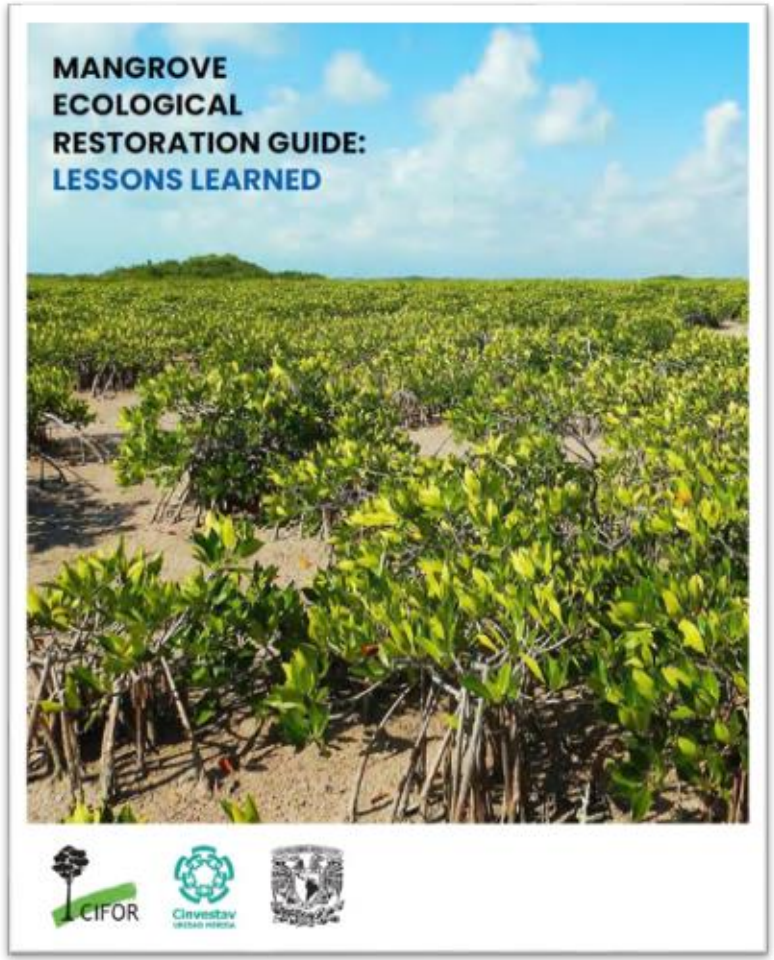
1. Mangrove Ecologists
2. Geodetic Engineer / Civil Engineer
3. Community Organizer
4. Marine Biologists

Ref: Loma (ZSL-Phils)

Technical Guidelines for Effective Mangrove Restoration







Products of interdisciplinary / collaborative works

ii. Co-create

Transdisciplinary Approach

Experts / specialists (of various fields / discipline) working with non-technical (non-academic) people or groups to describe the problem/s, combining their methods, ideas, and knowledge to solve a multi-faceted, dynamic and complex problem/s.

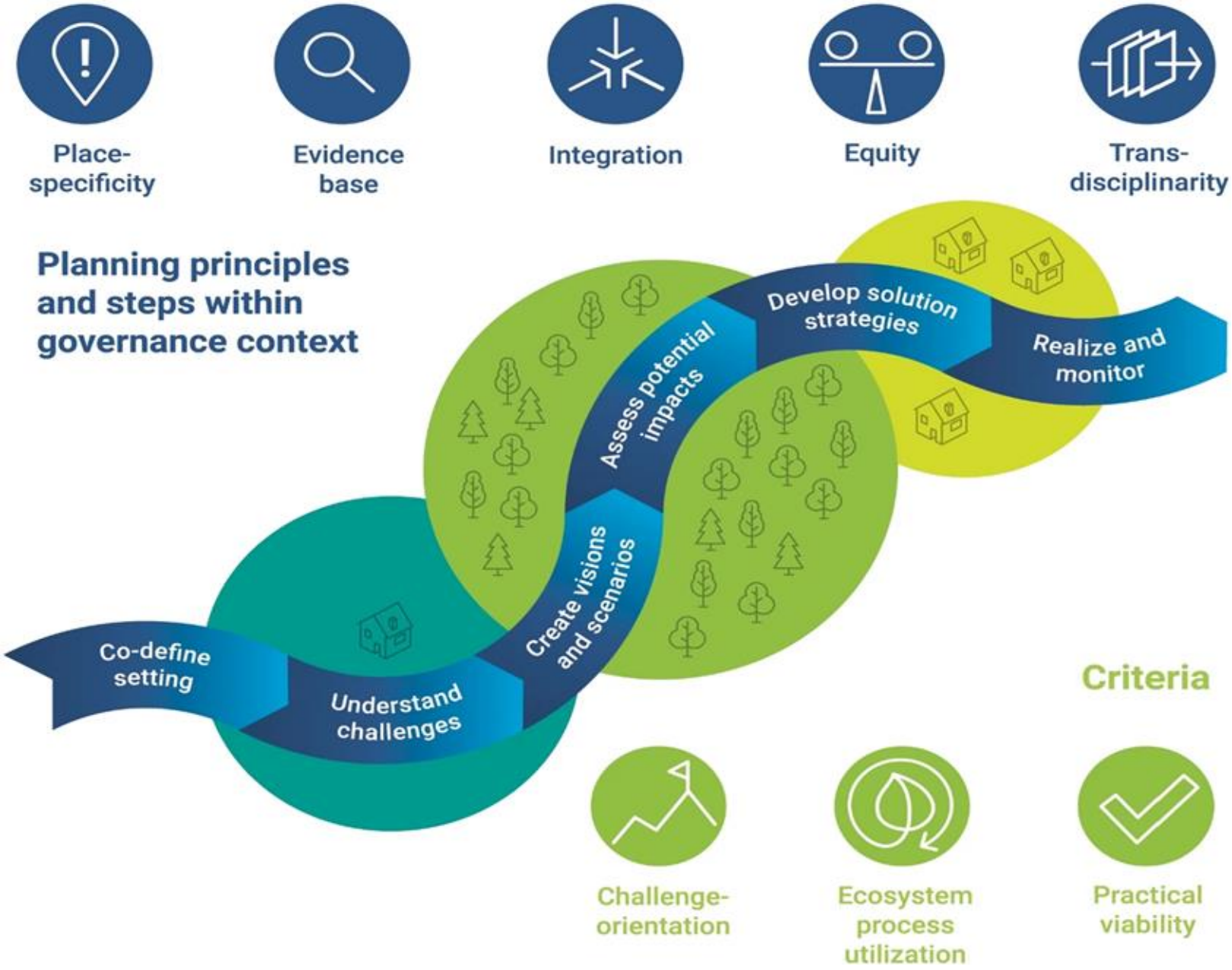
Key People in Mangrove Conservation Planning / Policy Development:

1. Ecologist / Forester
2. Marine Scientist
3. Hydrologist
4. Climate Scientist
5. Economist / Finance Specialist
6. Sociologist / Anthropologist
7. Governance / Policy Analyst
8. Livelihood and Entrepreneur Specialist
9. Agriculturist / Fisheries Specialist

Others: Soil scientist, entomologist, Civil Engineer

With:

1. Local communities / leaders
2. Private sector (including industries)
3. Civil society organizations / NGOs (among the best convenors)
4. Polic-makers



Conceptual framework of principles and steps for planning nature-based solutions (NBS)

Alber et al (2021). https://doi.org/10.1007/s13280-020-01365-1



NRCP Research Journal: Anna Pauline Orig de Guia et al. **2025**: 24(1), 99-114

NRCP RESEARCH JOURNAL

Full Paper

Terrestrial Mammals in the Del Carmen Mangrove Forest Reserve, Siargao Island, Philippines

Anna Pauline O. de Guia[1], Louise Abigail De Layola[2,3], Khryss P. Garcia[1], Ma. Niña Regina M. Quibod[4]
[1]Animal Biology Division, Institute of Biological Sciences, College of Arts and Sciences, University of the Philippines Los Baños, Laguna, 4031, Philippines

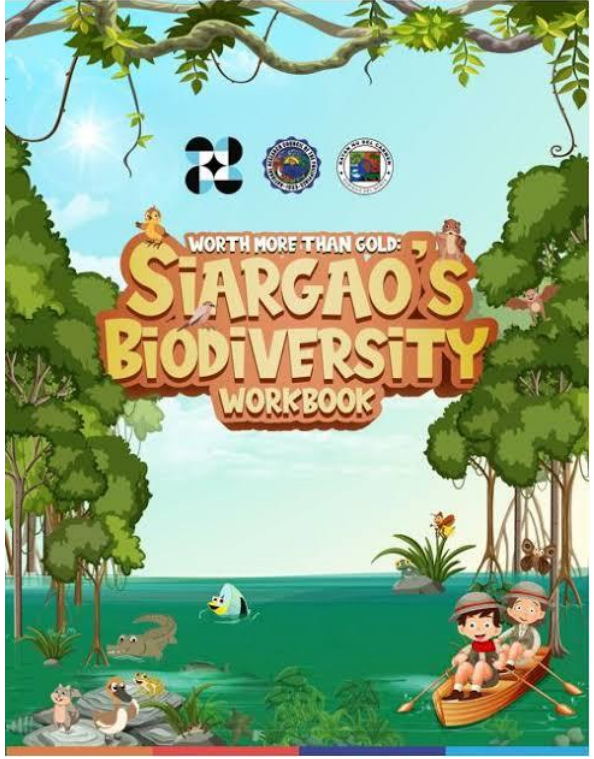
NRCP Research Journal: Dimple May Gianne Q. Dumaguit. **2024**, 23(2), 114-123

NRCP RESEARCH JOURNAL

Full Paper

Physicochemical Monitoring and Assessment of the Water Quality in the Mangrove Forest of Del Carmen, Siargao, Philippines

Dimple May Gianne Q. Dumaguit[1,2], Allyzxia Venisse H. Navarro[1], Paulene Anne S. Chen[2], Dino T. Tordesillas[1,2,3]





Upon the request of LGU-Del Carmen Siargao for an integrated mangrove assessment, the National Research Council of the Philippines (NRCP) funded and organized an interdisciplinary research team.

Results of the study were utilized by LGU-Del Carmen to co-develop conservation plans with scientists, which then led to successful enlistment to the Ramsar List of Wetlands of International Importance in 2024.

Source: NRCP, LGU-Del Carmen

iii. Innovate

Co-created / co-designed conservation technologies

The planting of mangrove trees in the study plot began in December 2007 using BEM, CM, CP, and conventional techniques. After 8 years, it was observed that the success percentage of the crop technique was as follows: CM > CP > BEM > Conventional, with the CM technique contributing to the highest success percentage. Conventional techniques are not recommended, despite geotube support. **Figure 9** below shows the plot area after 13 years of planting.



Before planting (17 July 2007)



1 year 3 month after planting (14 March 2009)



8 years after planting (2015)

Comp-mat (CM), Comp-pillow (CP), Bamboo Encasement Method (BEM)

Source: FRIM Malaysia



ADVANCING ESG

Protecting the protectors: Racing to save PH mangroves

Agence France-Presse / 04:30 AM July 23, 2026



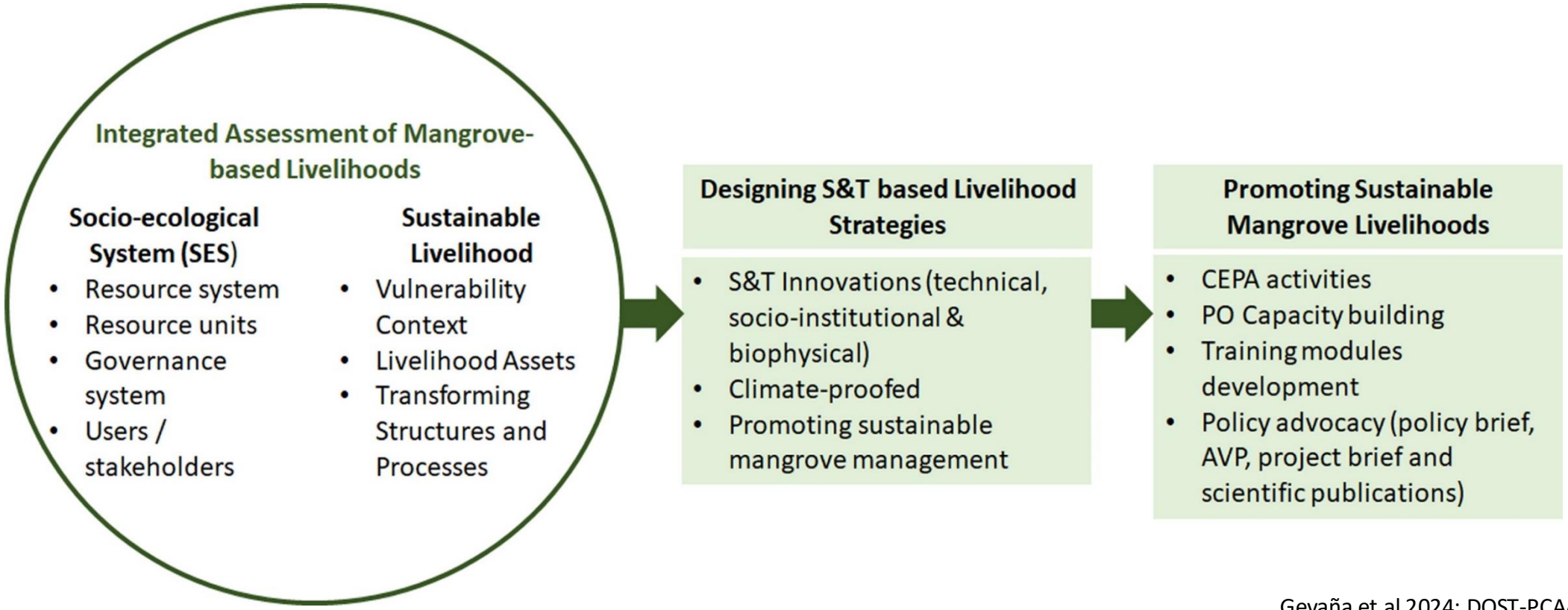
As part of disaster preparedness measures, some communities are building bamboo fences to slow incoming waves and help protect what remains of their mangrove forests.

Source: WWF-Philippines, Inquirer.net

iii. Innovate

Co-created / co-designed livelihoods

Sustainable Mangroves through Innovations and Livelihood Enhancement Promoting Growth and Climate Resilience (SMILE-Growth)

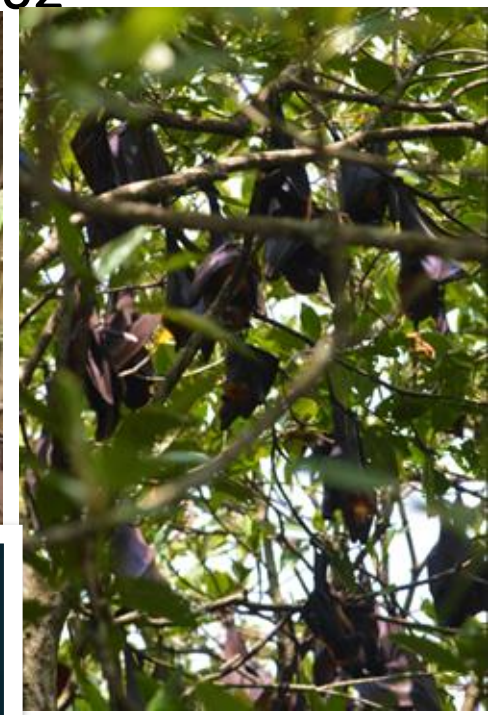


Gevaña et al 2024; DOST-PCAARRD

PROJECT SITE & BENEFICIARIES: Binonoan Producer's Cooperative (BIPCO), Infanta, Quezon, Philippines

Total Number of Members: 62





















Target beneficiaries of the project:

(1) CBFM members, (2) Other mangrove communities, (3) Government agencies such as the DENR, DA, BFAR, etc, (4) Non-government agencies, (5) LGUs, (6) SUCs and academes, (7) Private organizations, and (8) Policymakers

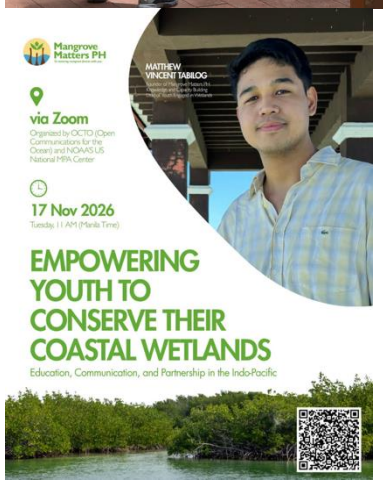
iv. Advocate

Collaborative promotion of good mangrove conservation plans, policies and programs (Ecoparks, educational programs, youth actions, film / arts)













Source: Mangrove Matters Ph, Taman Wisata Alam Angke Kapuk, Source: Le Thanh Tung, K. Fabro

iv. Advocate

Transdisciplinary (science-based and participatory) approach to mangrove restoration

APN Science Bulletin 10 (1)
www.apn-gcr.org/bulletin

Sustainable mangrove rehabilitation: Lessons and insights from community-based management in the Philippines and Myanmar

Leni D. Camacho [a*], Dixon T. Gevaña [a], Lorena L. Sabino [a], Clarissa D. Ruzol [a], Josephine E. Garcia [a], April Charmaine D. Camacho [a], Thaung Naing Oo [b], Aye Chan Maung [b], K. G. Saxena [c], Luohui Liang [d], Evonne Yiu [d], and Kazuhiko Takeuchi [d]



Keywords:

Science-based
Participatory
Collaborative
Multi-stakeholder

Rehabilitation Checklist:

Right species (based on coastal zone)

Right place (degraded mangrove areas only)

Right timing / season (tidal ht, weather)

Right nursery / seedling production

Right field planting and maintenance – site preparation, hauling, fencing, stand density / spacing, cleaning, replacement planting

Right PEOPLE

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

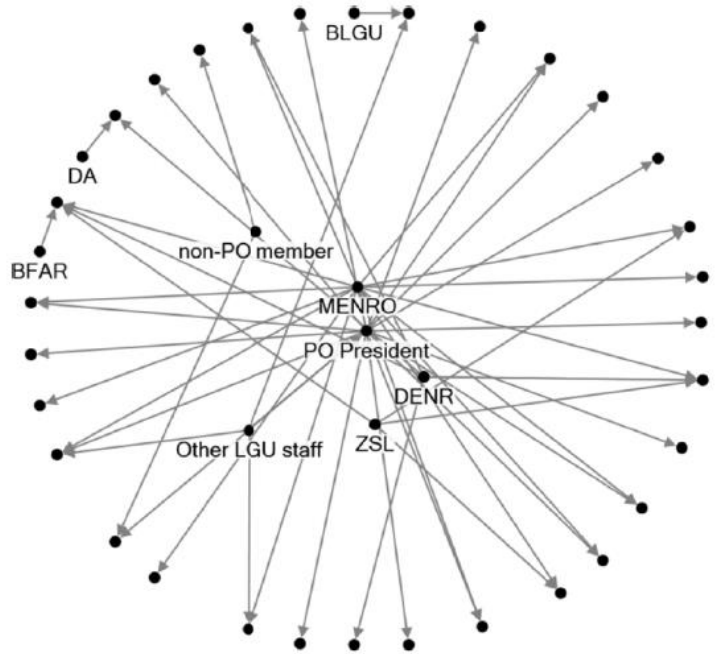


Fig. 3. Mangrove information network among members of the people's organization in the Katunggan Ecopark.

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.



National Blue Carbon Action Partnership

In partnership with the World Economic Forum, the national government(DENR) implemented the **National Blue Carbon Action Partnership (NBCAP).**

Countries: Indonesia, Vietnam and Philippines

Collaborative efforts of researchers, local communities, and policymakers are key to creating science-based solutions and locally-led approaches to build a resilient community and sustainable livelihood.

Key Output:

- Development of the NBCAP Roadmap
- Development of the Blue Carbon Quantification Protocol

PHILIPPINES NBCAP
National Blue Carbon Action Partnership

Search places

Google Earth Engine Apps

Select a value...

Select Province:

Select a value...

DISPLAY MANGROVE LAYERS

DISPLAY SEAGRASS LAYERS

DISPLAY TIDAL MARSH LAYER

DISPLAY ALL NATIONAL LAYERS

CALCULATE ECOSYSTEMS INSIDE MY AREA

NBCAP Resources

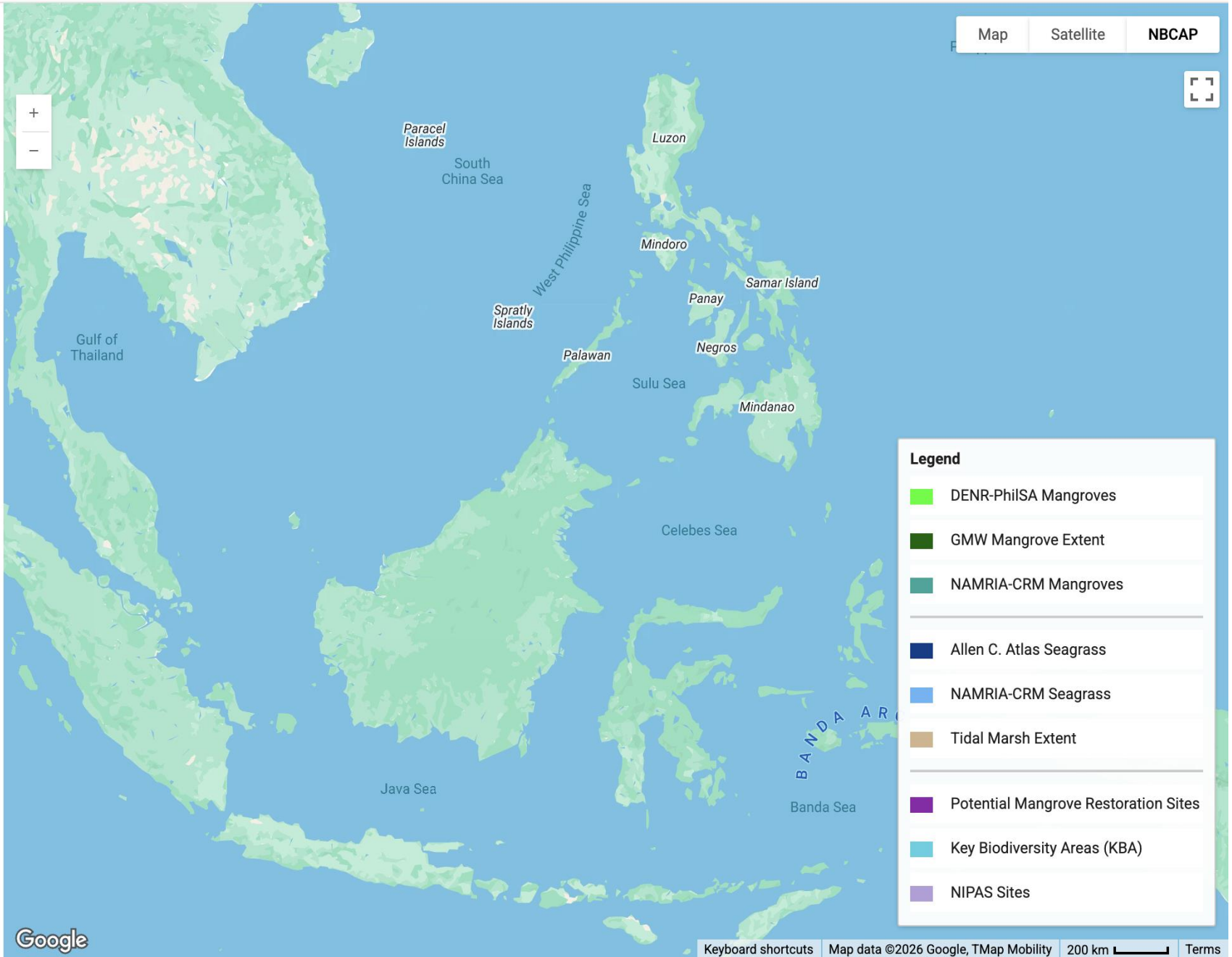
Other Technical Resources

NBCAP Explorer User Manual and Video Tutorial

Citation Guide for Datasets

Other Resources Folder (NBCAP Roadmap, Publications, Etc.)

List of KBA and NIPAS with Seagrass and Mangroves



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

It ensures / secures non-negotiable mangrove restoration & conservation targets 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.

Targets for Active Restoration

1. Degraded mangrove areas
2. Abandoned, unproductive, unutilized aquaculture ponds (previously mangrove areas)
3. Areas for coastal protection against storm surge, floods and future sea level rise

Targets for Strict Protection

1. Mangrove protected areas
2. Coastal greenbelts for storm surge protection
3. Riverine mangroves for stable banks
4. Critical mangrove areas supporting local / community-based livelihoods

18 JUN 2025

A Science-Policy Forum towards Future-proofing Livelihoods and Technologies to Conserve Mangroves




OPEN FORUM Q &A


SPECIAL THANKS TO OUR SPONSORS
MANGROVE BLUE CARBON ROADMAP TO 2030 AND BEYOND
A SCIENCE-POLICY FORUM TOWARDS FUTURE-PROOFING LIVELIHOODS AND TECHNOLOGIES TO CONSERVE MANGROVES
18 June 2025 | Century Park Hotel 599 P.Ocampo St., Malate Manila, 1004 Metro Manila
We, the participants of this landmark "Mangrove Blue Carbon Roadmap to 2030 and Beyond: Livelihoods and Technologies to Conserve Mangroves" pledge our strong commitment to support the global response to climate change.
We likewise pledge our support for future-proof initiatives that will empower communities.
DOST-PCAARRD


DRAFT ROADMAP
Output from the Inaugural Workshop last March 2024
DRAFT NATIONAL BC ACTION PLAN MILESTONES
Mapping of BC ecosystems: extents and change
Final Blue Carbon Roadmap and Policy Frameworks
At least 6 KBA priority sites assessed of C stocks and sequestration rates and GHG emissions per bioregion (hosted in the marine stations)
Mapped BC changes
Launching of the Blue Carbon Watch
Formation of the NBCAP Secretariat
Finalization of the BC Roadmap (starting from the mangrove roadmap)
Submission of the Executive Order on Blue Carbon Conservation
2024
2025
2026
2030


SPECIAL THANKS TO OUR SPONSORS
MANGROVE
BLUE CARBON







GLOBAL MANGROVE ALLIANCE

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

GLOBAL MANGROVE ALLIANCE PHILIPPINES

Republic of the Philippines
Department of Environment and Natural Resources
Biodiversity Management Bureau

PHILIPPINE MANGROVE CONFERENCE

PHILIPPINE MANGROVE CONFERENCE

Ensuring Accountable Pathways for Resilient Communities

March 24-26, 2026

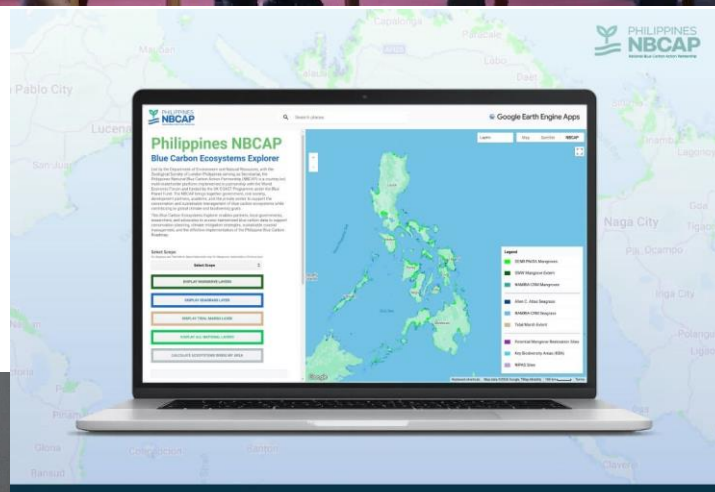
An Inaugural National Event by the Global Mangrove Alliance Philippines and the DENR Biodiversity Management Bureau

CONSERVATION INTERNATIONAL · ZSL · Wetlands International · WWF · rare · Mangrove Matters PH · OCEANA Protecting the World's Oceans · Forest Foundation Philippines · OCEANUS CONSERVATION









Philippines NBCAP

Blue Carbon Ecosystems Explorer

This explorer enables partners, local governments, researchers, and advocates to access harmonized blue carbon data to support conservation planning, climate mitigation strategies, sustainable coastal management, and the effective implementation of the Philippine Blue Carbon Roadmap.

IV. The Future is Local

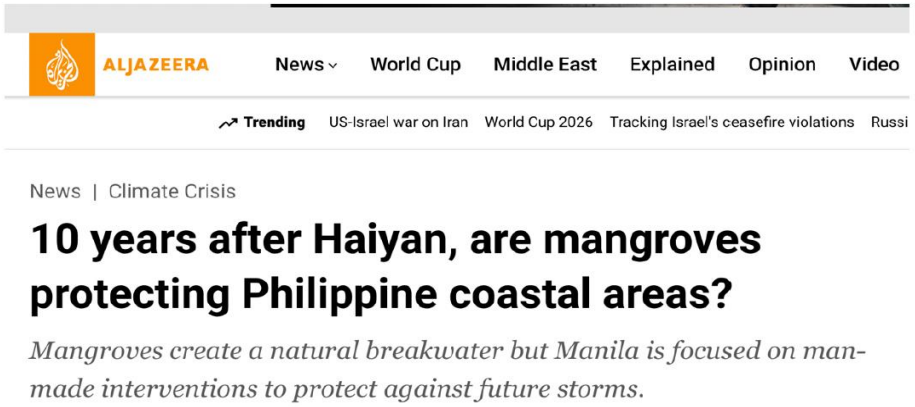


ENVIRONMENTAL ISSUES

More and more PH communities are creating coastal greenbelts. Why does this matter?

APR 29, 2025 7:08 PM PHT

JEE Y. GERONIMO



ALJAZEERA News World Cup Middle East Explained Opinion Video

Trending US-Israel war on Iran World Cup 2026 Tracking Israel's ceasefire violations Russi

News | Climate Crisis

10 years after Haiyan, are mangroves protecting Philippine coastal areas?

Mangroves create a natural breakwater but Manila is focused on man-made interventions to protect against future storms.

What stimulates the increasing local (LGU) interest on forest / mangrove conservation today?

Archipelagic thought / Local thought:

How can we best future-proof LGU-led mangrove governance to promote coastal resilience?

Strategic Roles of Local Government Units (LGUs) in Collaborative BC Conservation and Livelihood Development

1. LGUs have autonomy in land use planning and development
2. LGUs can freely engage (help organize) with local communities and other stakeholders on diverse mangrove projects
3. LGUs can craft specific local policies (with funds) to promote BC programs and livelihood projects
4. LGUs can partner with private sector on funding and com-implementing BC projects
5. They create mechanisms for income sources (tax and rents) from mangrove-related livelihoods / enterprises

Republic of the Philippines
PROVINCE OF SURIGAO DEL NORTE
MUNICIPALITY OF DEL CARMEN

Office of the Sangguniang Bayan

ORDINANCE NO. 141
(Series of 2025)

ORDINANCE ESTABLISHING BLUE CARBON CONSERVATION AREAS (BCCAs) IN THE MUNICIPALITY OF DEL CARMEN, SURIGAO DEL NORTE, PROVIDING FOR THEIR MANAGEMENT, REGULATION, AND PARTICIPATION IN CARBON TRADING, AND FOR OTHER PURPOSES



LGU-Del Carmen Siargao

The Asia Foundation

Philippine Marine Economy - A Platform for the Future

Exploring the LGU's Leadership Role in Blue Cabron

The Philippine Marine Economy: A Platform for the Future

A thought leadership initiative to deliver a comprehensive study on the Philippine marine economy and identify how marine ecosystems can drive sustainable economic growth

- Unlock economic and livelihood potential of marine ecosystems
- Address policy and knowledge gaps in marine markets
- Enable policies and financial mechanisms for sustainable investment
- Strengthen maritime governance and disaster risk reduction

Marine economy: a trillion peso industry

The Philippines is an archipelagic country with extensive coastlines and globally significant marine biodiversity. That creates a foundation for fisheries, tourism, coastal livelihoods,, and emerging marine industries.

According to PSA, the Philippine blue economy amounted to **PHP 1 trillion** in 2025, representing a 5.3% growth from the previous year. This was mostly from fishing, shipping and transportation, as well as manufacturing of ocean-based products.

PHP 1 trillion
Estimated value (2025)

5.3%
Growth rate (2024 v. 2025)

2.46 million
Individuals employed (2025)

Source: Philippine Statistics Authority

Marine economy: a trillion peso industry under threat

40%
of the country's original mangrove cover lost

PHP 18 billion
Estimated economic losses due to rising sea levels

150,000
Filipinos that are in danger of being displaced

Despite its value to the economy, it has remained underdeveloped. According to ADB, this is due to the **lack of integrated management for marine and coastal ecosystems and inadequate planning and investment** in marine economic development.

It is also under threat due to degradation, pollution, and over-extraction. According to studies, the Philippines has lost more than half of its original mangrove cover due to unregulated cutting and unchecked commercial and residential development.

Source: World Bank | GMA News | Philippine News Agency



ECONOMY

Value of PHL mangroves declines sharply over two decades, World Bank says

October 27, 2021 | 10:01 pm

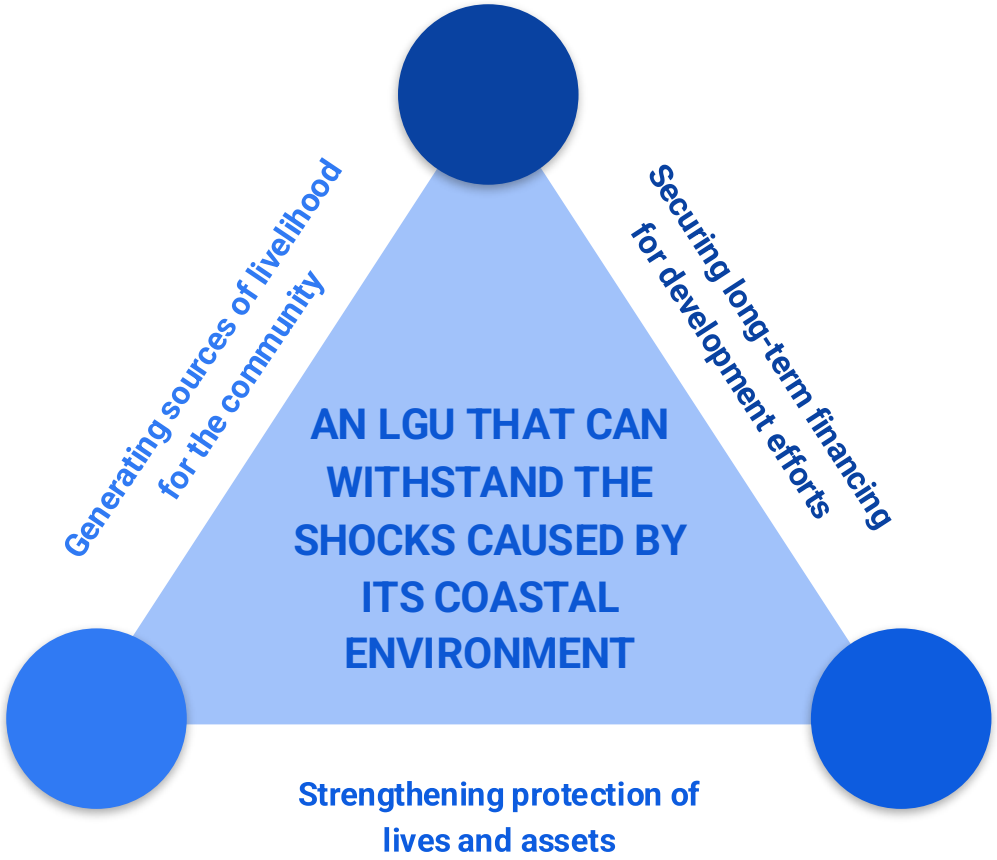
The asset value of Philippine mangroves declined 50% to $5.4 billion in 2018, from the $10.79 billion estimate in 1995

(Ref: World Bank : Changing Wealth of Nations 2021)

Source: bworldonline.com

Building marine economic resilience

Ability to withstand and recover from shocks



Ability to adapt to changing circumstances to mitigate future shocks

…and enhancing community resilience, bringing in biodiversity, livelihood, and climate action benefits

Aside from coastal protection, mangroves also provide:

1

Biodiversity protection

Mangroves provide natural habitat for over 1,533 different species, including nursery habitats for many commercially important fish.

2

Livelihood generation

Aside from boosting local fish production, they can also enable aquaculture, eco-tourism, and recreation activities.

3

Climate action

Mangroves are some of the most effective carbon sinks in the world, sequestering carbon 3-10 times more effective than terrestrial forests.



LGU Maasin City, Leyte



LGU Baybay City, Leyte



LGU San Benito, Siargao



LGU Del Carmen, Siargao



Mangrove area site visit in Maasin City, Leyte

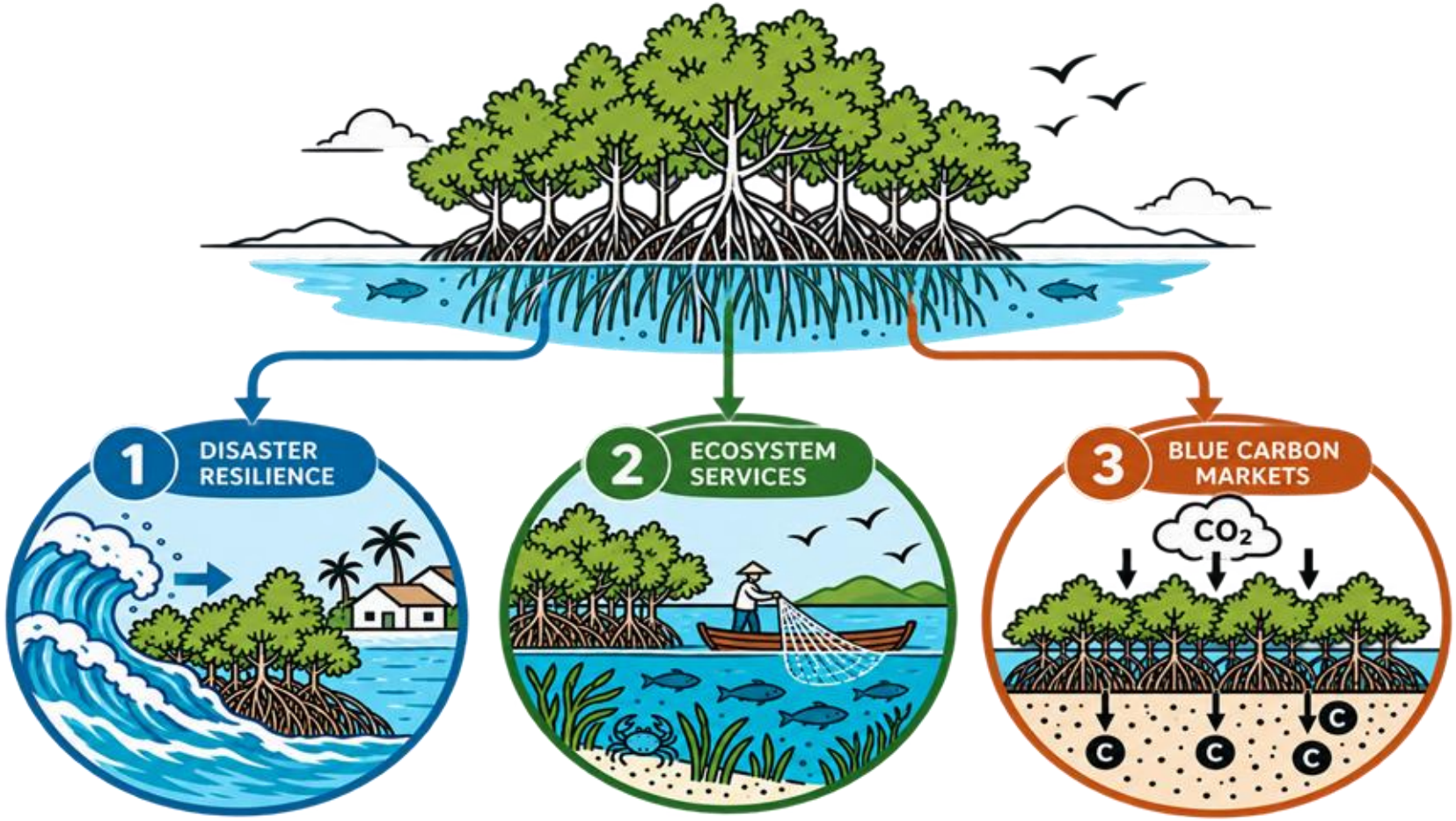


Private Sector Consultation



Mangrove area site visit in Baybay City, Leyte

Three pathways to marine economic resilience



A RESILIENT LOCAL MARINE ECONOMY

An LGU that can withstand and recover from the shocks faced by its coastal environment

Three pathways to marine economic resilience

Buhay
Disaster resilience

Reduce exposure to coastal hazards

Kabuhayan
Ecosystem services

Support livelihoods & sustainable use

Kayamanan
Blue carbon markets

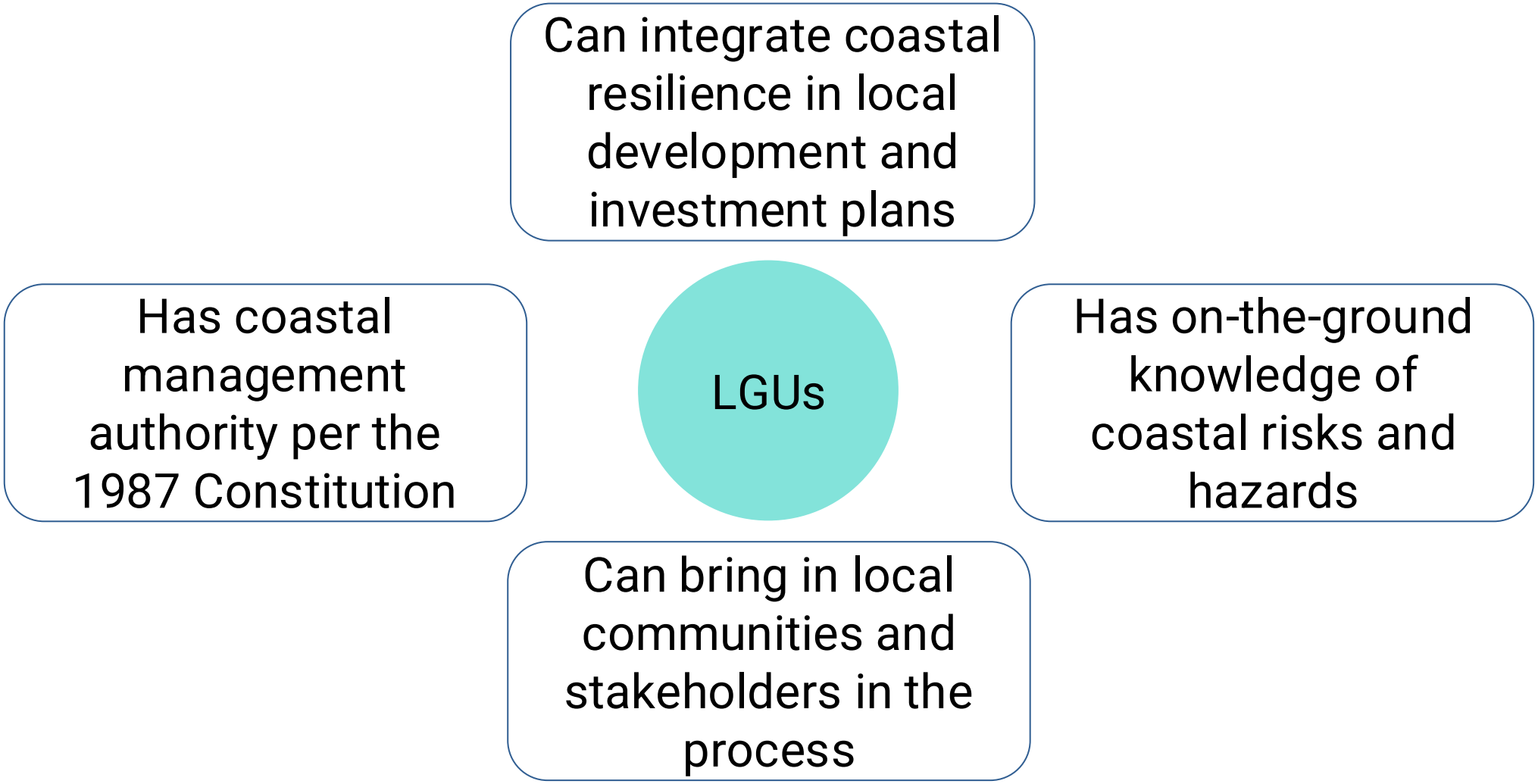
Climate finance and mitigation

A RESILIENT LOCAL MARINE ECONOMY
An LGU that can withstand and recover from the shocks faced by its coastal environment

Where do we start?

01	What do we have?	• Conduct desk research • Consult the community • Assess the most pressing needs of the locale
02	What can we do?	• Determine legal capacity • Identify appropriate starting point
03	How do we do it?	• Identify potential sources of funding • Choose right partner • Institutionalize conservation efforts

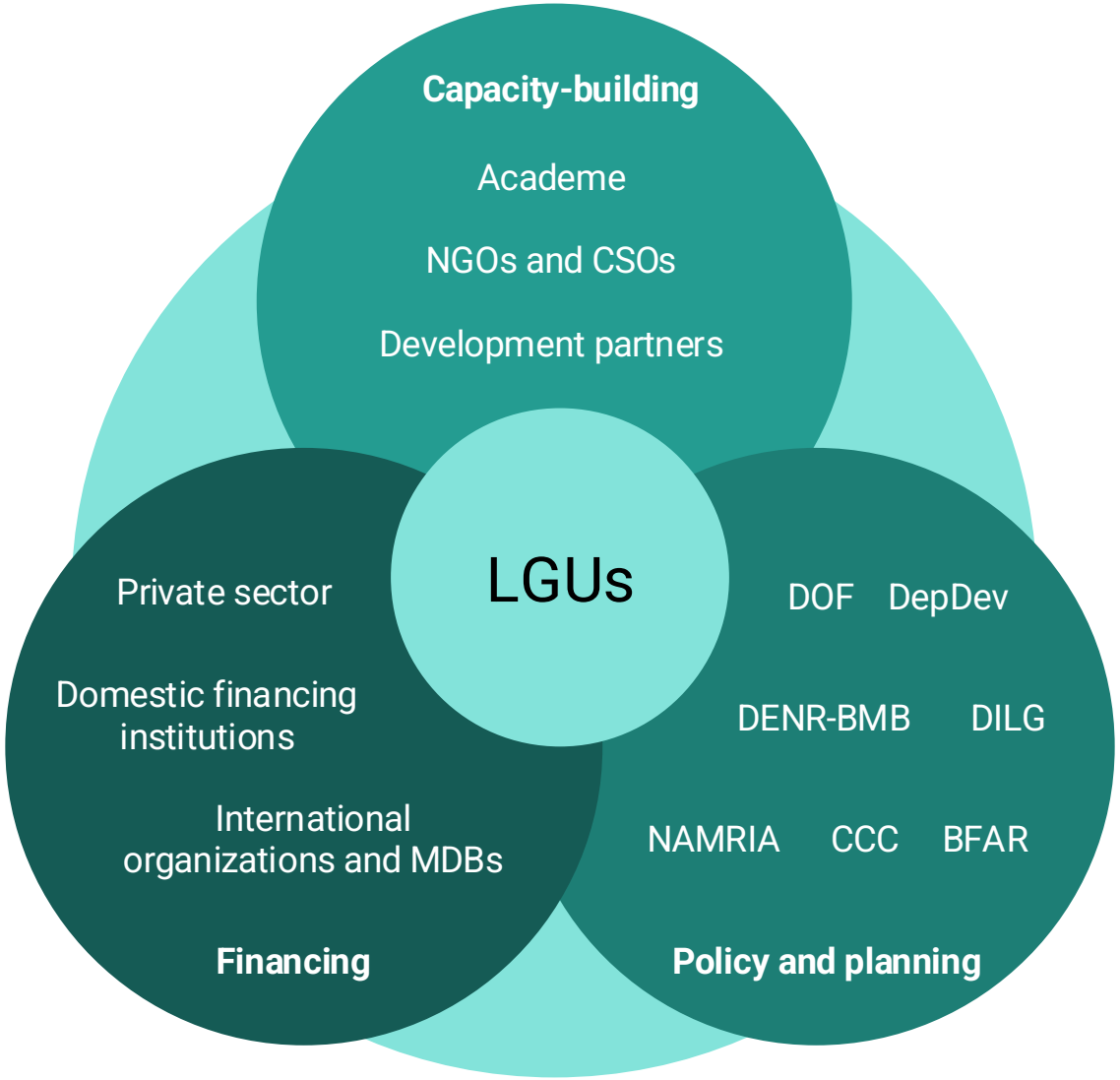
We need to put LGUs at the forefront of coastal resilience…



…with the strong support and guidance of other stakeholders

LGUs should be at the frontline of the regulation and management of coastal resources.

But this should be reinforced and reaffirmed by other stakeholders through policy coordination, financing, and capacity-building.



An institutional landscape that strengthen and affirms LGU's legal and corporate rights

TENURE

Clarify tenure, and resource-use rights in coastal and marine areas.

Help LGUs resolve overlapping claims, boundaries, and conflicting uses.

PERMANENCE

Provide guidance on how marine and coastal projects can be protected from future land-use changes.

Support monitoring and enforcement arrangements, especially in line with changing political priorities.

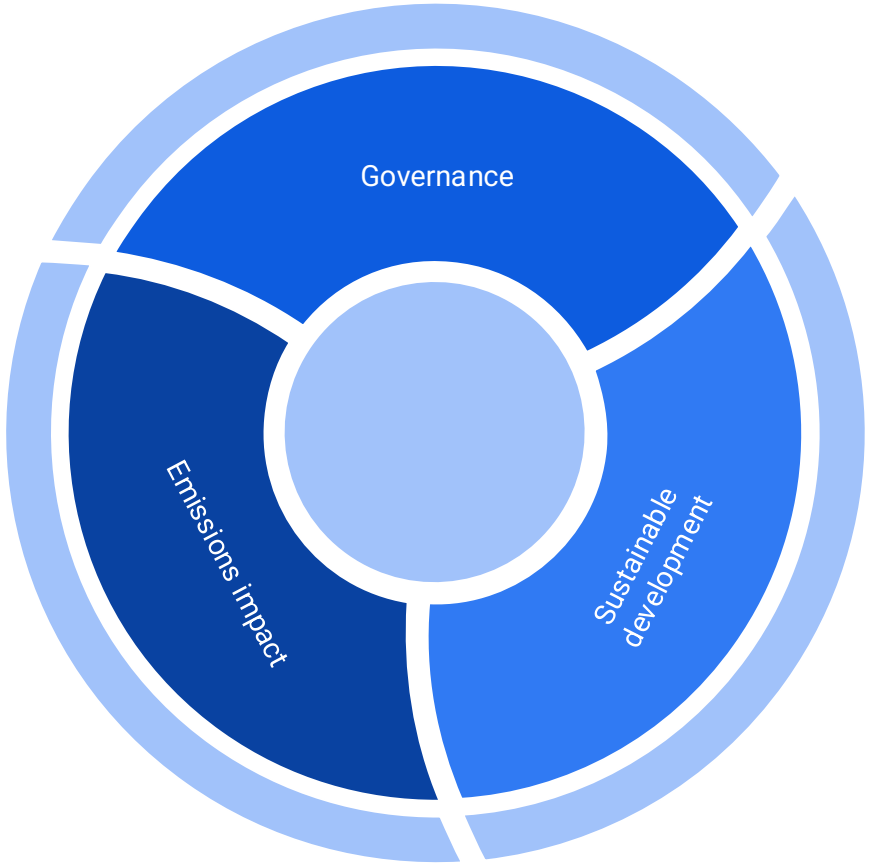
CORPORATE RIGHTS

Provide clear rules on what LGUs and communities can contract, develop, own, manage, or receive benefits from.

Clarify the legal basis for LGUs to enter into partnerships and revenue-sharing arrangements.

Blue carbon markets can provide complementary funding source for long-term conservation and management

- **Blue carbon** refers to the carbon captured and stored by mangroves, tidal marshes, and seagrass beds.
- A **blue carbon project** measures how much additional carbon is captured or emissions are avoided, and this can potentially be converted into verified **carbon credits.**
- **Carbon credits** are brought by companies (usually those in high-carbon-emitting sectors) to offset their emissions and meet sustainability goals.
- Carbon finance is **not a replacement for public funding or livelihood programs.** Instead, it can be a complementary source of financing for long-term ecosystem protection and restoration.



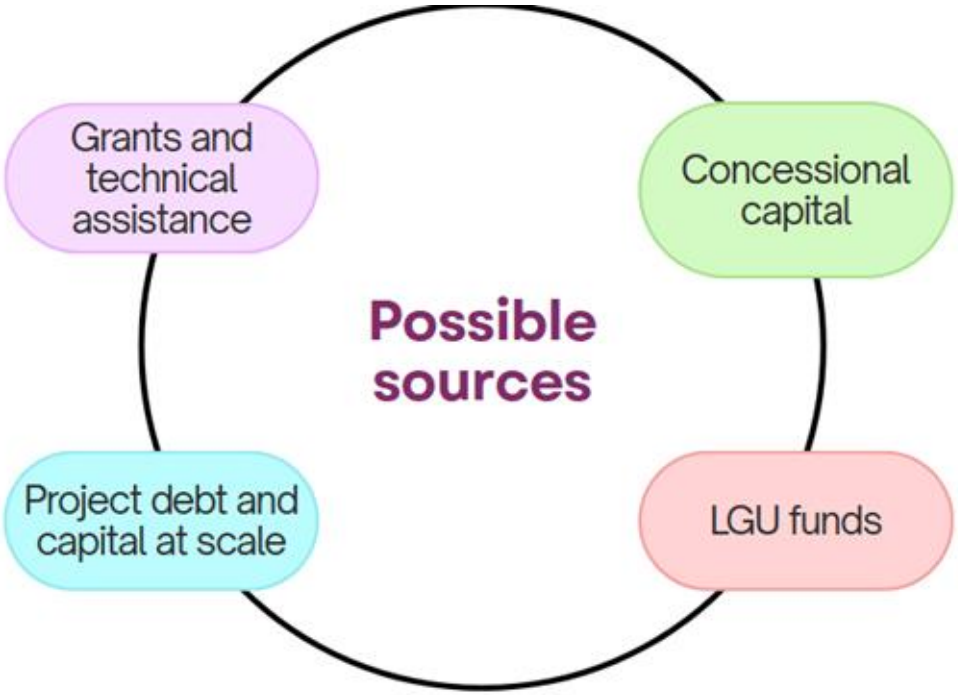
A domestic financing policy and mechanism that de-risks and attracts private investments

Twin valleys of death in blue carbon market financing:

1. Project cannot raise capital to achieve proof of concept

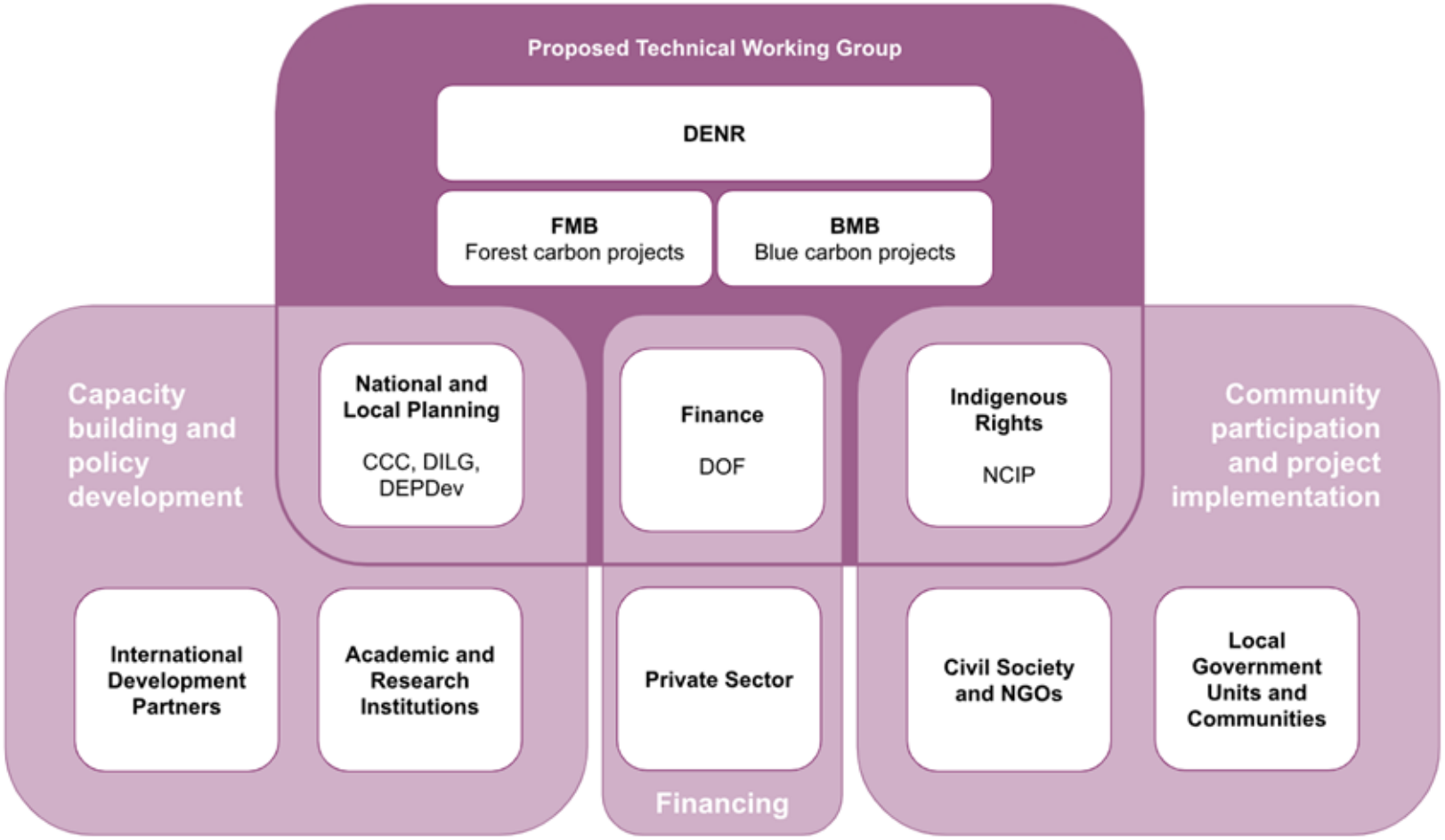
2. A validated project remains insufficiently de-risked to attract capital at scale

An LGU-led project answers the first of these directly: the LGU is a government-backed sponsor, and its participation is itself a de-risking instrument. However, it needs domestic facilities to shoulder the costs.



A landscape that enables collaboration and partnership among various stakeholders

This is the proposed TWG by DENR for blue carbon projects. We recommend adding mechanisms to enable partnerships with other actors, across capacity building, community participation, and financing.



IV. Southeast Asia’s best (some list)



Sustainable Mangrove Management

- Science-Based Approach
- Multi-stakeholder inclusion
- Promotion of local knowledge
- Innovation and technology



Bengkalis Island, Indonesia

Teluk Pambang Village, Bengkalis Island, Indonesia



Teluk Pambang Village, Bengkalis Island, Indonesia

local communities are positioned as critical actors



In their managed area, the Belukap Group documents illegally harvested mangrove wood. © A Yoseph Wihartono/YKANSource: Yayasan Konservasi Alam Nusantara



The mangrove group in Teluk Pambang Village also involves and relies on female members in their restoration activities. © A Yoseph Wihartono/YKAN. Source: Yayasan Konservasi Alam Nusantara

Teluk Pambang Village, Bengkalis Island, Indonesia



Women from Teluk Pambang Village Engaging in Activities Around the Mangrove Forest. © A. Yoseph Wihartono/YKANSource: Yayasan Konservasi Alam Nusantara

Village Forest Management Institution (LPHD)

- 179 residents forming ten groups
- Honeybee Cultivation KUPS and the Mangrove Biota KUPS.



Matang Mangrove Forest Reserve, Perak, Malaysia

Matang Mangrove Forest Reserve, Perak, Malaysia



Mangrove timber pile at a forest thinning site in Matang Mangrove Forest Reserve in Malaysia. Image courtesy of Behara Satyanarayana.

Matang Mangrove Forest Reserve, Perak, Malaysia



A mangrove thinning site at the Matang Mangrove Forest Reserve. Image courtesy of Behara Satyanarayana.

Prioritized strategies

- **Stakeholders' involvement**
- **Establishment and inclusion of community-based planning for the management**



Sungei Buloh Wetland Reserve, Singapore

Sungei Buloh Wetland Reserve, Singapore



Sungei Buloh Wetland Reserve, Singapore



Source: Asean Centre for Biodiversity

Conservation Approches

- Sluice management
- Collaboration



Ban Nai Nang, Thailand

Ban Nai Nang, Thailand



A stingless bee hive in Ban Nai Nang.Image by Carolyn Cowan/Mongabay.

Community-Based Mangrove Management

- Community-led ecological restoration
- Biodiversity-based livelihood development
- Community governance and capacity-building



Da Loc, Viet Nam

Da Loc, Viet Nam

Community–based Mangrove Management Board



- Participatory mangrove restoration and governance
- Multi-stakeholder collaboration and capacity-building
- Livelihood diversification and coastal resilience



Del Carmen, Siargao Island, Surigao del Norte, Philippines

Del Carmen, Siargao Island, Surigao del Norte, Philippines

In November 2024, **the Del Carmen Mangrove Wetland Forest Reserve** was officially declared as a **Wetland of International Importance** by the DENR.



Source: Municipality of Del Carmen

Del Carmen, Siargao Island, Surigao del Norte, Philippines

Science-based Governance

- Baseline assessment of the mangrove ecosystem
- Partnerships with the academe and research institutions to collect the necessary credible data

Translating Science into Policy

- Local Government of Del Carmen crafted various legislative measures (Local Ordinance) on forestry and fisheries-related activities

Tambayayong

- "*Coming together*"
- Multi-stakeholder discussions

Source: Local Government Unit of Del Carmen. (2025). Former illegal mangrove cutting capital now a wetlands of international importance. Green Destinations.

Del Carmen, Siargao Island, Surigao del Norte, Philippines

Targeted IEC

- Bakhaw (Mangrove) Festivals, Classroom-based campaigns for students of all ages, youth based concerts themed on sustainability, hosting the International Mangrove Marathon and home visitations to suspected illegal fishers

Enforcement

- Local government was able to recruit volunteers that helps in the monitoring and enforcement of our fisheries / forestry laws.
- Bantay Dagat (Marine Guardians) and Bantay Gubat (Forest Guardians)

Continued Mangrove Preservation and Reforestation

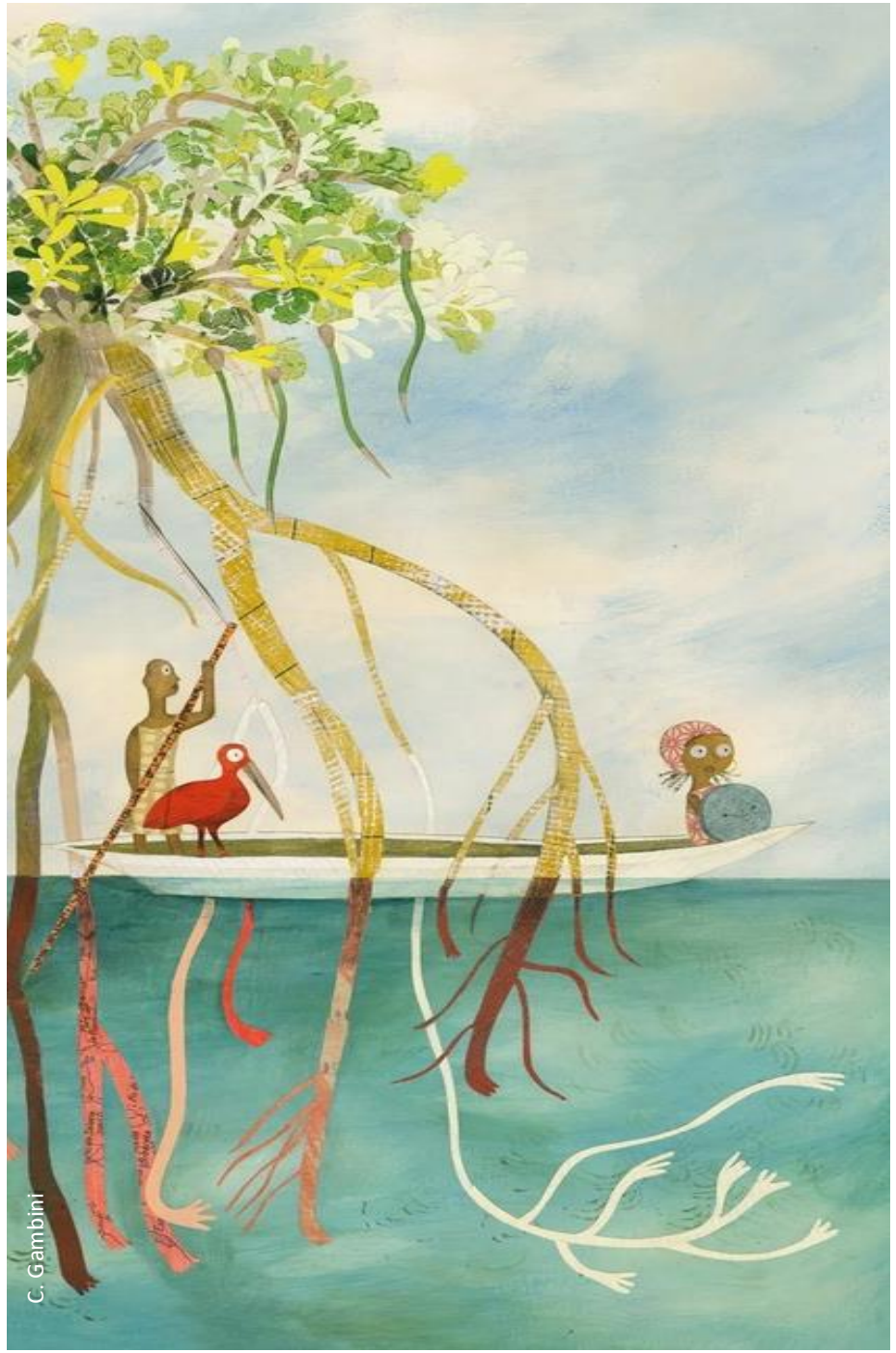
- In partnership with multiple local and external stakeholders from public, private and non-government partners

Source: Local Government Unit of Del Carmen. (2025). Former illegal mangrove cutting capital now a wetlands of international importance. Green Destinations.

Dedicated to our future generations who will stand up and commit in 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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