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2026 Biodiversity Science Forum

Advancing Biodiversity Enhancement in ASEAN:

Science-Based Pathways for
Climate Mitigation and Ecosystem
Restoration

30 September - 1 October 2026
Kuala Lumpur, Malaysia



Organised by ASEAN Centre for Biodiversity in partnership with Ministry of Natural Resources and Environmental Sustainability (NRES), Forest Research Institute Malaysia (FRIM) with support from ASEAN-UK Green Transition Fund through the Enhancing Conservation and Restoration of Wetlands and Peatlands in ASEAN as Effective Sinks and Reservoirs of Greenhouse Gases (EnCORE Wetlands) Project.

**Advancing Biodiversity Enhancement in ASEAN:
Science-Based Pathways for Climate Mitigation and Ecosystem Restoration**
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The ASEAN region contains some of the world's most important biodiversity hotspots and supports more than 660 million people. These ecosystems, however, face increasing pressures from land-use change, habitat fragmentation, illegal wildlife trade, invasive species, and the accelerating impacts of climate change.

The COVID-19 pandemic underscored the close links among ecosystem degradation, zoonotic spillovers, public health, and economic stability. To strengthen regional resilience, environmental policies must move beyond preventing biodiversity loss toward achieving measurable biodiversity gains, supported by climate mitigation and targeted ecosystem restoration.

Throughout 2025, the ASEAN-UK Green Transition Fund, through the project Enhancing Conservation and Restoration of Wetlands and Peatlands in ASEAN as Effective Sinks and Reservoirs of Greenhouse Gases (EnCORE Wetlands), provided the vital scientific and financial foundation for the 2025 Biodiversity Science Forum (BSF) in Jakarta and the initial ABO 4 Writeshop in Viet Nam. Building on this foundation, the 2026 Biodiversity Science Forum aims to bridge the gap between ecological research and actionable policy. By focusing on biodiversity enhancement as a primary objective, while leveraging climate mitigation and ecosystem restoration approaches, the forum will highlight scalable solutions, innovative technologies, and community-led restoration frameworks tailored to Southeast Asia.

PROGRAMME

DAY 1 | 30 SEPTEMBER 2026, Wednesday

Time	Agenda Item	Person(s) In Charge
7:30 – 9:00	Registration	ACB
9:00 – 10:00	Welcome Remarks	H.E. Datuk Wira Anis Rizana Mohd Zainudin <i>Secretary General, Ministry of Natural Resources and Environmental Sustainability, Malaysia</i>
	Opening Message	Dr. Jerome L. Montemayor <i>Executive Director, ASEAN Centre for Biodiversity</i>
	Messages of Support	Ms. Marie-Claire Joyce <i>Growth and Economic Counsellor, British High Commission Malaysia</i>
		H.E. Dr. Kao Kim Hourn <i>Secretary-General, ASEAN Secretariat</i>
10:00 – 10:45	<i>Launching of scientific posters, photo opportunity, and coffee break</i>	
10:45 – 12:00	Keynote Presentations	Dr. Khairul Naim Adham <i>Deputy Undersecretary, Biodiversity Management Section, Ministry of Natural Resources and Environmental Sustainability</i> Dr. Michelle Lim <i>Associate Professor of Law, Yong Pung How School of Law Singapore Management University UNESCO Chair in Sustainability Law Futures</i>
12:00 – 13:45	<i>Lunch Break</i>	
Thematic Panel Discussions		

Monitoring,	Panel 1: Biodiversity Assessment, and Emerging Science	Moderator: Christine Ely Nuevo <i>Director, Knowledge Management Division, ASEAN Centre for Biodiversity</i>
	13:45 – 13:55 Scaling Coral Reef Monitoring inMalaysia Using ReefCloud AI: A Case Study from Tioman Island	Muhammad Faiz Mohd Hanapiah <i>Assistant Professor, International Islamic University Malaysia</i>
	13:55 – 14:05 Physics-informed AI For Scalable Peatland Carbon Flux Monitoring Across Southeast Asia	Bidayatul Masulah <i>Junior Lecturer, IPB University</i>
	14:05 - 14:15 Developing A MultimetricIndex of Forest Health forGeothermal Reservations in the Philippines	Jay Fidelino <i>Research Associate, University of the Philippines Diliman</i>
	14:15 – 14:25 Restoresat: A Geospatial Foundation Model for Wall-to- wall Restoration Outcome Classification Across Southeast Asia	Andi Qur'Ani Ratu Sabrina Arham Putri <i>Research Aide, Politeknik Keuangan Negara STAN</i>
	14:25 –14:35 Assessing Biodiversity andEcosystem Loss and Damage From extreme weather Events: A Philippines Case Study	Neil Aldrin Mallari <i>Chief Scientist, Canter for Conservation Innovations Ph, Inc.</i>
	14:35 – 14:45 ASEAN Biodiversity ashboard: A Data Mobilisation latform toMonitor Regional rends inBiodiversity and Nature- ased Climate Mitigation	Jerome Alano <i>GIS Officer, ASEAN Centre for Biodiversity</i>
	14:45 – 15:30	Panel discussion
Thematic Panel Discussions		
	Panel 2: Biodiversity Enhancement and Ecosystem Resilience	Moderator: Nheden Amiel Sarne <i>Director, Biodiversity Conservation Division, ASEAN Centre for Biodiversity</i>
15:30 - 15:40	Early Detection of the Globally Invasive Little Fire Ant(<i>Wasmannia auropunctata</i>) in The Philippines: Lessons forBiodiversity Surveillance and Biosecurity In ASEAN	April Rose Monding <i>MS Graduate Fellow Caraga State University</i>
15:40 – 15:50	Beyond Protected Areas: A Science-based Community Conservation Framework for the South Philippine Hawk-eagle	Tristan Luap Senarillos <i>Biologist, Philippine Eagle Foundation &</i>

	(<i>Nisaetus pinskeri</i>) in Leyte, Philippines	<i>University of the Philippines Los Baños</i>
15:50 - 16:00	Progress Towards Effective Marine Protected Area Management in Indonesia: A National Assessment of Management Effectiveness (2021-2025)	Lusita Meilana <i>Research Fellow</i> <i>IPB University</i>
16:00 - 16:10	Revisiting and Updating the Key Biodiversity Areas of the Philippines	Hazel Arceo <i>Professor</i> <i>University of the Philippines Cebu</i>
16:10 - 16:30	Panel Discussion	
16:30 – 16:45	Closing and Summary for Day 1	Corazon de Jesus, Jr. <i>Acting Director, Programmes Department,</i> <i>ASEAN Centre for Biodiversity</i>
16:45 – 17:30	Poster Presentations	Authors in attendance
19:00 – 21:00	Welcome Dinner	

DAY 2 01 OCTOBER 2026, Thursday		
Time	Agenda Item	Person(s) In Charge
Thematic Panel Discussions		
	Panel 3: Climate Mitigation and Nature-based Solutions	Moderator: Husni Alhan bin Md Salimun <i>Principal Assistant Secretary, Biodiversity and Forestry Management Division, Ministry of Natural Resources and Environmental Sustainability</i>
8:30 – 8:40	Carbon Storage Contributions of Remnant Forest Patches in Banana-dominated Agroecosystems in Southern Philippines	Adrian Tulod <i>Associate Professor</i> <i>University of the Philippines Los Baños</i>
8:40 – 8:50	Integrating Green and Blue Carbon for Coastal Nature-based Solutions: A Framework for Climate Mitigation in Southeast Asian Urban Regions	Ainun Hasanah <i>Postdoctoral Researcher</i> <i>South China University of Technology</i>

8:50 – 9:00	Designing a Sponge City with Nature-based Solutions: From Flood-Risk Mapping to Resilient Urban Landscapes in Cirebon, Indonesia	Sebastien Goethals <i>Urban Planner, Landscape, and NbSExpert, Technical Assistance Facility to the Green Team Europe Initiative (TAF GTEI)</i>
9:00 – 9:10	Carbon Stocks and Emission Estimation in the Maludam and Agusan Peat Landscapes, EnCORE Wetlands Project	Siti Noor Fitriah Azizan <i>Senior Officer, Peatland Programme, Global Environment Centre</i>
9:10 – 9:20	Climate Mitigation and NbS: UK Perspectives in ASEAN	Sean Hilhorst <i>Head of Climate, Energy and Nature UK Mission to ASEAN</i>
9:20 - 9:45	Panel Discussion	
9:45 – 10:00	Coffee Break	

Thematic Panel Discussions		
	Panel 4: Restoration Science and Practice	Moderator: Sam Yen Yen <i>Head of Flora Biodiversity Programme, Forest Research Institute Malaysia, ACB Scientific Advisory Committee, Malaysia</i>
10:00 – 10:10	From Planting to Regeneration: Five Years of Science-based Peat Swamp Forest Restoration Using Threatened Native Dipterocarps in Brunei Darussalam	Salwana Jaafar <i>Lecturer Universiti Brunei Darussalam</i>
10:10 – 10:20	Rescuing Trees from Extinction: Growth Performance and Carbon Storage of Threatened Native Trees in BINHI Arboreta and Tree Parks	Pastor Malabrigo, Jr. <i>Professor University of the Philippines Los Baños</i>
10:20 – 10:30	Strategic Mangrove Restoration Can Deliver Consistently High Biodiversity Support Benefits Across Climate Futures	Hao Ngo <i>Lecturer & Researcher Vietnam National University</i>
10:30 – 10:40	Beyond Tree Planting: Lessons From Forest Landscape Restoration in Northern Vietnam	Le Yen <i>Agribusiness & Resilience Specialist SMEs Promote Resilience, Inclusion</i>

		<i>and Innovative Transformation Project</i>
10:40 – 10:50	The Benefits of Mangrove Restoration and Conservation Efforts to Coastal Communities in Timor-Leste	Junior Pinto <i>Research Analyst WorldFish</i>
10:50 – 11:00	25 Years of Ex-Tin Mine Rehabilitation: Challenges, Lessons Learned and Opportunities	Wai Mun Ho <i>Research Officer Forest Research Institute Malaysia</i>
11:00 – 11:30	Panel discussion	
11:30 – 12:00	CLOSING CEREMONY Summary of Key Discussions and Insights	Mr. Carlo Carlos <i>Director, Strategy and Planning Division ASEAN Centre for Biodiversity</i>
	Presentation of Rough Draft Recommendations to ASEAN Representatives	Dr. Khairul Naim Adham <i>Deputy Undersecretary, Biodiversity Management Section, Ministry of Natural Resources and Environmental Sustainability</i>
	Closing Remarks	Dato' Dr Ismail Hj. Parlan <i>Director General, Forest Research Institute Malaysia</i>
12:00 – 13:30	Lunch Break	
13:30 – 17:00	Field Visit: Forest Research Institute Malaysia (FRIM)	
17:30 – 19:00	Travel Back to Hotel	



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Scaling coral reef monitoring in Malaysia using ReefCloud AI: A case study from Tioman Island

Muhammad Faiz Mohd Hanapiah

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Abstract

Coral reefs throughout Malaysia are increasingly threatened by climate change, coastal development, pollution, sedimentation, and unsustainable tourism, highlighting the need for efficient and standardized long-term monitoring approaches. This study evaluates the potential of ReefCloud AI as an alternative platform for coral reef monitoring using surveys conducted at 14 reef sites around Tioman Island. Coral communities were assessed using the Coral Video Transect (CVT) method across shallow (8 m) and deeper (14 m) reef zones, with high-resolution underwater videos processed into image frames and analysed using ReefCloud AI for automated benthic classification and coral identification to genus level. The assessment documented 42 hard coral genera and an average hard coral cover of approximately 25%, revealing considerable spatial variability in reef condition across the island. ReefCloud AI substantially improved the efficiency and consistency of image analysis while minimizing observer bias and enabling standardized datasets suitable for temporal and spatial comparisons. Unlike conventional manual annotation, the AI-assisted workflow offers a scalable solution capable of supporting national reef monitoring programmes by reducing processing time and facilitating the integration of large image datasets collected over multiple years. When combined with emerging technologies such as underwater photogrammetry, geospatial mapping, and cloud-based data management, ReefCloud AI provides a robust framework for tracking ecosystem change, evaluating conservation interventions, and informing adaptive management of Marine Protected Areas. The findings demonstrate that artificial intelligence can transform coral reef monitoring from labour-intensive surveys into an efficient biodiversity surveillance system, offering significant opportunities to strengthen long-term coral reef conservation and regional biodiversity monitoring initiatives across Malaysia and the wider ASEAN region.

About the presenter

Dr. Muhammad Faiz Mohd Hanapiah is a marine scientist and conservation activist at the International Islamic University Malaysia (IIUM). He works on coral reef ecology, coastal habitat mapping and technology-driven marine conservation. He combines field surveys with geospatial analysis, hydrodynamic modelling, AI, underwater photogrammetry and remotely operated systems, focusing on the nearshore reefs of Pahang. He founded and heads the Advanced Coastal Research and Innovation IIUM (ACRIIUM) research group. He also founded ChasingKarang, an initiative that turns marine science into conservation action and public engagement. He has led externally funded projects, including RITE-Coral on climate-tolerant corals in turbid Pahang waters and The Uncharted Reefs of Kuantan programme.

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Physics-informed AI for scalable peatland carbon flux monitoring across Southeast Asia

Bidayatul Masulah¹, Shofi Latifah Nuha Anfaresi², Shinta Palupi³

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Abstract

Tropical peatlands in Southeast Asia are critical carbon sinks, yet monitoring their emissions remains challenging due to the prohibitive cost of physical field sensors like Eddy Covariance towers. While standard AI models offer a low-cost alternative, they often fail under extreme climate conditions by generating predictions that violate basic physical laws. To address this, we propose a scalable framework using Physics-Informed Neural Networks (PINN) to model carbon flux (CO₂) across Southeast Asian peatlands. Our approach integrates open-access microclimate data (water table depth and soil temperature from AsiaFlux) with satellite imagery (NDVI and Land Surface Temperature from Google Earth Engine). Unlike purely data-driven models, our network embeds the advection-diffusion-reaction partial differential equation directly into its loss function, enforcing physical consistency on predicted gas dynamics. Preliminary evaluations show that this hybrid framework reduces prediction error (RMSE) by up to 25% compared to conventional machine learning methods. More importantly, it enables robust scenario modeling, such as predicting emission spikes during severe El Niño events, without requiring expensive hardware deployment. By leveraging open-source data and physics-guided AI, this research offers a cost-effective, regional-scale solution to support climate mitigation and ecosystem restoration strategies in ASEAN.

About the presenter

Bidayatul Masulah is a lecturer candidate at the School of Data Science, Mathematics, and Informatics, IPB University, Indonesia, specialising in computational biomathematics. She holds a Master's in Applied Mathematics from Leiden University, Netherlands, and a Bachelor's in Mathematics from Airlangga University. Her research combines mathematical modelling, cellular automata and machine learning to study complex biological systems, from cell morphogenesis to tropical vegetation dynamics under climate stress. Her honours include the Young Investigator Award (South Korea), the Best Oral Presenter Award at AsiaFlux, and the LPDP Overseas Scholarship.

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Developing a multimetric index of forest health for geothermal reservations in the Philippines

Jay S. Fidelino¹, Abigail L. Garrino¹, Paulo Miguel M. Kim¹, Renz Angelo J. Duco¹, David Justin R. Ples², Ronelmar G. Aguilar³, Clarence P. Gamez³, Neil Antoni P. Miras³, Marisol dG. Pedregosa³, Abegail Y. Gatdula³, Melizar V. Duya¹, Mariano Roy M. Duya¹

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Abstract

Geothermal energy is widely recognized as one of the cleanest and most reliable renewable energy resources, and is an important component of the national energy strategy of many countries including the Philippines. Because of the nature of this resource, however, viable geothermal fields often occur in forest landscapes that support high levels of biodiversity. While geothermal energy has a relatively small land-use footprint, its development and operations can still alter forest ecosystems and potentially influence species composition and ecological processes. As such, there is a need to develop robust monitoring frameworks that can detect ecological changes over time and guide adaptive management. Biodiversity indicators that integrate information across multiple taxonomic groups can serve as a practical tool for evaluating forest health, identifying areas in need of intervention, and assessing the effectiveness of mitigation measures. Here, we aim to develop a multimetric index for the assessment of forest integrity using plants, bats, birds, and amphibians as bioindicator taxa. Alongside this index, we also developed a field sampling toolkit with standard protocols and minimum datasets needed to calculate the developed index. These efforts allow for the standardization of assessment and monitoring protocols across different sites using the same set of indicators. We conducted quadrat sampling of plants, mist netting of bats and birds, and belt transects of amphibians in fifteen sites each from four geothermal reservations in the Philippines representing a human disturbance gradient — reference forests, native species-based reforestation areas, exotic species-based reforestation areas, grasslands, and geothermal facilities. From a set of candidate metrics of abundance, richness, and composition across all sampled taxa, we identified those that varied systematically across the gradient. We conducted analyses separately for each geothermal reservation to identify site-specific metrics, as well as an analysis pooling data across all reservations to identify central metrics. We identified a variety of site-specific metrics across geothermal reservations and two central metrics shared by all four — the relative abundance of threatened birds and the total number of trees. We recommend field-testing the developed index to assess its validity and robustness across a variety of conditions. We also recommend exploring its potential adoption beyond geothermal reservations as the standard tool in monitoring the health of Philippine forests and forest-based renewable energy development and operations.

About the presenter

Jay S. Fidelino (he/him) is a wildlife biologist based at the Biodiversity Research Laboratory of the Institute of Biology, University of the Philippines Diliman. He also serves as a member of the Board of Trustees and the Secretary of the Biodiversity Conservation Society of the Philippines. He is also a member of the IUCN SSC

Small Mammal Specialist Group. He is currently part of the team updating the Key Biodiversity Areas of the Philippines.

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RestoreSAT: a geospatial foundation model for Wall-to-Wall restoration outcome classification across Southeast Asia

Andi Qur'Ani Ratu Sabrina Arham Putri

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Abstract

Ecosystem restoration is a central lever for achieving the Kunming-Montreal Global Biodiversity Framework (KM-GBF) Target 2 and the Bonn Challenge. Yet, operational Monitoring, Reporting, and Verification (MRV) systems for tropical restoration remain fragmented, single-sensor, and biased toward binary success labels. We introduce RestoreSAT, a fine-tuned variant of the NASA-IBM Prithvi-EO-2.0 geospatial foundation model for wall-to-wall three-class restoration outcome classification (*success*, *partial recovery*, *failure*) across ten ASEAN nations. RestoreSAT ingests fused Sentinel-1 C-band SAR backscatter and Sentinel-2 multispectral time series (2019–2025) using a temporal cross-attention head and is trained on 2,143 verified restoration polygons harvested from Restor.eco, WRI Global Restoration Initiative, and Bonn Challenge national pledges. Predictions are independently validated against GEDI L2A canopy height and 312 CIFOR field plots. Across ASEAN, RestoreSAT achieves a macro-F1 of 0.87 (95% CI: 0.84–0.89) and outperforms a U-Net + LSTM baseline by +14.2 F1 points and a Segformer-B3 baseline by +6.8 F1 points. This while requiring 63% fewer labels than the fully supervised baseline. Uncertainty is quantified via Monte Carlo dropout and conformal prediction, yielding pixel-level 90% coverage intervals. National aggregations reveal that only 38% of pledged restoration hectares in Southeast Asia meet the "success" criterion by year 5 with the largest performance gap in dryland Myanmar and lowland Sumatran peat.

About the presenter

Andi Qur'ani Ratu Sabrina Arham Putri is a researcher and student at Politeknik Keuangan Negara STAN, Indonesia. Her interests are public finance, taxation, economic policy, and quantitative economic analysis. She applies empirical, data-driven methods to policy questions. One example is a difference-in-differences study of Indonesia's policy on retaining natural-resource export proceeds and its effects on domestic financial instruments and foreign-exchange reserves. She is also interested in environmental taxation, maritime logistics, and investment. She combines econometrics with data visualisation to produce actionable policy insights.



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Assessing biodiversity and ecosystem loss and damage from extreme weather events: a Philippines case study

Neil Aldrin D. Mallari¹, Jennica Paula C. Masigan¹, Jhonny Wyne B. Edaña¹, Kristine Joy P. Andaya¹, Clark Jerome S. Jasmin¹, Quennie Ann E. Uy¹, Regina Aedrianne Felismino-Innovejas¹, Rhiana Angelita R. Parr¹, Oliver G. Coroza¹, Mary Ann C. Bautista¹

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Abstract

Extreme weather events increasingly threaten biodiversity and ecosystems, yet their ecological impacts are often insufficiently quantified, particularly in regions that are characterized by high biodiversity and vulnerability, like the Philippines. This case study explores a comprehensive, integrated assessment of biodiversity and ecosystem-based loss and damage following Typhoon Rai (Odette) in Palawan, Philippines. We performed a change detection analysis using a combination of high-resolution mapping and shifts in species richness and habitat suitability tests. In this study, we documented substantial conversion of closed forest areas into open forests and non-forest landscapes, which affected 57% (125,581 hectares [ha]) of the 221,126 ha of total forests in the hazard footprint. The resulting habitat contraction and fragmentation present high risks to indicator species, emphasizing the necessity for standardized, spatially explicit methodologies in post-disaster ecological assessments. This study demonstrates the feasibility of integrating biodiversity and ecosystem metrics into non-economic loss and damage assessment frameworks. This approach deepens understanding by elucidating the ecological consequences of extreme weather events and supports evidence-based strategies for disaster risk reduction, recovery, and restoration planning to effectively address critical habitat and biodiversity losses within tropical systems.

About the presenter

Dr. Neil Aldrin D. Mallari is a conservation scientist with more than three decades of experience in biodiversity conservation, climate resilience, and sustainable development. He is President and Chief Scientist of the Center for Conservation Innovations Philippines, following senior roles with Fauna & Flora International and the Haribon Foundation. He co-developed the LAWIN Forest and Biodiversity Protection System and the Enhanced Biodiversity Monitoring System. He also co-led the Sukat ng Kalikasan natural capital accounting framework and developed the Green Assessment and Recovery Framework. He has authored nearly 50 publications, including the Philippine Red Data Book. He holds a PhD in Ecology from Manchester Metropolitan University. He is a 2025 laureate of The Outstanding Filipino Awards, an Ashoka Fellow, and a National Geographic Explorer.

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Early Detection of the Globally Invasive Little Fire Ant (*Wasmannia auropunctata*) in the Philippines: Lessons for Biodiversity Surveillance and Biosecurity in ASEAN

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Abstract

Biological invasions are an increasing threat to biodiversity, ecosystem resilience, and sustainable agricultural landscapes across Southeast Asia. The little fire ant, *Wasmannia auropunctata*, is among the world's most damaging invasive ant species, causing significant ecological, agricultural, and public health impacts. As its invasive range continues to expand across Asia, established populations have been reported from Taiwan, China, and Japan, while interceptions associated with agricultural trade have been documented in Thailand, highlighting the increasing risk of spread within Southeast Asia. Although *W. auropunctata* has previously been reported from the Philippines, these records lacked specimen-based taxonomic verification, leaving its occurrence in the country unconfirmed. This study provides the first confirmed record of *W. auropunctata* in the Philippines based on morphological examination of voucher specimens collected during standardized field surveys in Mindanao. Ant communities were sampled along transects in cacao plantations and adjacent forest vegetation using baiting, vegetation beating, Winkler extraction, and active searching. *W. auropunctata* was detected at two adjacent sites approximately 20 km east of Iligan City but was absent from three surveyed sites closer to the urban center. At occupied sites, the species was consistently recovered across multiple sampling methods and microhabitats, indicating established populations rather than an isolated introduction. Although the pathway of introduction remains uncertain, the movement of planting materials, agricultural commodities, and other trade-related activities is considered the most plausible mechanism. This study fills an important knowledge gap in the distribution of *W. auropunctata* in Southeast Asia and underscores the importance of specimen-based verification, routine invasive species surveillance, and strengthened regional biosecurity collaboration to enable early detection and rapid response across the ASEAN region.

About the presenter

April Rose P. Monding is a Filipino biologist specialising in the taxonomy, systematics, and conservation of ants (Hymenoptera: Formicidae). She combines field inventories with modern taxonomic and molecular techniques to document ant diversity in Mindanao and the wider Philippines. She earned her BS in Biology (Biodiversity), magna cum laude with a Best Thesis Award, and her MS in Biology from Mindanao State University – Iligan Institute of Technology. She completed both degrees as a Department of Science and Technology scholar. In 2024 she completed a research internship at the University of California, Davis, training in ant identification, DNA extraction, and imaging.

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Beyond protected areas: a science-based community conservation framework for the South Philippine Hawk-eagle (*Nisaetus pinskeri*) in Leyte, Philippines

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Abstract

The South Philippine Hawk-eagle (*Nisaetus pinskeri*) is a globally threatened island-endemic raptor found only in the Philippines and is among the country's least-studied birds of prey. Despite its conservation significance, the species currently lacks a dedicated national conservation program, and little is known about effective strategies for protecting its breeding territories, particularly those occurring outside protected areas. In 2025, an active nesting territory was documented in Barangay Mahagnao, Burauen, Leyte, on privately owned agricultural land beyond the national protected area system. This presented a rare opportunity to develop and evaluate a science-based conservation approach for one of the Philippines' most threatened yet overlooked raptors. Long-term nest monitoring, habitat assessments, and stakeholder engagement identified agricultural expansion, habitat conversion, and the absence of formal habitat protection as the primary threats to the nesting territory. Rather than relying solely on species protection under existing legislation, ecological findings were translated into a collaborative conservation framework integrating local communities, private landowners, local government units, the Department of Environment and Natural Resources, and the Protected Area Management Board. This approach resulted in the initiation of local conservation policies, formal recognition of the species as a municipal flagship, long-term monitoring commitments, habitat restoration initiatives, and the development of a proposed Conservation Estate model promotes voluntary landowner stewardship, biodiversity-friendly farming, seasonal nest protection, and incentive-based conservation on privately owned lands. The Mahagnao case demonstrates how ecological research can be transformed into practical conservation action through landscape-scale governance beyond conventional protected area boundaries. More importantly, it provides a replicable decision-support framework and a pilot Conservation Estate approach that can be tested and adapted for newly discovered South Philippine Hawk-eagle nesting territories and other threatened forest raptors occupying unprotected landscapes throughout the Philippines and the broader ASEAN region.

About the presenter

Tristan Luap P. Senarillos is an early-career raptor biologist at the Philippine Eagle Foundation (PEF). He is also an MS Wildlife Science student at the University of the Philippines Los Baños. He joined PEF as a volunteer in 2015 and full-time in 2018. Since then he has led Philippine Eagle expeditions and biodiversity assessments that documented previously unrecorded eagle pairs. His current research focuses on the breeding ecology, habitat, and conservation

of the globally endangered South Philippine Hawk-eagle (Nisaetus pinskeri). He works with government agencies, local communities, and conservation organisations.

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Progress towards effective marine protected area management in Indonesia: a national assessment of management effectiveness (2021-2025)

Lusita Meilana^{1*}, Amehr Hakim⁶, Ririn Widiastutik⁶, Dedy Eka Syaputra⁶, Rusdatus Sholihah⁶,
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Abstract

The Kunming–Montreal Global Biodiversity Framework emphasizes that achieving marine conservation targets requires not only expanding Marine Protected Area (MPA) coverage but also improving management effectiveness. Indonesia has substantially increased the number of MPAs over the past decade; however, understanding whether management quality has improved alongside this expansion remains a critical challenge. This study evaluated the management effectiveness of Indonesian MPAs from 2021 to 2025 using the national Management Effectiveness Evaluation (MEE) database covering 127 MPAs. Management performance was classified into three categories: Minimum, Optimum, and Sustainable, enabling assessment of temporal trends in conservation performance. The results demonstrate a steady improvement in management effectiveness across the national MPA network. The number of MPAs achieving Minimum management increased from 37 in 2021 to 57 in 2025, while those reaching the Optimum category more than doubled from 24 to 58, becoming the dominant management level by 2025. The number of Sustainable MPAs increased from none in 2021 to 12 in 2025, although this represents a slight decline from 13 in 2024, indicating that maintaining the highest management standard remains challenging. Overall, these findings suggest that Indonesian MPAs are progressively transitioning from minimum toward optimum management; however, further investment in institutional capacity, sustainable financing, monitoring, and adaptive governance is required to increase the number of sustainably managed MPAs. This study highlights the importance of evaluating management effectiveness alongside area-based conservation targets and provides evidence to support implementation of Indonesia's marine conservation strategy and the Kunming–Montreal Global Biodiversity Framework.

About the presenter

Lusita Meilana is a Research Fellow at the Center for Coastal and Marine Resources Studies, IPB University, Indonesia. She specialises in marine protected areas, marine spatial planning, and coastal ecosystem conservation. She holds advanced degrees from Xiamen University, China. She is a member of the

Horseshoe Crab Specialist Group of the International Union for Conservation of Nature Species Survival Commission. She uses spatial decision-support tools such as Marxan, InVEST, and geographic information systems to assess conservation priorities, ecosystem services, and coastal risks. She has published on the management effectiveness of marine protected areas in Indonesia. She also leads community-based efforts to reduce horseshoe crab bycatch. She was Principal Investigator for the Asian Horseshoe Crab Population Survey 2024 in Indonesia.

Advancing Biodiversity Enhancement in ASEAN:

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Revisiting and Updating the Key Biodiversity Areas of the Philippines

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Abstract

Key Biodiversity Areas (KBAs) are critical areas for the persistence of global biodiversity. National governments have been using KBAs to measure their progress towards the 30x30 Kunming-Montreal Biodiversity Framework target. The Philippines identified 228 KBAs in 2006 and 2009 respectively for the terrestrial and marine areas. These KBAs were revisited and reassessed using the 2016 IUCN KBA Global Standard. Since 2024, we have undertaken national and regional workshops and consultations with experts and data stakeholders, literature reviews, compiled biodiversity records across various platforms, to review and update these legacy KBAs and evaluate new sites. As of July 2026, a total of 316 KBAs have been identified, of which 185 are terrestrial, 102 are marine, and 29 are integrated KBAs (sites that have both terrestrial and marine components), for a total of 1,815 trigger species, of which 71% are endemic to the country and 47% are threatened. These KBAs cover approximately 26% of the country's terrestrial area and 22% of the Philippine maritime domain. During the process, the following key learnings emerged: (1) there is a paucity of population assessments for most of the major taxonomic groups, which challenged the application of the species-based criteria with population thresholds; (2) the broad natural distributions of many marine species and the non-contiguity of marine habitats caused by the country's archipelagic nature reduce the likelihood of smaller marine sites qualifying under the species-based criteria and thresholds; (3) mapping of ecosystems and undertaking ecosystem threat assessment are necessary to enable us to apply the ecosystems-based criteria; and (4) many sites may not meet global thresholds but remain critical to Philippine biodiversity conservation, emphasizing the need to develop national standards that incorporate the local context and dynamics in KBA identification. Despite these challenges, the KBA Framework continues to help shape the operationalization of the Philippine Biodiversity Strategy and Action Plan and supports evidence-based conservation planning at the national scale. The strengthening of the KBA National Coordination Group will also be crucial to ensure the integration and long-term adoption of the KBA framework in conservation planning and management in the Philippines.

About the presenter

Dr. Hazel O. Arceo is a Professor in the Department of Biology and Environmental Science, University of the Philippines (UP) Cebu, specialising in marine ecology. She holds a BS Marine Biology from the University of San Carlos and an MS Marine Science from the UP Marine Science Institute. She earned her doctorate from the University of Nice-Sophia Antipolis, France, where she studied how well marine protected areas (MPAs) sustain small-scale fisheries. Her research covers fish biology, coral reef ecology, and biodiversity conservation. She oversees the Philippine MPA Database. She also chairs the Sub-Committee on Marine Bony Demersal Fishes of the Philippine Aquatic Red List Committee.

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Carbon storage contributions of remnant forest patches in Banana-dominated agroecosystems in Southern Philippines

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Abstract

Agricultural expansion continues to reduce forest cover in tropical landscapes, threatening biodiversity and diminishing ecosystem services such as carbon sequestration. Remnant forest patches embedded within agricultural landscapes may serve as important nature-based solutions by maintaining carbon stocks while supporting productive land use. This study quantified and compared carbon stocks in five biomass pools (overstorey, understorey, litter, roots, and soil) between remnant forest patches and adjacent banana (*Musa* spp.) agroecosystems in Bukidnon, Southern Philippines. A total of 54 nested sampling plots were established across nine paired forest patch-banana plantation sites. Carbon stocks were estimated using standard biomass assessment methods and compared between land uses. Remnant forest patches stored significantly greater biomass carbon than adjacent banana agroecosystems, with total biomass carbon averaging $106.39 \pm 88.40 \text{ Mg C ha}^{-1}$, approximately two to three times higher than that of banana plantations. Forest patches also exhibited significantly higher carbon accumulation ($2.62 \pm 2.18 \text{ Mg C ha}^{-1} \text{ yr}^{-1}$) and CO_2 fixation rates ($9.60 \pm 7.98 \text{ Mg CO}_2\text{-eq ha}^{-1} \text{ yr}^{-1}$). Most carbon in forest patches was stored in the overstorey (65–75%), whereas banana agroecosystems stored proportionally more carbon in pseudostems and litter due to routine crop residue retention. Although soil organic carbon did not differ significantly between land uses, the substantially greater biomass carbon stored in remnant forest patches demonstrates their critical contribution to landscape-level climate regulation. The findings highlight the importance of conserving and restoring remnant forest patches within agricultural landscapes as cost-effective nature-based solutions for enhancing carbon sequestration while maintaining agricultural production. Integrating these forest remnants into land-use planning can contribute to climate change mitigation and support more sustainable tropical agricultural landscapes.

About the presenter

Dr. Adrian M. Tulod, FHEA, is a registered forester, restoration ecologist, and Associate Professor at the Institute of Renewable Natural Resources, College of Forestry and Natural Resources, University of the Philippines Los Baños (UPLB). He previously spent more than 17 years at Central Mindanao University. He holds a PhD in Forestry (Restoration Ecology) from the University of Canterbury, New Zealand, and MS and BS degrees in Forestry from UPLB. His research covers forest restoration and regeneration, forest health, plantation forestry, carbon storage and accounting, and biodiversity. Recent work includes gall rust in falcata plantations and carbon storage in forest and agroforestry systems. He has led projects funded by the Department of Science and Technology's Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development, and by the Commission on Higher Education.

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Integrating green and blue carbon for coastal nature-based solutions: a framework for climate mitigation in Southeast Asian urban regions

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Abstract

Coastal cities in Southeast Asia are experiencing rapid urbanization, increasing climate risks, and accelerating transformation of coastal ecosystems. These urbanized coastal landscapes contain critical carbon-rich ecosystems, including mangrove forests, tidal wetlands, seagrass ecosystems, and urban green spaces, which provide essential ecosystem services for biodiversity conservation, carbon sequestration, and climate mitigation. However, current approaches to urban climate mitigation often emphasize carbon emission reduction while insufficiently integrating the ecological functions of green and blue carbon systems within coastal city regions for carbon sink enhancement. This study proposes an Integrated Green–Blue Carbon System (i-GBCS) framework to advance nature-based solutions (NbS) for climate mitigation and ecosystem restoration in coastal cities. Building upon a systematic synthesis of global green and blue carbon research, the study first identifies the evolution, major themes, and knowledge gaps in carbon sequestration research. The synthesis reveals that existing studies increasingly recognize the importance of ecosystem-based climate solutions but remain fragmented between terrestrial and marine carbon systems, ecological conservation, and urban planning practices. Drawing upon empirical investigations of coastal urban regions in Southeast Asia, including analyses of carbon emission patterns, carbon sink capacity, spatial heterogeneity, and land–water interactions, this study further demonstrates the complex relationships between urban development, landscape structures, and coastal carbon dynamics. These findings suggest an integrated perspective that considers terrestrial vegetation, coastal ecosystems, urban spatial patterns, and ecological connectivity as interconnected components of climate mitigation strategies. The proposed i-GBCS framework integrates three interconnected dimensions: (1) ecological processes, focusing on carbon flows, land-sea carbon transfer, and ecosystem interactions; (2) spatial and methodological approaches, incorporating multisource data integration, remote sensing, spatial analysis, and carbon assessment methods; and (3) planning and governance pathways, promoting carbon management and cross-sectoral collaboration and coordination. By positioning coastal cities as interconnected social–ecological systems rather than isolated urban areas, this framework provides a science-based pathway for enhancing biodiversity conservation, carbon sequestration, and climate resilience in ASEAN coastal regions. The study contributes to advancing nature-based solutions by bridging carbon science, landscape ecology, and urban planning, supporting future restoration and climate mitigation initiatives across Southeast Asian coastal cities.

About the presenter

Dr. Ainun Hasanah is a Postdoctoral Researcher at the School of Architecture, South China University of Technology. She holds a PhD in Urban and Rural Planning from Wuhan University. Her research covers

climate mitigation, urban carbon dynamics, landscape ecology, and climate resilience in Southeast Asian coastal regions. She uses spatial analysis and remote sensing to study carbon emissions and sequestration in rapidly urbanising areas. She was an external reviewer for the Intergovernmental Panel on Climate Change's Special Report on Climate Change and Cities and 2027 Methodology Report on Short-lived Climate Forcers. She also reviews for several international journals.

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Designing a Sponge City with Nature-based Solutions: From Flood-Risk Mapping to Resilient Urban Landscapes in Cirebon, Indonesia

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Abstract

Across Southeast Asia, rapidly urbanising coastal cities face increasingly complex water risks, where river sedimentation, coastal accretion, tidal inundation and urban waterlogging interact with vulnerable communities and degraded ecosystems. Addressing these risks requires moving beyond conventional grey infrastructure towards integrated, landscape-scale approaches that work with natural processes.

This presentation will introduce the ASEAN Nature-based Solutions (NbS) Catalogue and Platform and then presents Cirebon Water-sensitive City as the first NbS pilot application. Cirebon Port-City provides a practical case for demonstrating how a flood-prone and environmentally vulnerable urban area can be transformed into a more resilient sponge city.

The approach begins with flood-risk assessment and spatial mapping, identifying how river, coastal and urban water processes interact. Planning green and blue infrastructure, including river corridors, wetlands, retention areas, urban green spaces and other nature-based interventions aims at slowing, storing, filtering and safely conveying water while restoring ecological functions.

The case demonstrates how biodiversity science, hydrological risk assessment and spatial planning can be connected to create practical pathways from risk mapping to NbS investment and implementation.

About the presenter

Sebastien Goethals is the NbS Project Lead of the TAF-GTEI (Technical Assistance Facility - Green Team Europe) and the author of the ASEAN Nature-based Solutions (NbS) Catalogue. Under the ASEAN NbS Platform, he leads three pilots: regenerative agroforestry in the Selangor River Basin, Malaysia; marine and coastal biodiversity conservation in the Ticao-Burias Pass Protected Seascape in the Philippines; and the Water-sensitive Green Port City project in Cirebon, Indonesia. Based in Kuala Lumpur, he founded Citilinks and Naturelinks, which advance ecological restoration through integrated planning, design, governance, and finance.

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Carbon Stocks and Emission Estimation in the Maludam and Agusan Peat Landscapes, EnCORE Wetlands Project

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Abstract

Under the EnCORE Wetlands Project, carbon stocks and greenhouse gas (GHG) emissions were assessed in two representative peatland landscapes: Maludam, Sarawak, Malaysia, and Agusan, Agusan del Sur, Philippines. The assessment aimed to test and apply selected methodologies, and to generate initial baseline information on carbon stocks and emission levels across different land use and management conditions. The results provide indicative information on the distribution and variation of carbon stocks and GHG emissions, across the assessed sites, highlighting the influence of land use, hydrological conditions, and peat properties on carbon storage and emission dynamics. The approaches and lessons from the assessment can support evidence-based peatland management, conservation, restoration, and climate adaptation planning for both landscapes, while contributing to the development of harmonised assessment approaches across the ASEAN region.

About the presenter

Siti Noor Fitriah Azizan is a Senior Programme Officer with the Peatland Programme at the Global Environment Centre (GEC), Malaysia. Her background is in peatland greenhouse gas emissions, carbon-nitrogen dynamics, soil microbiology, and biogeochemistry. She holds a PhD in Agriculture from Meiji University, Japan; an MPhil in Ecological Engineering from Universiti Teknologi Malaysia; and a BSc (Hons) from Universiti Malaysia Sarawak. At GEC she applies this expertise to practical peatland management. She currently works on carbon assessment and capacity building under the EnCORE Wetlands Project with the ASEAN Centre for Biodiversity.

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From planting to regeneration: five years of science-based peat swamp forest restoration using threatened native dipterocarps in Brunei Darussalam

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Abstract

Tropical peat swamp forests are among the world's most carbon-dense ecosystems and support exceptional biodiversity, yet extensive logging, drainage and fire have left many peatlands across Southeast Asia severely degraded. Restoring these ecosystems requires science-based approaches that utilise native peat-specialist species while generating long-term evidence to guide restoration practice. However, field evaluations of threatened dipterocarp performance under restoration remain scarce. This study assesses the establishment and early restoration outcomes of two threatened peat swamp dipterocarps, *Rubroshorea albida* (Vulnerable) and *Dryobalanops rappa* (Endangered), within the Badas Tree Planting Project, a long-term peat swamp forest restoration programme in Brunei Darussalam. Across two restoration phases, 535 saplings were planted over 5.94 ha and monitored using a standardised framework that records survival, height, diameter at breast height (DBH), and leaf production. Five years after planting, *Rubroshorea albida* maintained an overall survival of 21%, with 70 surviving individuals now functioning as small trees. Survivors achieved a mean height of 3.14 m, a maximum height of 7.40 m, and a maximum DBH of 12.99 cm, demonstrating sustained growth. Meanwhile, *Dryobalanops rappa* maintained 89% survival after six months, accompanied by continued increases in height and stem diameter, indicating successful early establishment under degraded peat swamp conditions. These findings demonstrate that threatened native dipterocarps can contribute to peat swamp forest restoration through sustained establishment, natural regeneration potential, and locally adapted planting material. Long-term monitoring provides essential evidence for adaptive restoration management and offers practical guidance for peatland restoration initiatives across Brunei and the wider ASEAN region.

About the presenter

Dr. Salwana Md Jaafar is a tropical ecosystem ecologist and Lecturer at the Institute for Biodiversity and Environmental Research (IBER), Universiti Brunei Darussalam (UBD). Her research covers tropical forest ecology, biodiversity conservation, ecosystem restoration, and nutrient cycling, focusing on the peat swamp and heath forests of Brunei Darussalam. Her topics include long-term forest change, plant-soil interactions, and litter decomposition. She is involved in long-term peat swamp forest restoration research using threatened native dipterocarps. She also contributes to ecological monitoring, native tree planting, and campus greening through IBER and the UBD Botanical Research Centre.

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Rescuing trees from extinction: growth performance and carbon storage of threatened native trees in BINHI Arboreta and Tree Parks

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Abstract

The increasing interest in native tree plantations in the Philippines highlights the need for baseline information on the growth and survival of indigenous species under field conditions. This study assessed the survival and growth performance of threatened native tree species established in the BINHI arboreta and tree parks of the Energy Development Corporation (EDC) to support conservation, restoration, and reforestation efforts. A complete inventory was conducted across 54 arboreta and tree park sites, covering 3,712 trees representing 107 native species. Measurements of diameter at breast height (DBH), merchantable height, and total height were compared with baseline planting records. Tree volume, biomass, carbon stock, mortality, and growth rates were estimated using standard forestry methods, while differences among species and sites were analyzed using descriptive statistics and one-way ANOVA. Growth performance varied considerably among species and locations. Piling-liitan (*Canarium luzonicum*), manggis (*Koompassia excelsa*), and bani (*Pongamia pinnata*) exhibited the highest growth increments, indicating strong adaptation to plantation conditions. In contrast, threatened dipterocarps such as Mindanao narig (*Vatica elliptica*), Basilan apitong (*Dipterocarpus eurhynchus*), and Mindanao narek (*Hopea brachyptera*) showed relatively lower growth rates. Basilan apitong recorded the highest mortality rate (33.33%). The plantations collectively stored 46.91 Mg C, with Sorongon Tree Park in Digos City, Davao del Sur contributing the largest carbon stock at 7.47 Mg C (15.93% of the total). The results demonstrate the potential of several threatened native tree species for plantation establishment and highlight the value of arboreta and tree parks as platforms for conservation, species recovery, restoration planning, and long-term ecological monitoring. These findings provide important guidance for species selection and management in future native tree-based reforestation programs in the Philippines.

About the presenter

Prof. Pastor L. Malabrigo Jr. is a Professor at the University of the Philippines Los Baños (UPLB) specialising in plant taxonomy, biodiversity conservation, forest restoration, and nature-based solutions. He has been curator of trees at the UPLB Museum of Natural History since 2012. He is known as the "Indiana Jones" of Philippine native trees for his work rescuing and documenting the country's rarest species. He has authored more than 250 scientific papers and 13 books, including the National Book Award-winning Shades of Majesty: 88 Philippine Native Trees. He is the only Filipino member of the Global Tree Specialist Group of the International Union for Conservation of Nature (IUCN) Species Survival Commission. He leads the IUCN Red

List assessment of Philippine endemic and native trees. His awards include UPLB Outstanding Researcher in Natural Sciences (2024).

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Strategic mangrove restoration can deliver consistently high biodiversity support benefits across climate futures

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Abstract

Mangrove ecosystems are central to global restoration agendas, yet the extent to which restoration can support associated assemblages under climate change remains insufficiently understood. Here, we develop a global spatial optimization framework that integrates ensemble species distribution models for 2,391 mangrove-associated species with multidimensional biodiversity metrics, ecological suitability and land-use feasibility to project mangrove-associated biodiversity patterns and restoration priorities across baseline and future climates, under three shared socioeconomic pathways (SSP1-2.6, SSP3-7.0 and SSP5-8.5) for 2050 and 2100. Our results indicate declines in mangrove-associated species richness and functional distinctiveness across several tropical mangrove regions, whereas weighted rarity shows a comparatively less negative response under future climates. In comparison, subtropical regions exhibit overall increases across the three biodiversity dimensions. Despite these changes, the broad geography of restoration priority remains stable across climate futures, with Southeast Asia consistently representing the largest concentration of priority areas. Restoring 30% of feasible area captures 44.77-49.33% of potential biodiversity support, indicating that strategically targeted mangrove restoration can contribute efficiently to global biodiversity targets. These findings highlight the need to place biodiversity support more centrally in restoration planning under future climate and land-use change.

About the presenter

Hao Ngo is a lecturer and researcher at the Faculty of Development Economics, University of Economics and Business, Vietnam National University, Hanoi. Hao Ngo's research examines how mangroves can be planned and managed to support biodiversity conservation, blue carbon, and coastal resilience under climate and land-use change. The work combines spatial analysis, ecological modelling, and multi-criteria coastal planning. Recent projects assess the biodiversity value of global mangrove restoration under future climate scenarios, cumulative human impacts on Southeast Asian mangroves, and links between mangrove carbon priorities and flood-exposed populations in Viet Nam.

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Beyond tree planting: lessons from forest landscape restoration in northern Vietnam

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Abstract

Forest Landscape Restoration (FLR) is increasingly promoted across Southeast Asia as a nature-based solution to restore degraded landscapes, conserve biodiversity, strengthen climate resilience, and support local livelihoods. However, in practice, restoration is often equated with tree planting, raising concerns about whether current approaches can deliver the multiple ecological and social outcomes envisioned by FLR. Empirical evidence on how restoration policies are interpreted, implemented, and experienced by local communities remains limited in Vietnam. This study, conducted as part of the author's Master's research at the Australian National University in 2025, examines the implementation of FLR in Thai Nguyen Province, northern Vietnam, using a qualitative case study informed by the FLR framework developed by Chazdon and Brancalion (2019). Data were collected through interviews with eight expert stakeholders, 32 semi-structured interviews, and eight gender-disaggregated focus group discussions with local communities. Thematic analysis was employed to explore stakeholders' perspectives on restoration practices, ecological outcomes, and livelihood impacts. The findings reveal a fundamental trade-off in Vietnam's current FLR approach. Restoration efforts centred on exotic Acacia monocultures have generated important economic benefits and improved household livelihoods; however, these gains have come at the expense of broader ecological objectives. Participants consistently perceived Acacia plantations as providing limited biodiversity benefits, fewer ecosystem services, and lower resilience to climate-related disturbances, while increasing vulnerability to pests and diseases. The study also found that current restoration practices may reinforce existing social inequalities by limiting meaningful participation and equitable benefit sharing for women, poorer households, and young people. These findings suggest that increasing tree cover alone is insufficient to achieve the broader goals of Forest Landscape Restoration under climate change. Moving beyond monoculture tree planting towards more diverse restoration approaches, including native tree species, agroforestry, assisted natural regeneration, and inclusive governance, can better balance biodiversity conservation, climate resilience, and sustainable livelihoods. These lessons contribute to restoration science and provide practical recommendations for strengthening FLR policy and practice in Vietnam and across the ASEAN region.

About the presenter

Yen Le is an environmental and climate resilience practitioner with more than 13 years of experience with international non-government organisations and development organisations in Viet Nam and Southeast Asia. Her work covers climate resilience, natural resource management, biodiversity conservation, and inclusive livelihoods for ethnic minority communities and women. She holds a Master of Environment (Advanced) from the Australian National University as an Australia Awards scholar. Her master's research was on forest landscape restoration in Thai Nguyen Province. She was a Hubert H. Humphrey Fellow at Cornell University

from 2020 to 2021. She is currently an Agribusiness Resilience Specialist on the SPRINT Project, funded by Global Affairs Canada.

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The benefits of mangrove restoration and conservation efforts to coastal communities in Timor-Leste

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Abstract

Mangrove ecosystems are vital for the ecological and socio-economic resilience of coastal communities, underpinning the well-being and deep ecological-cultural relationship of the indigenous people of Suai-loro in Covalima Municipality. Despite their importance, this ecosystem faces increasing degradation from improper domestic waste management, uncontrolled livestock grazing, illegal logging and settlement expansion. To counter these threats, the GEF Ikan Adapt project is collaborating with indigenous people, coastal communities and local stakeholders on fisheries and aquaculture adaptation through community-based ecological mangrove restoration approach. Activities involved are community-led mangrove clean-ups, mangrove education campaign, supporting domestic waste management and planning to implement *tara-bandu* (customary prohibition) program to ensure long-term ecosystem protection. These initiatives are designed to directly link a healthy mangrove ecosystem to improved local livelihoods, thereby valuing and preserving both the ecological and cultural heritage of the area. Presenting the project's framework and initial findings, demonstrating that integrated interventions which address both ecological degradation and socio-economic needs are essential for achieving durable mangrove restoration, effective climate adaptation, and enhanced community resilience. Critically, indigenous communities remain heavily dependent on these ecosystems for food, livelihoods, and materials for traditional cultural housing.

About the presenter

Junior Gama Pinto is a Timorese aquatic ecologist and fisheries professional. He is a Research Analyst (Human and Ecological Research) at WorldFish Timor-Leste. He works on ecological assessments, fisheries and climate data analysis, bathymetry mapping, mangrove restoration, and environmental education. He holds a degree in Fisheries and Marine Science from Universidade Nacional Timor Lorosa'e. His work links ecological sustainability with the livelihoods of coastal and fisheries-dependent communities. He previously coordinated a study on mangroves and community livelihoods funded by the United Nations Development Programme. He has contributed to regional initiatives, including the Regional Congress of the Partnerships in Environmental Management for the Seas of East Asia. He has also contributed to activities of the Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security. He speaks Tetun, Portuguese, English, and Indonesian.

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25 Years of Ex-Tin Mine Rehabilitation: Challenges, Lessons Learned and Opportunities

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Abstract

For over a century, tin mining played an important role in Malaysia's economic development, following the discovery and exploitation of alluvial tin deposits, particularly in the Kinta Valley, Perak and Klang Valley, Selangor. The expansion of tin mining had altered the landscape. Areas that were once covered by forest were altered through extensive vegetation clearance, soil disturbance and major changes in land-use. Upon closure, these ex-tin mines were progressively converted to urban areas, recreational parks, residential areas and agricultural land, while only a small proportion of the mines remained barren and unproductive. Recognising the need to rehabilitate these degraded landscapes, Forest Research Institute Malaysia (FRIM) initiated a rehabilitation programme in 1999 at a 121 ha ex-tin mining site, known as FRIM Research Station in Bidor (SPF Bidor) initially focusing on the establishment of forest plantation trials using cost-effective rehabilitation approaches. The site comprises predominantly sand, slime and sandy slime tailings interspersed with mining ponds. Sand tailings are characterised by high soil temperature, nutrient deficiency and low water-holding capacity, whereas slime tailings have high water-retention capacity and are prone to waterlogging during monsoon season. Initial planting trials focused mainly on exotic plantation species owing to their relatively high survival rates and only several native species were initially tested. These early trials provided an important foundation for understanding species performance and site constraints and have since contributed to the long-term rehabilitation of the former mining landscape with more shade-tolerant species. Over time, these tree stands transformed the harsh conditions of the ex-tin mine into habitats capable of supporting a wider range of native flora and fauna, including threatened tree species. After 25 years of rehabilitation, SPF Bidor now supports more than 110 native tree species, together with diverse bird and fungal communities, demonstrating substantial biodiversity recovery under challenging site conditions. SPF Bidor continues to provide valuable opportunities for research on rehabilitation techniques, species establishment and carbon sequestration, while also serving as an important educational and training site for students.

About the presenter

Dr. Wai Mun Ho is a Research Officer in the Ecophysiology Branch, Forest Plantation Programme, Forestry Biotechnology Division at the Forest Research Institute Malaysia. He holds a PhD in Forest Environmental Science from Seoul National University (2008), specialising in silviculture and restoration ecology. In 2025 he became an International Society of Arboriculture Certified Arborist. His research interests include plant physiology, carbon sequestration, rehabilitation and afforestation of degraded areas and problematic soils, and phytoremediation.

POSTER PRESENTATIONS



Advancing Biodiversity Enhancement in ASEAN:

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Harnessing UAV imagery and AI for automated native canopy tree species detection in Brunei's hyperdiverse tropical forest

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Abstract

Identifying native tree species within forests is a crucial component in forest inventory and biodiversity assessment. Leveraging uncrewed aerial vehicles (UAV) and artificial intelligence (AI) in the pipeline would offer a cost-effective, time-efficient, and minimally destructive approach while ensuring wide coverage over remote forest areas. Despite the availability of industrial-grade drones and advanced AI detection models, annotated datasets for tropical tree species remain scarce, limiting AI model development for species detection in the high-diversity forest of the Southeast Asian tropics. For this reason, this study aims to develop a benchmark dataset for canopy-layer tree detections in the dense, biodiverse and intact forests of Brunei Darussalam. UAV image datasets annotated with several tree species native to Borneo, including *Gymnostoma nobile* and *Symplocos polyandra* will be utilised in an automated tree species detection pipeline incorporating one of the latest versions of You Only Look Once (YOLO) object detection model, i.e. YOLO26. The dataset is derived from forest dynamic plots in intact heath forest areas at the Universiti Brunei Darussalam (UBD) Botanical Research Centre and consists of high-resolution RGB drone imagery annotated according to precise in-image tree positions. Preliminary results will be discussed during the presentation, highlighting the performance metrics of single- or multi-class tree species detection and showcasing the model implementation to detect native trees across UBD campus' forested areas. This dataset will be further expanded to encompass native tree species across Brunei in an automated pipeline with the addition of georeferencing capabilities to map individually detected trees. Thus, establishing a foundation for training and benchmarking AI-based species detection models tailored for national forest inventories in Brunei with a workflow supporting scalable biodiversity assessment and long-term ecological monitoring.

About the presenter

Zulfadli Mawardi has been a Research Assistant at the Institute for Biodiversity and Environmental Research, Universiti Brunei Darussalam, since 2024. He holds a Master of Geospatial Science from RMIT University, Australia, and a BSc in Meteorology and Climate from the University of Reading, United Kingdom. His work covers field research and biodiversity database management, including a tree census across the mixed dipterocarp and mangrove forests of Brunei Darussalam. His research applies artificial intelligence and geospatial technologies to biodiversity, particularly data mining of biodiversity literature and drone-assisted tree species identification.



Development of deep learning-based object detection Models to Monitor Philippine Long-tailed Macaques (*Macaca fascicularis*) using camera trap data: potential applications in the surveillance of Philippine Mammals

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Abstract

Camera trapping has become an indispensable, minimally-invasive tool for wildlife monitoring, but the increasing volume of images generated by camera-trap surveys has created a major bottleneck in data processing, as image sorting and species identification remain largely dependent on manual annotation. This study developed and evaluated deep learning-based object detection models for the automated detection of the Philippine long-tailed macaque (*Macaca fascicularis*) from camera-trap images and explored their potential application in wildlife monitoring. Using transfer learning and structured data pre-processing, a total of 3947 images collected from 40 camera traps established across field transects in the Puerto Princesa Subterranean River National Park, Palawan, Philippines were used to train three object detection architectures – Faster R-CNN, RF-DETR, and YOLOv11. Images were annotated using Roboflow Annotate and split into training (70%), validation (20%), and test (10%) sets. Model performance was assessed using standard detection metrics, including training loss, mean Average Precision (mAP), precision, and recall. Among the evaluated models, RF-DETR achieved the highest detection accuracy, obtaining an mAP@0.5 of 0.9423 and a precision of 0.9438, demonstrating the advantages of transformer-based architectures for detecting wildlife in complex tropical environments. YOLOv11 produced comparable detection performance (mAP@0.5 = 0.9290) while delivering substantially faster inference (161.81 FPS), making it well suited for near real-time applications. Faster R-CNN achieved lower training losses but exhibited slower inference (13.95 FPS) and lower overall detection consistency than the other models. A user-friendly software application integrating the trained models was also developed to facilitate automated image processing and species detection. The results demonstrate that deep learning-based object detection can substantially improve the efficiency of camera-trap data processing while maintaining high detection accuracy. This framework provides a scalable approach for automated monitoring of the Philippine long-tailed macaque and establishes a foundation for extending AI-assisted wildlife surveillance to other Philippine mammal species, supporting more efficient biodiversity assessments and conservation.

About the presenter

Roman Fornesa is an Assistant Professor at the Animal Biology Division, Institute of Biological Sciences, University of the Philippines Los Baños (UPLB), where he teaches Wildlife Biology and Zoology. He holds a BS in Biology (Wildlife Biology) from UPLB and a Master's in Zoonoses and One Health from the Universitat Autònoma de Barcelona. He has worked with EcoHealth Alliance and the International Rice Research Institute on wildlife ecology, disease surveillance, and ecological risk analysis. His research spans tetrapod diversity, population ecology, zoonotic disease surveillance, and ecological modelling.

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Evaluating Remote sensing-based biodiversity indicators of marine mammal strandings in Lingayen Gulf from 2018 to 2025

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Abstract

Remote sensing (RS) is an emerging method for monitoring biodiversity threats in highly productive ASEAN marine ecosystems. In the Philippines, Lingayen Gulf is a consistent hotspot of marine mammal strandings, events where individuals are found dead or alive onshore due to interacting environmental and anthropogenic factors. In this study, these drivers were analyzed using multi-spectral satellite imagery from 2018-2025. Sentinel-2 Harmonized Data, MODIS-AQUA, HYCOM, and ETOPO1 data were acquired and processed in Google Earth Engine to derive mean and anomaly values. From these, normalized difference chlorophyll index (NDCI), normalized difference turbidity index (NDTI), colored dissolved organic matter (CDOM), sea surface temperature (SST), current speed, and bathymetry of the gulf were calculated. Marine mammal stranding hotspots were then predicted using generalized linear mixed models (GLMM) incorporating environmental covariates and spatial random effects, alongside Incidence Risk Ratios, multicollinearity diagnostics, and correlation analysis. Productivity, turbidity, CDOM, SST, ocean currents, and boat traffic collectively explained 63.9% of annual variation in strandings. CDOM emerged as the primary indicator, with a minor 0.14 m^{-1} increase in mean CDOM elevating risk stranding by 130%. Higher productivity may increase prey abundance, attracting marine mammals into the gulf's shallow waters where they are more vulnerable to acoustic solar termination and acoustic trauma from illegal blast fishing. SST was also significant, with a 1% decrease associated with a 32% increase in stranding risk. Lower SST correlates with higher chlorophyll concentrations, resulting in harmful algal blooms that may cause neurotoxicosis and biomagnification. This study demonstrates a scalable, RS-based framework for ASEAN coastal management and climate mitigation. By transforming CDOM and SST satellite data into real-time biodiversity indicators, Southeast Asian agencies can implement proactive Early Warning Systems (EWS) to support marine megafauna conservation efforts.

About the presenter

Kisha Wasi Pungsayan is an MS Environmental Science student at the Institute of Environmental Science and Meteorology, University of the Philippines (UP) Diliman. She holds a BS in Biology from UP Baguio. With the Marine Mammal Research and Conservation Laboratory, she studies how human activities affect marine mammals. She uses remote sensing, field data, and genomics to understand the causes of strandings in the Philippines.

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GREEN-EDGE: An AI-assisted camera-trap system for near-real-time wildlife Monitoring in Wallacea

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Abstract

Camera traps are widely used for biodiversity monitoring, but images collected in remote forests often remain stored on the device until researchers manually retrieve them. This can create substantial delays between wildlife detection and conservation response, particularly in areas with limited electricity and internet connectivity. GREEN-EDGE is developing a low-cost and locally manageable monitoring system to provide more timely wildlife information from Gorontalo, Indonesia, within the Wallacea biodiversity hotspot. The prototype integrates a motion-triggered camera, Raspberry Pi edge device, artificial-intelligence model, and low-power long-range communication. Images are processed at the camera-trap location to identify relevant observations before selected information and compressed images are transmitted in small segments to a receiving station and monitoring dashboard. The model was developed to recognise seven animal classes, including conservation-priority species such as Maleo, macaque, and anoa. Model performance was evaluated using held-out image data, while communication reliability, distance, and energy requirements were examined through network simulation and preliminary hardware tests. The optimised model maintained high wildlife-classification performance, achieving an F1-score of 97.0% while remaining suitable for use on a compact edge device. Simulation results showed that transmitting complete, uncompressed images required excessive time and energy, whereas image compression substantially improved the feasibility of longer-distance monitoring. During a preliminary outdoor system test at a distance of more than 100 metres, 46 of 48 image segments, or 95.83%, reached the receiving station. Additional experiments showed that trees, vehicles, buildings, and other obstructions reduced transmission reliability, indicating that device and gateway placement will be important in forest environments. The preliminary findings indicate that processing images at the camera-trap location and transmitting only prioritised information can reduce unnecessary data transfer and shorten delays in biodiversity monitoring. GREEN-EDGE could complement conventional camera traps by helping conservation practitioners identify important wildlife events more quickly in connectivity-constrained landscapes. Further work will validate the system under forest conditions in Gorontalo, assess long-term energy performance, and evaluate its reliability using actual wildlife encounters.

About the presenter

Muhammad Bondan Vitto Ramadhan is a Research Officer at Monash University Indonesia, working across data science, edge artificial intelligence (AI), the Internet of Things, and environmental monitoring. He contributes to the GREEN-EDGE project, which is building a low-cost, AI-assisted camera-trap system for near-real-time wildlife monitoring in Gorontalo, in the Wallacea biodiversity hotspot. His part covers edge devices, LoRa long-range communication, network simulation, and monitoring dashboards. Research from

the project was presented at the 2026 International Conference on Future Internet of Things and Cloud in Granada, Spain. He is now working on the system's field deployment and validation.

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Assessing the potential of green buildings to contribute to positive biodiversity outcomes

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Abstract

The built environment accounts for 30% of global biodiversity loss, making it clear that business-as-usual approaches are no longer viable if we want to ensure the long-term survival of our biodiversity. A key pathway towards greater sustainability lies in the adoption of green buildings. However, current green building rating schemes rarely incorporate biodiversity indicators, leaving a critical gap in urban sustainability practices. This study aims to (1) assess the extent to which biodiversity criteria are measured and considered in green building rating schemes within Southeast Asia, and (2) identify and prioritise biodiversity indicators that can be systematically integrated into urban design and green building standards. A systematic review of peer-reviewed literature and existing rating scheme criteria is being conducted. Indicators are mapped against ecological relevance referencing the biodiversity sensitive urban design framework and other relevant nature positive frameworks for the built environment. The indicators will also be tested for feasibility and effectiveness. The research will deliver a framework of biodiversity indicators, highlight underrepresented ecological dimensions, and propose pathways for integration of biodiversity criteria into green building rating systems. With rapid urbanisation happening within the Southeast Asia region, embedding biodiversity criteria into green building rating schemes is critical to prevent irreversible loss of biodiversity. This research provides a timely review of the biodiversity performance of green building rating schemes within Southeast Asia and aims to provide recommendations to improve these rating schemes should gaps be identified. This work contributes to advancing resilient, ecologically inclusive cities and serves as an important resource for policymakers, practitioners, and rating agencies.

About the presenter

See Sin Ching is a Master's by Research student at Nanyang Technological University, Singapore, researching how to protect and increase biodiversity in Southeast Asian cities. Her work assesses the biodiversity performance of green buildings. She aims to build a framework for adding biodiversity indicators to green building standards. The framework draws on biodiversity-sensitive urban design and nature-positive frameworks, in line with the Kunming-Montreal Global Biodiversity Framework. She is also a Senior Environmental and Biodiversity Consultant at Mott MacDonald Singapore. She has more than seven years of experience across Asia in biodiversity assessments, geographic information system analysis, critical habitat assessments, and environmental impact assessments.

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Comparative analysis of forest structure and diversity in Brunei's tropical forests

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Abstract

Brunei Darussalam hosts some of Southeast Asia's most intact tropical forests, including heath, mixed dipterocarp, and peat swamp ecosystems. Despite their importance for biodiversity and carbon storage, few studies have compared these forest types simultaneously, leaving gaps in understanding how soil and environmental gradients shape tree communities and forest structure. We utilised a multi-ecosystem, multi-site design to conduct the first systematic comparison of forest structure, diversity, and soil properties across Brunei's forests. Within 81 small plots (20 m × 20 m) established across three forest types, each represented by three sites, we measured all trees ≥ 5 cm diameter at breast height (DBH), sampled and analysed soil physicochemical properties and measured selected environmental parameters. Analyses revealed clear contrasts in forest structure and diversity among ecosystems, with mixed dipterocarp forests supporting the richest tree assemblages, peat swamp forests characterized by larger stems but lower diversity, and heath forests showing intermediate values with strong site-level variation. Non-metric Multidimensional Scaling (NMDS) ordination demonstrated distinct clustering of tree communities by forest type, strongly associated with gradients in soil carbon, pH, and gravimetric water content. Generalized least squares (GLS) models confirmed that soil principal components significantly predicted tree abundance and diversity, underscoring the role of fertility, water availability, and elevation in shaping forest composition. Principal Component Analysis (PCA) further highlighted how soil nutrients and hydrological conditions jointly structured community differences across sites. These findings demonstrate the value of integrated biodiversity assessment across multiple forest ecosystems by linking vegetation patterns with underlying soil and environmental gradients. By combining structural, diversity, and soil metrics within a standardised comparative framework, this study provides an important ecological baseline for long-term biodiversity monitoring and advances our understanding of tropical forest dynamics. The results support the development of evidence-based conservation and monitoring strategies that incorporate soil–vegetation interactions to enhance the resilience of Brunei's high conservation value forests under future environmental change.

About the presenter

Hazimah Hj Mohd Din is an Assistant Lecturer at the Institute for Biodiversity and Environmental Research (IBER), Universiti Brunei Darussalam (UBD). She has over a decade of experience in tropical forest biodiversity research, ecological restoration, and environmental education, including 10 years as a Senior Research Assistant at IBER. She holds an MSc in Forest Resources and Ecological Restoration from Yeungnam University, South Korea, and a BSc in Biological Sciences from UBD. She has led tree diversity teams on scientific expeditions in Brunei Darussalam, and does public outreach through the UBD Botanical

Research Centre. She has published on tropical forest diversity, heath forest ecology, and peat swamp forest restoration.



Integrating occurrence data and policy analysis to assess protected area effectiveness for the endemic Selangor Red Betta (*Betta livida*) in Tropical Peat Swamp Forests

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Abstract

Tropical peat swamp forests are among the most carbon-dense and biodiverse ecosystems in Southeast Asia, yet they face unprecedented threats from land-use change, drainage, and fragmentation. Endemic freshwater species such as the Selangor Red Betta (*Betta livida*) are highly vulnerable to these pressures, serving as critical indicators of ecosystem health. Despite its endemic status and restricted distribution to a few localities in Selangor, the species remains data-deficient with unknown population numbers, and no dedicated legal protection exists for its habitat. This study evaluates whether existing protected areas effectively conserve the known habitats of *Betta livida* and assess the adequacy of current policy frameworks for freshwater endemic species conservation in Malaysia. We employed a three-pronged approach namely (1) collated occurrence records from published literature, museum collections (e.g., ZRC 15287), and online databases (FishBase, GBIF) to map the current known distribution of *B. livida*; (2) conducted a protected area gap analysis by overlaying occurrence points with boundaries of Forest Reserves and other protected areas in Selangor; and (3) reviewed relevant national policies including the Fisheries Act 1985, National Forestry Act 1984, Wildlife Conservation Act 2010, and the National Biodiversity Policy to identify legal mechanisms and gaps for freshwater endemic species protection. Our findings reveal that known *B. livida* occurrence points are not well represented within existing protected area networks, with most records located outside legally protected zones. The policy review identifies critical gaps in species-specific protection under Malaysian fisheries law, which primarily focuses on marine and commercial species, leaving endemic freshwater fauna without clear legal safeguards. We identify priority unprotected habitats that warrant conservation attention and propose actionable policy recommendations aligned with Malaysia's commitments to the Kunming-Montreal Global Biodiversity Framework (Targets 3, 4, and 12). This study provides a foundational science-policy framework to guide freshwater endemic species conservation in Malaysia. By using an endemic flagship species as an indicator of peatland ecosystem health, our findings offer a replicable model for assessing protected area effectiveness and informing conservation planning for data-deficient freshwater biodiversity across the ASEAN region. The outputs of this research namely a baseline distribution map and a protected area gap analysis, provide tangible tools for state-level conservation action and contribute to regional biodiversity targets under the ASEAN Centre for Biodiversity's strategic priorities.

About the presenter

Dr. Mohd Yusoff Ishak is an Associate Professor at Universiti Putra Malaysia (UPM) specialising in water quality, ecotoxicology, and aquatic environmental management. He holds a PhD from the University of Adelaide. His research addresses aquatic environmental risks in tropical settings, including heavy-metal contamination, sediment-water interactions, ecosystem health, and biomonitoring. He combines field assessment with modelling. He increasingly puts his science into practice through community engagement, citizen science, and

climate adaptation work. He leads UPM's *Water Security* research programme and has also held environmental and public-sector appointments.

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A national ecosystem mapping approach for terrestrial conservation in Indonesia

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Abstract

Most of Earth's ecosystems are currently influenced by human activities, with tropical ecosystems facing particularly intense pressures despite their global importance for biodiversity and human well-being. At the same time ecosystem-related data remain fragmented, available at different scales and using inconsistent boundaries, while global datasets are limited to coarse resolutions. This raises a fundamental question about which data best represent ecologically important ecosystems and provide reliable information for prioritising conservation and restoration. This study presents an approach for producing a single harmonised ecosystem map and demonstrates its practical use for identifying priority areas for biodiversity conservation. Using Indonesia as a case study, we apply a hierarchical rule-based decision-tree approach grounded in ecological dominance principles to integrate 17 terrestrial ecosystem types and 8 human-modified land classes and assess ecosystem status within river basin boundaries. Results show that human modification increases from east to west across country. Within islands, river basins of different sizes cannot be treated as equivalent, as a comparable degree of modification carries different ecological consequences for the ecosystems remaining within a basin. The approach is a first step towards mapping ecosystems rather than land cover or vegetation formation alone, with units defined by dominant vegetation and its environmental setting. The framework is transferable and may be applied in other tropical countries facing similar ecosystem complexity and data limitations.

About the presenter

Fithrothul Khikmah is a PhD student in the Transforming Cities Hub at Monash University Indonesia. Her research harmonises ecosystem maps across Indonesia to guide conservation priorities. She studied Cartography and Remote Sensing at Universitas Gadjah Mada. She completed a Master of Photogrammetry and Geoinformatics at Hochschule für Technik Stuttgart on a German Academic Exchange Service (DAAD) scholarship for development-related postgraduate courses. She has worked with WWF-Indonesia and the Center for International Forestry Research on land cover and forest conservation. She was also a Research Assistant on spatial analysis for the Citarum Action Research Project. She received an early-career grant for the World Biodiversity Forum 2026 in Davos. She was a panellist for the DAAD Web Talk Series 2026 on Sustainable Development Goal 15.

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Protected area effectiveness through cultural ecosystem service valuation: evidence from the Mount Makiling Forest Reserve ASEAN Heritage Park, Philippines

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Abstract

Protected areas are increasingly expected to demonstrate not only their ecological contributions but also the socio-economic benefits they provide to support long-term conservation investments. Ecosystem service valuation offers a practical approach for quantifying these benefits and generating evidence to inform protected area management and policy. This study assessed the cultural ecosystem services of the Mount Makiling Forest Reserve–ASEAN Heritage Park (MMFR-AHP) in the Philippines to demonstrate how economic valuation can strengthen protected area effectiveness. Using a choice experiment, the study estimated tourists' willingness to pay for enhanced inspirational and educational ecosystem services. Results showed that visitors are willing to pay an additional PHP 106.00 (USD 1.70) per visit for improved inspirational experiences and PHP 103.00 (USD 1.67) per visit for enhanced educational opportunities. Integrating these values into the existing entrance fee structure of the Mariang Makiling Trail could generate an estimated PHP 4.01 million (approximately USD 65,000) annually, providing a sustainable source of funding for biodiversity conservation, visitor management, environmental education, and protected area operations. The findings demonstrate that cultural ecosystem services generate measurable economic benefits that can support adaptive and evidence-based protected area management. By establishing a scientific basis for reviewing user fees and developing Payment for Ecosystem Services (PES) mechanisms, this valuation strengthens long-term conservation financing while balancing biodiversity protection with sustainable public use. Crucially, securing biodiversity conservation through PES creates a feedback loop: sustainable funding protects the ecological integrity of the landscape, which in turn enhances its power to inspire, educate, and connect the public with nature. As an ASEAN Heritage Park, MMFR-AHP illustrates that cultural values such as educational enrichment, sense of place, and artistic inspiration are not merely abstract concepts, but vital components that must be integrated into economic valuation. Ultimately, this study highlights ecosystem service valuation as a practical decision-support tool for protected areas across the ASEAN region, driving home the message that valuing cultural dimensions is essential for fostering deeper stakeholder support, improving ecosystem resilience, and advancing sustainable conservation strategies.

About the presenter

Dr. Mae Belen L. Putian is a licensed forester and University Extension Specialist II at the Makiling Center for Mountain Ecosystems, College of Forestry and Natural Resources, University of the Philippines Los Baños (UPLB). She holds a PhD in Forestry (Forest Resources Management), an MS in Environmental Science, and a BS in Forestry, all from UPLB. Her research covers ecosystem services valuation and the management of forests, watersheds, and protected areas. She also studies the socio-economic and cultural dimensions of

environmental governance. Her doctoral dissertation valued the cultural ecosystem services of the Mount Makiling Forest Reserve, linking biodiversity, cultural practices, and community identity.

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Youth-Led social innovation for climate-resilient urban and mangrove biodiversity in the Mekong–ASEAN Region

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Abstract

Biodiversity loss and climate change are rapidly eroding ecosystem services that support community wellbeing in the Mekong–ASEAN region, while conventional conservation approaches still underutilize youth leadership and locally grounded innovation, despite recent ASEAN commitments on youth, climate resilience, and biodiversity. This study presents a youth-led social innovation model that integrates participatory biodiversity monitoring, mental health promotion, and community co-design of nature-based solutions across pilot urban and mangrove sites in Yangon (Myanmar), Vientiane Capital (Lao PDR), and Ho Chi Minh City (Viet Nam). From early 2024 to mid-2026, we engaged 150 youth volunteers (aged 18–30, 62% women) and 10 community-based organizations across 8 pilot sites, including urban parks, school grounds, peri-urban community forests, and small mangrove fringes along peri-urban waterways. Using smartphone-based species observations, open biodiversity and climate-risk datasets for the Asia–Pacific region, and brief self-reported scales on stress, social connectedness, and sense of agency, youth worked with local residents and municipal partners to co-design low-cost interventions such as pollinator gardens, riparian buffer plantings, and micro-forest plots. Key innovative elements included: (1) integrating open biodiversity and climate information into youth-friendly decision tools and site-selection exercises; (2) structured co-creation workshops that positioned youth as facilitators between communities and local authorities; and (3) a digital storytelling campaign that amplified youth narratives on nature, climate resilience, and mental health across local and regional platforms. Over a 10- to 12-month implementation period, mean observed plant and invertebrate species richness increased by 28–42% across intervention sites, while bird species richness increased by 17% relative to baseline counts collected using simple repeat-survey transects. Participating youth reported a 30% reduction in average self-reported stress scores and a 25% increase in perceived social connectedness, indicating concurrent psychosocial benefits associated with active biodiversity stewardship. Three local governments—Yangon City Development Committee, selected district authorities in Vientiane Capital, and ward-level education and environment offices in Ho Chi Minh City—along with two school networks began informally integrating youth-generated biodiversity maps and design guidelines into green-space planning and extracurricular programs, demonstrating early governance uptake consistent with ASEAN efforts to strengthen youth participation in climate and biodiversity decision-making. While challenges remain in securing long-term financing, ensuring inclusion of marginalized youth, and maintaining robust data quality, the findings suggest that youth-driven social innovation can deliver measurable biodiversity gains, strengthen climate resilience, and advance inclusive participation targets under the Kunming–Montreal Global Biodiversity Framework in ASEAN urban and peri-urban settings. The model offers a transferable framework for embedding youth leadership, mental health promotion, and nature-positive local action into regional biodiversity and climate resilience strategies.

About the presenter

Dr. Aung Than Oo is a medical doctor, public health researcher, and development professional from Myanmar. He founded Myanmar Youth Foundation–SDGs, which promotes youth leadership and participation in the Sustainable Development Goals. He holds an MBBS from the University of Medicine-2; an MPH from BRAC University, as a scholar of the World Health Organization's Special Programme for Research and Training in Tropical Diseases; an International MPH from Tsinghua University; and a postgraduate diploma in peacebuilding from Makerere University. His work spans public health programming, humanitarian programme design, and disease surveillance, including malaria research in Rakhine State. From a One Health perspective, his interests include biodiversity-health linkages, climate resilience, community-based conservation, and youth participation in sustainability governance. He has presented on Mekong River security and environmental change at the headquarters of the United Nations Educational, Scientific and Cultural Organization.

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How you (humans) see me, how they (birds) don't: window collision is a serious threat to Philippine birds

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Abstract

Bird-window collision (BWC) is an anthropogenic threat that occurs when birds fail to distinguish glass as barriers and fly straight into them, causing injuries or death. Studies about BWCs are mostly from temperate regions (e.g., USA, Canada), leaving a knowledge gap in tropical countries — like the Philippines — where majority of bird species are found. Bird Window Strike PH (BWSPH), a citizen science initiative launched in 2021, is dedicated towards studying the status and trends of BWCs in the country. Reports of 447 collision incidents from July 2013 to May 2025 reveal that 11% of all bird species found in the Philippines fall victim to BWCs, majority of which are residents (55%), including endemics (20%). Family Columbidae were the most frequent colliders (35%), with Common Emerald Dove (*Chalcophaps indica*) ranking as the top species (22%); Family Alcedinidae, Pittidae, Sturnidae, and Megalaimidae make up the succeeding top families. Globally threatened species such as the Ashy Thrush (VU) and Chocolate Boobook (NT) were also reported to collide with windows. Peak collision months were in May and October, coinciding with breeding and migration seasons. Although some birds initially survive the impact, a larger percentage (53%) eventually die from internal injuries. Notably, reporters also describe observations of group collisions, pursuit- and disturbance-induced impacts, successive strikes, variations in recovery period, and impact-related trauma. This study is a critical first step in understanding BWCs in the Philippines and is valuable in addressing conservation concerns, suggesting strategies in creating bird-friendly infrastructures, and promoting public contribution to scientific literature.

About the presenter

Ezireign Joyce DC. Ramos is an early-career wildlife biologist with a BS in Biology (Ecology, Evolution, and Biodiversity) from the University of the Philippines Diliman. Since 2023 she has been a researcher for the citizen science project Bird Window Strike Philippines. She has presented its work at national and international symposia to encourage bird-friendlier building design. She is also a databaser and researcher for the Philippine Key Biodiversity Areas Updating Project. In her spare time, she preserves window-collision victims through taxidermy.

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Landscape connectivity and biodiversity: evidence from a three-site connectivity gradient in Indonesia

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Abstract

Biodiversity indicates ecosystem health and relies fundamentally on landscape connectivity, which is a result of anthropogenic activities, are increasingly being disrupted, thus fragmenting and isolating habitat and constraining wildlife movement, colonisation, and persistence. We examined three Indonesian special-purpose forest areas (KHDTK) forming a natural connectivity gradient: Aek Nauli, retaining a secondary and primary forest matrix although its link toward the greater Leuser landscape has been severed; Bukit Suligi, a fragment-corridor linking several conservation areas but embedded within a palm oil plantation matrix; and Parung Panjang, a lowland fragment isolated within an extractive industrial matrix. Fauna was surveyed using line transects, visual encounter surveys, exploration and interviews; we assessed rare, threatened and endangered (RTE) representation and habitat specialisation, and standardised sampling effort using iNEXT (Hill numbers). Aek Nauli recorded 93 species, Bukit Suligi 85, and Parung Panjang 45, with divergence concentrated in connectivity-sensitive taxa (birds and mammals), while herpetofauna remained comparable. Aek Nauli and Bukit Suligi converged in richness, dominance structure, and RTE representation (22 and 24 species), while Parung Panjang fell below an isolation threshold (10 species) and was dominated by generalists. Parung Panjang's most iconic species was recorded only through interviews, indicating functional collapse of the mammal assemblage and ongoing defaunation. Connectivity thus acts on richness and dominance as a threshold rather than a gradient, with links to conservation estates buffering fragmentation until those links break. Restoration of isolated sites must therefore be paired with connectivity strengthening, not merely added forest cover.

About the presenter

Indria Zhafirah Akbar is a Jakarta-based landscape ecology professional working on ecosystem restoration, biodiversity conservation, and nature-based climate solutions. As Junior Biodiversity Protection Officer at Pertamina Foundation, she leads reforestation and biodiversity conservation under the company's corporate social responsibility programmes. She contributes to a 2025 target of 1.2 million seedlings and oversees three social forestry projects. She holds a Bachelor of Landscape Architecture from IPB University. She previously worked at the Resilience Development Initiative, and on the Urban Forests project of the United States Department of Agriculture Forest Service and IPB University. She has published on urban forest management and carbon storage monitoring.

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Revisiting and Updating the Key Biodiversity Areas of the Philippines

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Abstract

Key Biodiversity Areas (KBAs) are critical areas for the persistence of global biodiversity. National governments have been using KBAs to measure their progress towards the 30x30 Kunming-Montreal Biodiversity Framework target. The Philippines identified 228 KBAs, in 2006 and 2009 respectively for the terrestrial and marine areas. These KBAs were revisited and reassessed using the 2016 IUCN KBA Global Standard. Since 2024, we have undertaken national and regional workshops and consultations with experts and data stakeholders, literature reviews, compiled biodiversity records across various platforms, to review and update these legacy KBAs and evaluate new sites. As of July 2026, a total of 316 KBAs have been identified, of which 185 are terrestrial, 102 are marine, and 29 are integrated KBAs (sites that have both terrestrial and marine components), for a total of 1,815 trigger species, of which 71% are endemic to the country and 47% are threatened. These KBAs cover approximately 26% of the country's terrestrial area and 22% of the Philippine maritime domain. During the process, the following key learnings emerged: (1) there is a paucity of population assessments for most of the major taxonomic groups, which challenged the application of the species-based criteria with population thresholds; (2) the broad natural distributions of many marine species and the non-contiguity of marine habitats caused by the country's archipelagic nature reduce the likelihood of smaller marine sites qualifying under the species-based criteria and thresholds; (3) mapping of ecosystems and undertaking ecosystem threat assessment are necessary to enable us to apply the ecosystems-based criteria; and (4) many sites may not meet global thresholds but remain critical to Philippine biodiversity conservation, emphasizing the need to develop national standards that incorporate the local context and dynamics in KBA identification. Despite these challenges, the KBA Framework continues to help shape the operationalization of the Philippine Biodiversity Strategy and Action Plan and supports evidence-based conservation planning at the national scale. The strengthening of the KBA National Coordination Group will also be crucial to ensure the integration and long-term adoption of the KBA framework in conservation planning and management in the Philippines.

About the presenter

Dr. Mariano Roy M. Duya is an Associate Professor at the Institute of Biology, University of the Philippines (UP) Diliman, and Curator of its Vertebrate Museum. He holds a PhD in Biology from UP Diliman, and a Master's in Wildlife Studies and a BS in Biology from UP Los Baños. Before academia, he spent 12 years with Conservation International Philippines, latterly as Programme Manager of the Sierra Madre Biodiversity Corridor Program. His research covers the taxonomy, biogeography, ecology, and conservation of Philippine vertebrates, particularly terrestrial mammals. He is a member of the Small Mammal Specialist Group of the International Union for Conservation of Nature Species Survival Commission. He also chairs the Mammal Technical Working Group of the Philippine Red List Committee.



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Evaluating the contribution of tropical benthic *Sargassum* to coastal carbon pools: a preliminary study from Koh Tha Rai, Thailand

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Abstract

Tropical benthic macroalgae are increasingly recognized as potential contributors to coastal carbon pools; however, their contribution remains poorly quantified within blue carbon frameworks, especially in tropical coastal ecosystems. This preliminary study investigated the contribution of benthic *Sargassum* to coastal organic carbon (OC) storage on the small inhabited island of Koh Tha Rai, Surat Thani Province, in the Gulf of Thailand, where *Sargassum* beds occur alongside adjacent seagrass meadows and mangrove forests. Field sampling was conducted within a representative *Sargassum* habitat, including biomass collection of the dominant species, *Sargassum polycystum*, and sediment coring to a depth of 20 cm. Organic carbon (%OC) in *S. polycystum* tissue was determined using elemental analysis, while sediment organic carbon stocks were quantified for the 0–20 cm sediment profile. Stable carbon isotope ($\delta^{13}\text{C}$) analysis was also conducted to provide preliminary insight into the potential sources of sedimentary organic carbon. The organic carbon content of *S. polycystum* biomass averaged $32.99 \pm 0.27\%$, while sediment organic carbon stocks in the *Sargassum*-associated habitat reached $37.86 \pm 4.10 \text{ Mg C ha}^{-1}$, compared with $19.39 \pm 7.26 \text{ Mg C ha}^{-1}$ in the adjacent seagrass meadow. Preliminary stable isotope observations suggest that sedimentary organic carbon is derived from multiple coastal primary producers, with *Sargassum* representing one of several contributing sources alongside adjacent vegetated ecosystems. Although based on a single study site, these findings indicate that benthic *Sargassum* is associated with considerable organic carbon storage and may contribute to interconnected coastal carbon pools. This study provides baseline information on the carbon storage potential of tropical benthic *Sargassum* habitats and supports further investigation into the role of macroalgal ecosystems within integrated blue carbon assessments.

About the presenter

Amirah Iskandar is a PhD Biology student in the Seaweed and Seagrass Research Unit at Prince of Songkla University, Thailand. She holds a BSc and an MSc in Marine Biology from Universiti Kebangsaan Malaysia. Her doctoral research investigates the carbon storage potential and spatial dynamics of tropical benthic *Sargassum*. It combines field observations, sediment carbon assessment, stable isotopes, and remote sensing. Her interests include blue carbon, seaweed and seagrass ecology, and coastal carbon dynamics.

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Community-based nature-based solutions for climate mitigation and ecosystem-based adaptation in Timor-Leste: practical experiences from the National Directorate of Biodiversity

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Abstract

Climate change poses significant threats to biodiversity, ecosystem services, and the livelihoods of rural and coastal community in Timor-Leste. As a young biodiversity practitioner working at the National Directorate of Biodiversity (NDB), Ministry of Tourism and Environment, I have been directly involved in supporting community-based Nature-based Solution (NBS) that integrate biodiversity conservation, climate change mitigation, and ecosystem-based adaptation (EBA), this paper reflects practical experiencing ecosystem resilience and carbon sequestration. The National Directorate of Biodiversity promote both green carbon and blue carbon initiatives through collaboration partnerships with local communities, Municipalities, traditional leaders, civil society organizations, and development partners. One of the key activities includes establishing community-managed mangrove and native tree nursery center, providing high-quality seedlings for forest restoration, watershed rehabilitation, and mangrove ecosystem recovery. These nurseries support large-scale tree planting and mangrove restoration activities that increase terrestrial and coastal carbon storage while restoring degraded ecosystem. Field implementation has involved supporting communities in tree planting campaign across degraded landscape and coastal zone, contributing to long-term carbon sequestration, biodiversity recovery, soil conservation, and involved watershed functions. In coastal areas, mangrove restoration enhances blue carbon storage while protecting communities from coastal erosion, storm surges, and sea-level rise. These activities demonstrate how ecosystem restoration simultaneously contributes to climate change mitigation and adaptation. Community awareness and environment education have been central components of these initiatives. Through public awareness campaigns, community dialogues, school outreach programs, and field demonstration, local communities have increased their understanding of biodiversity conservation, climate change impacts, sustainable natural resource management, and the important role of forests and mangroves in strong carbon and maintaining ecosystem resilience, these education activities have strengthened community ownership and encouraged long-term stewardship of natural resources.

Recognizing the importance of indigenous knowledge and local governance, the National Directorate of Biodiversity has supported communities in establishing Tara Bandu, Timor-Leste's customary traditional law that regulates the sustainable use and protection of forests, mangrove, rivers, wetland, and coastal ecosystem. Tara Bandu has strengthening community-based governance by reducing illegal logging, destructive fishing, mangrove cutting, wildlife exploitation, and other unsustainable practices while reinforcing local responsibility for biodiversity conservation. The Directorate also collaborates with national institutions and international development partners to support the implementation of Timor-Leste's emerging carbon sequestration policies and carbon market framework, including initiatives associated with national legislation on carbon sequestration and carbon credits. These efforts aim to create future opportunities for

participation in international carbon markets while ensuring that local communities benefit from ecosystem restoration and sustainable natural resource management. From my experience supporting these field activities, successful Nature-based Solutions depend not only on ecosystem restoration but also on strong community participation, traditional ecological knowledge, institutional collaboration, and supporting government policies. This integration of green carbon restoration, blue carbon conservation, ecosystem-based adaptation, environmental education, sustainable livelihood development through community ecotourism, and customary governance provides an effective approach for achieving Timor-Leste's climate mitigation and biodiversity conservation goals.

The experience of the National Directorate of Biodiversity demonstrates that investing in community capacity, restoring degraded ecosystems, strengthening local governance through Tara Bandu, and promoting inclusive participation can simultaneously enhance carbon sequestration, conserve biodiversity, improve climate resilience, and support sustainable livelihoods. These experiences provide practical lessons for other small island developing states seeking locally driven Nature-based Solutions that contribute to national climate commitments, biodiversity targets, and sustainable development.

About the presenter

António Gusmão is a biodiversity practitioner at the National Directorate of Biodiversity, Ministry of Tourism and Environment, Timor-Leste. He works on community-based nature-based solutions that combine biodiversity conservation, climate mitigation, ecosystem-based adaptation, and sustainable livelihoods. His fieldwork includes supporting community-managed mangrove and native tree nurseries, and forest and mangrove restoration. It also includes environmental education through community dialogues and school outreach. He is particularly interested in integrating traditional ecological knowledge and Tara Bandu customary law into community-based conservation. His other interests are green and blue carbon, and community ecotourism.



Spatial Variability of the Marine Carbonate System across Seagrass-Associated Coastal Waters in Penang and Kemaman, Malaysia

Muhammad Danish Danial Umar, Ferdius @ Ferdaus Mohamat Yusuff, Nur Amiera Kamarudin, Zulfa Hanan Ah'aari, Muta Harah Zakaria

Abstract

Seagrass meadows are important coastal ecosystems that influence marine carbon cycling through photosynthesis, respiration, organic matter accumulation, and interactions with carbonate chemistry. These processes can modify seawater pH, dissolved inorganic carbon dynamics, and carbonate mineral saturation, yet spatial variability in carbonate-system conditions among seagrass-associated environments remains insufficiently characterized in tropical coastal waters. This study evaluates the spatial variability of the marine carbonate system across seagrass-associated coastal waters in Penang and Kemaman, Malaysia. Water samples were collected in Penang (Middle Bank and Pulau Gazumbo) and from Telaga Simpul in Kemaman, Terengganu. Key environmental parameters, including salinity, pH, total alkalinity, partial pressure of carbon dioxide ($p\text{CO}_2$), total inorganic carbon, and calcium and aragonite saturation states (Ω_{Ca} and Ω_{Ar}), were assessed to characterize spatial differences in carbonate chemistry. Penang sites generally exhibited relatively alkaline conditions, with pH ranging from 7.96 to 8.04 and $p\text{CO}_2$ from 386.0 to 668.2 μatm . In contrast, Telaga Simpul showed greater variability, with pH ranging from 7.12 to 7.42 and $p\text{CO}_2$ ranging from 3,052.8 to 32,484.3 μatm . Carbonate saturation states also differed substantially between regions, with Penang showing Ω_{Ar} values of 2.75–4.67, whereas Telaga Simpul exhibited values ranging from 0.63 to 7.01. The contrasting carbonate-system characteristics indicate substantial spatial heterogeneity among seagrass-associated coastal environments and suggest that local physicochemical conditions may strongly influence carbon cycling and carbonate dynamics. These findings provide baseline information for understanding carbonate-system variability in tropical seagrass ecosystems and contribute to broader assessments of their role in coastal carbon cycling and ecosystem resilience.

Keywords: Marine carbonate system; Seagrass meadows; Carbonate chemistry; Carbon cycling; Tropical coastal waters; Malaysia

About the presenter

*Dr. Nur Amiera Kamarudin is an ecologist, ecotoxicologist, and research assistant at Universiti Putra Malaysia (UPM), where she earned her PhD in Ecotoxicology (2025), MSc in Ecology, and BSc in Biology. For nearly a decade she has used the Javanese medaka (*Oryzias javanicus*) as a sentinel organism. Her work examines how heavy metals, herbicides, temperature, and seawater variation affect aquatic organisms and ecosystem health. In 2026 she undertook postdoctoral research at Universitas Gadjah Mada, Indonesia, on agroforestry systems and soil quality. She is also involved in UPM's communication, education, and public awareness programmes for seagrass conservation.*



Influence of Species Composition and Meadow Size on Blue Carbon Storage in Seagrass Ecosystems of Peninsular Malaysia

Ferdius @ Ferdaus Mohamat Yusuff, Muhammad Danish Danial Umar, Nur Amiera Kamarudin, Zulfa Hanan Ah'aari, Muta Harah Zakaria

Abstract

Seagrass meadows are important coastal blue carbon ecosystems, yet the influence of species composition and meadow size on carbon storage remains poorly understood in the scattered seagrass meadows of Peninsular Malaysia. This study quantified carbon stocks in selected meadows and evaluated differences between monospecific and multispecies systems. Field surveys were conducted on the East Coast (Paka Shoal and Pulau Tok Haji, Terengganu; Sungai Semerak, Kelantan) and West Coast (Pulau Konet and Pulau Besar, Melaka; Teluk Pelanduk, Negeri Sembilan). Seagrass biomass was assessed using transect-quadrat sampling, while sediment cores were analysed for bulk density and organic carbon using Loss on Ignition (LOI). Carbon stocks were estimated following established blue carbon protocols, and Pearson correlations were used to examine relationships with meadow size. East Coast meadows were dominated by the pioneer species *Halodule pinifolia* and had low biomass carbon densities ($0.05\text{--}1.17 \text{ t C ha}^{-1}$), although sediment carbon remained substantial, with Paka Shoal recording $39.49 \text{ t C ha}^{-1}$. In contrast, larger multispecies West Coast meadows containing structurally larger species, including *Enhalus acoroides* and *Thalassia hemprichii*, supported greater biomass and landscape-level carbon stocks. Pulau Konet recorded the highest biomass carbon density ($13.68 \text{ t C ha}^{-1}$), while Pulau Besar had the highest total landscape carbon stock ($2,690.39 \text{ t C}$). Meadow size was significantly correlated with below-ground carbon ($r = 0.652$, $p = 0.041$), total seagrass carbon ($r = 0.641$, $p = 0.046$), and total carbon stock ($r = 0.726$, $p = 0.017$), but not with sediment carbon density. The greater carbon storage of large, multispecies meadows supports previous evidence that meadow extent and species structure enhance blue carbon capacity. However, this study provides new evidence that sediment carbon density is independent of meadow size, with small pioneer-dominated meadows capable of maintaining substantial sediment carbon reservoirs. Thus, both extensive multispecies meadows and smaller monospecific meadows should be incorporated into Malaysia's blue carbon conservation strategies.

Keywords: Carbon burial; Climate mitigation, Coastal sediments; Ecosystem heterogeneity; Spatial variability

About the presenter

Associate Professor Dr. Ferdius @ Ferdaus Mohamat Yusuff is with the Department of Environmental Sciences and Technology, Faculty of Forestry and Environment, Universiti Putra Malaysia (UPM). She holds a BSc (Hons) in Biology and an MSc in Ecotoxicology from UPM, and a PhD from the University of Tokyo. Her research spans ecotoxicology, pollution control, and marine, freshwater, and coastal ecosystems. She has

studied greenhouse gas emissions and soil carbon changes from land conversion to oil palm; food webs and blue carbon stocks in coastal mudflats and mangroves; and the effects of heavy metals, biocides, and microplastics on aquatic organisms. She is also active in community-based coastal protection projects.



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Beyond tree planting: an integrated framework for native species selection to enhance biodiversity, carbon sequestration, and climate-resilient forest restoration in the Philippines

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Abstract

Forest restoration is increasingly recognized as a key strategy for addressing biodiversity loss and climate change. However, successful restoration remains constrained by the lack of evidence-based approaches for selecting native tree species suited to local environmental conditions. This study evaluated planting sites within the University of the Philippines Laguna–Quezon Land Grant (UPLQLG), Luzon, Philippines, to develop a framework for evidence-based species selection by combining biodiversity assessment, environmental characterization, carbon sequestration, climate projections, and silvicultural evaluation. Biodiversity, tree growth, site conditions, and carbon storage were assessed using 38 vegetation quadrats, while candidate mother trees were geotagged as future seed sources. Results showed that elevation was the only environmental factor significantly influencing native tree growth, whereas soil properties and measured microclimatic variables exhibited comparatively weak relationships. The restoration stands supported 161 morphospecies and exhibited very high plant diversity (Shannon diversity index, $H' = 4.18$), while storing an estimated 129 t ha^{-1} of carbon, equivalent to $473 \text{ t CO}_2 \text{ ha}^{-1}$, demonstrating the capacity of the restoration areas to simultaneously restore biodiversity and contribute to climate-change mitigation. Based on these findings, six complementary decision parameters were identified for prioritizing native tree species for restoration: ecological importance, growth performance, carbon sequestration, conservation significance, projected climate suitability, and phenotypic evaluation of geotagged mother trees. The resulting Integrated Native Species Restoration Decision Framework (INSRDF) integrates these parameters into a unified decision-support system that guides species prioritization, site-species matching, seed-source selection, and adaptive silvicultural management. By linking ecological, environmental, and climate-resilience considerations within a single framework, INSRDF provides a practical and transferable approach for improving the effectiveness, biodiversity outcomes, carbon sequestration potential, and long-term resilience of native forest restoration programs.

About the presenter

Kyle Adrian B. Cancino is a Registered Professional Forester and an MS Forestry student at the College of Forestry and Natural Resources, University of the Philippines Los Baños (UPLB). He is majoring in Silviculture

and Forest Influences with a minor in Soil Science. He also earned his BS in Forestry at UPLB. His research focuses on forest restoration, native tree species, biodiversity, carbon sequestration, and soil-plant interactions, including in degraded and mining-affected landscapes. He has contributed to forest inventories, biodiversity and carbon stock assessments, and ecological risk assessments in Zambales, Palawan, and elsewhere. His collaborative work on mine-land restoration has received poster awards. He is also active in forestry teaching and environmental education around Mount Makiling.

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Closing the loop: traceable voluntary carbon offsets and digital monitoring for community-based restoration in Indonesia

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Abstract

Indonesia needs to rehabilitate about 12.7 million hectares of degraded land, according to the Ministry of Forestry, yet far fewer people can plant than that demand requires. Voluntary carbon offsetting can bridge the gap, letting individuals fund restoration without visiting a site. What has been missing is a credible link between the money contributed, the trees planted, and evidence that they survive. Without it, a contribution risks becoming a payment with no verifiable outcome. This study examines whether a technology-based platform can connect individual voluntary carbon offset contributions to community-based restoration in a traceable, independently monitored way. A digital voluntary carbon offset platform was paired with a spatially explicit digital monitoring, reporting, and verification (dMRV) system. Carbon stock estimation followed a field-based forest carbon inventory approach, with biomass estimated using allometric equations and converted to CO₂e. Contributions are pooled and directed by Jejakin to planting by Forest Farmer Groups (KTH) and local communities, while the dMRV system locates each site and tracks its progress, so a contribution can be followed to a specific place. The results of this study showed that the platform mobilised 1.589.593 contributors, showing that participation in restoration finance can scale without site visits. Contributions supported 185 restoration programs, resulting in 758.010 trees planted across 3.104,1 hectares of rehabilitated land, representing 215 tree species with a survival rate of 95,86 %. The restoration activities accounted for an estimated 128.446,61 tCO₂e in carbon offsets, with a traceable chain linking each contribution, the community that planted, and the monitored result. These findings close the traceability gap behind distrust of voluntary offsets, establishing a verified restoration and finance pipeline rather than a completed carbon claim. The three-year operational data show feasibility and verification, not permanence. The next phase builds in counterfactual baselines for additionality, monitoring beyond year three for durability, and field plots validating the dMRV against ground-measured carbon stocks, a foundation for a defensible mitigation claim.

About the presenter

Fakhri N. Syahrullah is a forestry and environmental professional based in Bogor, West Java, working on forest restoration, biodiversity conservation, and community development. As Partnership and Impact Delivery Lead at Jejakin, he uses project management, due diligence, and monitoring to support forest and land restoration across Indonesia. He holds a Bachelor of Forestry from IPB University (2017), focusing on forest resources conservation and ecotourism. He has also contributed to biodiversity research in the Peleng archipelago, Central Sulawesi.