



2024 BIODIVERSITY SCIENCE FORUM

HABITATS OF HERITAGE

Peatlands, Mangroves
& Freshwater Swamps
in Southeast Asia

6-7 November 2024, Singapore

*Jointly organised by Asia Research Institute, Department of History & Department of Biological Sciences,
at the National University of Singapore (NUS); and ASEAN Centre for Biodiversity, Philippines
With support from NUS Faculty of Science - Faculty of Arts and Social Sciences Collaborative Grant*

Habitats of Heritage: Peatlands, Mangroves, and Freshwater Swamps in Southeast Asia
6-7 November 2024, Singapore

This workshop is jointly organised by the Inter-Asia Engagements Cluster at the Asia Research Institute, Department of History, and Department of Biological Sciences at the National University of Singapore (NUS) and the ASEAN Centre for Biodiversity (ACB), Philippines. It is also supported by the NUS Faculty of Science—Faculty of Arts and Social Sciences Collaborative Grant.

Southeast Asian habitats are home to some of the world’s richest centres of biodiversity. From Indonesian lakes to Thai peatlands and from Philippine mangroves to Burmese swamps, these *habitats of heritage* are sites of rare, endemic, migratory, and endangered species while at the same time serving as places of historical, social, and economic value. They provide essential ecosystem services and invaluable cultural services too. Yet this biodiversity heritage in Southeast Asia is in a state of crisis. Anthropogenic forces such as mega-urbanisation, infrastructure development, and industrial food production rapidly convert peatlands into plantations, rivers into dammed-up waterways, and mangroves into mass aquaculture. The impact of these conversions—coupled with the effects of climate change—is grave for Southeast Asia’s flora and fauna, and the communities that depend on them. As the entanglement of habitat loss, global extinctions, and local extirpations are on the rise in the region, so is the urgent drive to map and know ecosystems, collect data on biological species, expand coverage of nature parks and protected reserves, and cultivate conservation awareness (and action) among publics and policymakers in Southeast Asia and beyond. Today’s regional biodiversity work is further networked by a long history of inter-Asia connectivity, making this nature-based engagement increasingly collaborative, interdisciplinary, culturally sensitive, community-facing, and data-driven.

In partnership with the ASEAN Centre for Biodiversity, our workshop aims to produce new insight into Southeast Asia’s peatlands, mangroves, and freshwater swamps. In particular, it seeks to create a platform for biologists, historians, park managers, museum curators, conservationists, community organizers, and others to report updates on the state and status of Southeast Asian habitats as well as to provide cultural, scientific, and historical analyses into the region’s local biodiversity heritage. By framing and focusing on Southeast Asia’s peatlands, mangroves, and freshwater swamps as *habitats of heritage*, our forum hopes to foster new kinds of biodiversity conversations that span disciplines, languages, methods, publics, and ecologies.

WORKSHOP CONVENORS

Dr Anthony D. Medrano | Yale-NUS College & Department of History, National University of Singapore

Dr Arvin C. Diesmos | ASEAN Centre for Biodiversity, Philippines

Dr Eunice Jingmei Tan | Department of Biological Sciences, National University of Singapore

A/P Maitrii V. Aung-Thwin | Asia Research Institute & Department of History, National University of Singapore

PROGRAM AT A GLANCE

DATE	TIME (SGT)	PANEL SESSION
6 Nov 2024 (Wed)	09:00 – 09:30	WELCOME & INTRODUCTORY REMARKS
	09:30 – 11:00	PANEL 1 – FRESHWATERS
	11:30 – 13:00	PANEL 2 – PEATLANDS
	14:00 – 15:30	PANEL 3 – MANGROVES
	16:00 – 17:30	PANEL 4 – WETLAND CONSERVATION
	18:00 – 20:00	WORKSHOP DINNER <i>(For speakers and chairpersons only)</i>
7 Nov 2024 (Thu)	09:00 – 10:30	PANEL 5 – PEATLANDS
	11:00 – 12:30	PANEL 6 – WETLANDS
	12:30 – 13:00	CLOSING REMARKS
	15:00 – 17:00	FIELD TRIP <i>(For speakers and chairpersons only)</i>

6 NOVEMBER 2024 • WEDNESDAY

09:00 – 09:30	WELCOME AND INTRODUCTORY REMARKS
	MAITRII V. AUNG THWIN Deputy Director, Asia Research Institute, National University of Singapore THERESA MUNDITA S. LIM Executive Director, ASEAN Centre for Biodiversity LIM LIANG JIM Group Director, Conservation, National Parks Board
09:30 – 11:00	PANEL 1 – FRESHWATERS
Chairperson	MAITRII V. AUNG THWIN National University of Singapore
09:30	Shrimp, Nickel, and Flowerhorns: Novel Configurations of Conservation Practices in Sulawesi's Ancient Lakes JONATHAN GALKA Harvard University
09:45	Peatland Fish Diversity in Southeast Asia HEOK HUI TAN Lee Kong Chian Natural History Museum
10:00	Mudskippers as Mangrove Flagship Species ZEEHAN JAAFAR National University of Singapore ALYSSA YAN YING TAN Yale-NUS College
10:15	Freshwater Fish Biodiversity in Brunei Darussalam RAFHIAH KAHAR Universiti Brunei Darussalam
10:30	QUESTIONS & ANSWERS
11:00 – 11:30	TEA BREAK
11:30 – 13:00	PANEL 2 – PEATLANDS
Chairperson	ARVIN C. DIISMOS ASEAN Centre for Biodiversity
11:30	Peatlands: Biodiversity for Food Security and Climate Nexus MADE HESTI LESTARI TATA National Research and Innovation Agency Indonesia
11:45	Microbial Community Dynamics and Carbon Cycling in Brunei's Peat Swamp Forests SALWANA MD JAAFAR Universiti Brunei Darussalam
12:00	The Badas Peat Swamps of Brunei Darussalam: Ecological Insights and Conservation Efforts RAHAYU SUKMARIA BINTI HJ SUKRI Universiti Brunei Darussalam
12:15	Assessing the Impact of Peat Rewetting Activities from Plot to Landscape Scale: A Case Study in Central Kalimantan HIDAYAH HAMZAH World Resource Institute Indonesia DEDE SULAEMAN World Resource Institute Indonesia
12:30	QUESTIONS & ANSWERS
13:00 – 14:00	LUNCH BREAK

Habitats of Heritage: Peatlands, Mangroves, and Freshwater Swamps in Southeast Asia
6-7 November 2024, Singapore

14:00 – 15:30	PANEL 3 – MANGROVES
<i>Chairperson</i>	RENEE LORICA <i>National University of Singapore</i>
14:00	Strange Forests of the Sea: Documentation and Knowledge Production about Mangrove Forests in the 19th to 20th Century Philippines MA. FLORINA ORILLOS-JUAN <i>De La Salle University</i>
14:15	Mangrove Ecosystem Biodiversity of Peam Krasop and Koh Kapik, Cambodia VANESSA HERRANZ MUÑOZ <i>Fishing Cat Ecological Enterprise</i>
14:30	Myanmar’s Mangroves: Lifeblood of Coastal Communities MYO OO <i>Green Network Tanintharyi Region</i> SAW WIN MYO SAN <i>Green Network Tanintharyi Region</i>
14:45	Kingship on a Mangrove Island: Protecting Pulau Kukup FAIZAH ZAKARIA <i>National University of Singapore</i>
15:00	QUESTIONS & ANSWERS
15:30 – 16:00	TEA BREAK
16:00 – 17:30	PANEL 4 – WETLAND CONSERVATION
<i>Chairperson</i>	EUNICE JINGMEI TAN <i>National University of Singapore</i>
16:00	A Link Between the Land and the Sea: Ethnobotany, Heritage and Conservation in Philippine Mangrove Histories RUEL V. PAGUNSAN <i>University of the Philippines Diliman</i>
16:15	Community-Led Mangrove Management in Indonesia: Integrating Traditional Ecological Knowledge into Conservation Efforts BEBY PANE <i>Yayasan Pesisir Lestari</i>
16:30	Mangroves of Vietnam: Biodiversity, Benefits and Management PHAM HONG TINH <i>Hanoi University of Natural Resources and Environment</i>
16:45	ASEAN Flyway Network: Biodiversity Conservation of Wetlands and Migratory Waterbirds in the ASEAN Region SHUFEN YANG <i>National Parks Board Singapore</i>
17:00	QUESTIONS & ANSWERS
17:30	END OF DAY 1
18:00 – 20:00	WORKSHOP DINNER (<i>For Presenters, Chairpersons and Invited Guests</i>)

7 NOVEMBER 2024 • THURSDAY

09:00 – 10:30	PANEL 5 – PEATLANDS
<i>Chairperson</i>	DARREN CHONG JINN YEO <i>Lee Kong Chian Natural History Museum</i>
09:00	Tasik Bera – A Unique Habitat for Freshwater Fishes in Peninsular Malaysia AMIRRUDDIN AHMAD <i>Universiti Malaysia Terengganu</i>
09:15	Rapid Biodiversity Assessment in Peatland Ecosystems in Vientiane and Champasak Provinces, Lao People’s Democratic Republic INTHAVY AKKARATH <i>Water Resources Department, Lao PDR Ministry of Environment</i>
09:30	Unravelling the Mystery of Food Webs and Impact of Land-use Change in Malaysian Peat Swamps ELYSIA TOH <i>University of the Sunshine Coast</i>
09:45	Tech-Driven Conservation: How the SUPA Project Transformed Peatland Fire Management in Thailand THAWATCHAI PALAKHAMARN <i>GIZ Thailand SUPA Project</i>
10:00	QUESTIONS & ANSWERS
10:30 – 11:00	TEA BREAK
11:00 – 12:30	PANEL 6 – WETLANDS
<i>Chairperson</i>	NUR HASANAH GAUCH <i>ASEAN Centre for Biodiversity</i>
11:00	Vegetation Structure, Zonation, and Plant Biodiversity in the Agusan Peat Swamp Forest, Philippines EDWINO S. FERNANDO <i>University of the Philippines Los Baños</i> LOWELL C. ARIBAL <i>Central Mindanao University</i>
11:15	UST’s Aquatic Insect To Zooplankton (A To Z) Research and its Contributions to our Knowledge about Aquatic Biodiversity and Ecology in Major Inland Wetlands of the Philippines REY DONNE S. PAPA <i>University of Santo Tomas</i>
11:30	Wings over Water: Birds of Southeast Asian Wetlands YEN YI TAN <i>Lee Kong Chian Natural History Museum</i>
11:45	Integrated Solutions for Management of Tropical Freshwater Swamp Forest YIXIONG CAI <i>National Parks Board Singapore</i>
12:00	QUESTIONS & ANSWERS
12:30 – 13:00	CLOSING REMARKS ARVIN C. DIISMOS <i>ASEAN Centre for Biodiversity</i>
13:00 – 14:00	LUNCH BREAK
14:15 – 15:00	BUS TRANSFER
15:00 – 17:00	FIELD TRIP (For Presenters, Chairpersons and Invited Guests) SUNGEI BULOH WETLAND RESERVE (Co-ordinated By ACB and NPARKS)
17:00	END OF DAY 2

**Shrimp, Nickel, and Flowerhorns:
Novel Configurations of Conservation Practices in Sulawesi's Ancient Lakes**

JONATHAN GALKA
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There is change afoot in Central Sulawesi's ancient lakes. These five lakes and their drainages are home to several spectacular evolutionary radiations: molluscs of the genus *Tylomelania*, shrimp of the genus *Caridina*, and *Telmatherinid* silversides. But today, as the group Sulawesi Keepers implores, much of the "freshwater fauna of Sulawesi is at risk of extinction." Dam projects at Lakes Poso and Towuti, habitat fragmentation, the introduction of nonnative fish species, increased siltation resulting from nearby deforestation, and the as-yet incompletely known effects of increasing nickel mining have all degraded lake habitats. Sulawesi Keepers, a group based in continental Europe and coordinated by Ostrava Zoo in the Czech Republic, seeks to combat these threats via a multi-pronged approach. In Europe, they appeal to long-standing efforts among aquarium hobbyists to help build and network insurance populations of endangered molluscs, shrimp, and fish at home. They have identified flowerhorn cichlids, first introduced into Lake Matano and spreading from there, as a primary threat to remaining invertebrate biodiversity. In Sulawesi, they work with local partners, including the Institut Mosintuwu, and, perhaps surprisingly, nickel mining operations, to raise awareness of the effects of the flowerhorn, monitor introductions, and potentially build predator exclusion zones. This talk focuses on these forms of conservation practice emerging between tank craft in Europe, nickel mining's interest in in situ interventions, and the local communities bordering Sulawesi's ancient lakes.

Jonathan Galka is a doctoral candidate in the History of Science department at Harvard University. From 2024 to 2025, he will be a visiting scholar at the Asia Research Institute, National University of Singapore, and with the Nanyang Technological University's Centre for Contemporary Art on its Climate Change and Cultural Loss project. His dissertation examining the 20th-century identification of deep-sea manganese nodules as scientific, political, and economic resources, queries how the construction of nodules as a mineral resource frontier imbricated the biological and geological sciences with Cold War and postcolonial ocean law and politics. Jonathan has continued this work in Singapore, as deep-sea nodules take on renewed significance in new energy transitions. His historical and ethnographic work on oceanic resource frontiers appears or is forthcoming in *Historical Studies of the Natural Sciences*, *Social Studies of Science*, and *History and Philosophy of the Life Sciences*. Jonathan is also beginning a second project on the history and future of ocean thermal energy conversion (OTEC). Before his doctoral research, he completed a B.S. in the history of science, ecology and evolutionary biology at Yale University.

Peatland Fish Diversity in Southeast Asia

HEOK HUI TAN

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Peatland habitats were once extensive in Southeast Asia but are now fragmented and highly modified for cultivation and urbanization. The waterways and bodies are highly acidic and inhabited by unique aquatic life, none more so specialized than stenotopic fish species. This talk will highlight the North Selangor Peat Swamp Forest, touch upon fish miniaturization in nutrient-poor waters, and delve into the uber-rare genus *Encheloclarias*.

Heok Hui Tan has been working on Southeast Asian freshwater fishes for more than 30 years and published extensively on the systematics and taxonomy of these fishes (covering elasmobranchs to Tetraodontidae); having described more than 135 species to date. He is the Scientific Manager and Curator of Fishes at the Lee Kong Chian Natural History Museum. He also works on the conservation and ecology of fishes in Singapore's freshwater and coastal waters, and he actively participates in field expeditions and collection building.

Mudskippers as Mangrove Flagship Species

ZEEHAN JAAFAR

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ALYSSA YAN YING TAN

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Mangrove ecosystems are facing unprecedented anthropogenic threats throughout Southeast Asia. Significant losses in area cover have consequently impacted the efficacy of ecosystem service provision. Conservation of mangrove forests has been historically challenging due to the persistent negative perceptions surrounding these habitats. Conservation efforts have been hampered by ideas of mangrove areas as 'swamps' that are 'dirty' and 'dangerous' in which the areas are 'unproductive' and 'inarable'. The adoption of a flagship species can aid in conservation endeavours. Flagship species are organisms closely associated with specific habitats that can serve as ambassadors to increase public awareness of conservation needs. In our presentation, we discuss why mudskippers make excellent candidates as flagship organisms for mangrove ecosystems. These fishes are closely associated with mangrove forests, are charismatic, and are highly visible. Further, they are already embedded in the many native heritage —as featured in many local folklores throughout Southeast Asia. Widespread recognition of mudskippers as emblems of mangrove ecosystems can unite conservation narratives for the imperilled mangrove ecosystems.

Zeehan Jaafar is a marine biologist at the National University of Singapore with research interests in the ecology of marine fishes and the conservation of their habitats. She has led and participated in many international and regional expeditions to enhance her understanding of the diversity and distribution patterns of fish fauna.

Alyssa Yan Ying Tan is an undergraduate student at Yale-NUS College. She has an avid interest in mudskipper ecology and behaviour and is keen on understanding the role of organisms in the intersection of heritage and species conservation.

Freshwater Fish Biodiversity in Brunei Darussalam

RAFHIAH KAHAR

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This talk offers an overview of the diversity of native freshwater fish species in Brunei Darussalam, based on past studies and recent research. It explores the distribution of these species across different habitats, from lowland rivers to upland streams, emphasising the unique ecological features of each environment. Additionally, the talk highlights research conducted in Ulu Temburong National Park, providing valuable insights into the ecology of hillstream freshwater fishes in this region.

Rafhiah Kahar is a freshwater ecologist specialising in the reproductive ecology of freshwater fishes in Brunei Darussalam. She is also interested in exploring freshwater fauna biodiversity, trophic ecology, and the impacts of anthropogenic activities on aquatic ecosystems. In addition to her research, she currently serves as the Head of the Kuala Belalong Field Studies Centre and Education Coordinator at the Institute of Biodiversity and Environmental Research, where she oversees the management of a remote field station and leads biodiversity education and outreach initiatives.

Peatlands: Biodiversity for Food Security and Climate Nexus

MADE HESTI LESTARI TATA

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Peat ecosystems provide various ecosystem services. Peatlands, in their natural condition, act as significant carbon sinks, storing large amounts of carbon in the vegetation and its substrate. The conversion of pristine peatlands into agricultural land through artificial drainage resulted in a water storage loss. The diversity of plants and fish in the peat ecosystem provides food, medicines, and other tangible benefits. However, peatland is considered merely as unproductive land that should be utilized for economic development. The expansion of plantation-based agriculture, but not optimal food crop production, ostensibly to address national concerns relating to poverty alleviation and food security. Drainage of peatlands can lead to drier peat surfaces, increasing vulnerability to fire, and eventually resulting in loss of plant diversity and significant greenhouse gas (GHG) emissions. Land use change, climate change and land degradation are some relevant factors in food security. Our study showed that peat forests in Indonesia decreased significantly in agricultural land. The food production in some peat provinces is not very cost-effective compared to oil palm, which is not a peatland species. Exploring other crop types which are suitable on peatlands and do not need drainage is necessary to decrease GHG emissions. There are linkages and trade-offs between climate change, land use change and food security, and some programmes are recommended.

Made Hesti Lestari Tata is a principal researcher in the field of silviculture – agroforestry technology of the Research Center for Ecology and Ethnobiology, National Research and Innovation Agency (BRIN). She graduated with a PhD from the Department of Plant Ecology and Biodiversity, Utrecht University, The Netherlands, in 2008. She is experienced in conducting research and development in silviculture and agroforestry technology, paludiculture, rehabilitation, ecology in lowland forest ecosystems and peat ecosystems. She is familiar with working with various parties, including farmers, local governments, non-governmental organizations, universities, private sectors, and international institutions. She has also coached several undergraduate and postgraduate students from IPB University and Universitas Gajah Mada. Various publications of scientific articles in the form of books, parts of books and articles in national and international journals and proceedings have been published during her career as a researcher. Her achievements include two registered simple patents.

Microbial Community Dynamics and Carbon Cycling in Brunei's Peat Swamp Forests

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Peat swamp forests (PSFs) are critical for global carbon (C) storage due to their vast belowground C reserves. While the aboveground functions of PSFs have been well-documented, the belowground processes influencing soil C cycling, particularly the role of microbial communities, have been less understood. This study aimed to explore the belowground traits and functions in Brunei Darussalam's PSFs, focusing on plant-microbe interactions and their impact on C and nutrient cycling. It was hypothesized that PSFs exhibit unique belowground dynamics driven by their microbial community composition. The objectives included analyzing soil bacterial and fungal communities using DNA sequencing techniques. Soil samples were collected from PSF plots, with analyses concentrating on microbial composition. By integrating data on microbial community diversity, this research provided a more comprehensive understanding of how plant nutrient acquisition strategies and microbial decomposition processes control nutrient and C cycling in PSFs. These insights are crucial for predicting ecosystem responses to climate change and for informing conservation strategies in these vital tropical forest ecosystems.

Salwana Md. Jaafar is an expert in Tropical Ecosystem Ecology, currently an Assistant Lecturer at the Institute for Biodiversity and Environmental Research, Universiti Brunei Darussalam. With a PhD in Biodiversity focusing on the effects of invasive *Acacia* species on nutrient cycling in Brunei's tropical lowland rainforests, she has made significant contributions to the field. Her research interests include nutrient cycling, invasive species ecology, and tropical ecosystem conservation. Dr. Salwana has received extensive research training at renowned institutions, including the University of Aberdeen in Scotland, Nanyang Technological University in Singapore, and Stanford University in the United States. With a robust background in research and academia, she continues to explore and disseminate knowledge in tropical ecology, aiming to address pressing environmental challenges.

The Badas Peat Swamps of Brunei Darussalam: Ecological Insights and Conservation Efforts

RAHAYU SUKMARIA BINTI HJ SUKRI

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Covering about 16% of the country, Brunei Darussalam's peat swamps are among the most intact tropical peatlands in Southeast Asia. The Badas peat dome, in particular, is a critical habitat with high biodiversity value, yet it remains largely unexplored. This talk will highlight the unique ecological characteristics of the Badas peat dome, and discuss the challenges faced in its management and conservation. Key research projects at the Institute for Biodiversity and Environmental Research at Universiti Brunei Darussalam on the biodiversity and ecology of the Badas peat swamps will be reviewed. These scientific studies of flora and fauna diversity, ecosystems and reforestation enhance our understanding of the Badas peat swamps to better support their protection.

Rahayu Sukmaria Binti Hj Sukri is an Associate Professor in Plant Ecology with the Institute for Biodiversity and Environmental Research (IBER) and the Curator at the Botanical Research Centre, Universiti Brunei Darussalam (UBD). She received her PhD in 2010 from the University of Aberdeen. As a tropical forest ecologist, she has over 20 years of research experience working in Brunei's forests. She is the Principal Investigator of the IBER Forest Plots Network and represents Brunei Darussalam on the Scientific Advisory Committee to the ASEAN Centre for Biodiversity. Her current research focuses on biodiversity and conservation, particularly on plant ecology, diversity and community composition, peat swamp ecology, the impact of invasive Acacias on natural ecosystems in Brunei and the reforestation and revegetation of degraded peatlands in Brunei. She began working at the Badas peat swamps in Brunei during her undergraduate studies at UBD and presently leads IBER's research projects on Brunei's peatlands in collaboration with local and international partners.

Assessing the Impact of Peat Rewetting Activities from Plot to Landscape Scale: A Case Study in Central Kalimantan

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Over half of Indonesia's peatland areas, which span approximately 14.43 million hectares and represent over 80% of Southeast Asia's peatlands, are degraded. Despite their essential ecological functions, these peatlands have experienced significant degradation due to human activities in recent decades. Much of this land has been converted for agricultural use, with artificial canals constructed to manage and drain the water. This alteration has led to severe issues, including frequent peat fires, a drastic decline in peat groundwater levels (GWL), and substantial carbon emissions that contribute to climate change. In response, rewetting activities have been implemented to restore these degraded areas. However, a gap in understanding how these rewetting efforts impact peat hydrological properties remains. To address this, the World Resource Institute (WRI) Indonesia conducted a plot-scale study to measure the effects of peat rewetting by doing on-site measurements in Kahayan-Sebangau Peat Hydrological Units (PHU), Central Kalimantan. To extend this research to a landscape scale, hydrological modelling using a deterministic, physically-based model coupled with a fully dynamic, one-dimensional modelling system was employed to assess the impact of rewetting infrastructures in the PHU. This study will present the correlation between peat GWL and other parameters, such as rainfall and soil moisture, observed during the plot-scale research. Additionally, a formulation to predict the impact distance and area of rewetting based on GWL rise in canals will be discussed. The percentage of the rewetted area in the PHU achieving a 2cm rise in GWL will also be provided, offering insights into the effectiveness of rewetting interventions.

Hidayah Hamzah is the Senior Manager for Forest and Peat Monitoring at WRI Indonesia. She has been working on sustainable peatland issues and forest monitoring for more than 10 years. Hidayah co-authored publications and articles on forest monitoring and peatland management in Indonesia. Hidayah holds an MSc in Natural Resources Management from the University of Twente in the Netherlands and a Bachelor's Degree in Marine Science from IPB University in Indonesia.

Dede Sulaeman is the Research Lead for Peatland at WRI Indonesia, overseeing research related to peatland restoration and degradation. With 10 years of experience, he specialises in land resources management, hydrological modelling, soil and water conservation, and watershed management. He has published journal articles, publications and articles on peatland restoration and peatland subsidence in various journals. Dede collaborates with government institutions, NGOs, and the private sector to advance peatland research and restoration efforts.

**Strange Forests of the Sea:
Documentation and Knowledge Production about Mangrove Forests
in the 19th to 20th Century Philippines**

MA. FLORINA YAMSUAN ORILLOS-JUAN

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The Philippines is regarded as an “area with the greatest diversity of mangrove species and mangrove ecosystem worldwide.” Mangrove trees grew abundantly in the country but in recent years, due to conversion for various uses and overexploitation, the forest cover has significantly diminished. The paper examines the production of knowledge about the “strange forests of the sea,” which was based on careful surveying, fieldwork and documentation carried out by the personnel of the Inspección General de Montes and the Bureau of Forestry in the 19th to 20th century. Official reports and corresponding publications revealed the estimated extent of the mangrove forest cover at the turn of the 20th century and the economic viability of harnessing mangroves for timber, fuelwood, tanbark, dye, and other uses. These accounts also contained valuable information about the local names of different species of mangroves known in different provinces and islands, including their various domestic uses.

Ma. Florina Yamsuan Orillos-Juan is an Associate Professor at the Department of History and an Affiliate of the Southeast Asia Research Center and Hub, De La Salle University Manila. Her research interests include the environmental history of the Philippines, the history of disasters, the history of leprosy in the Philippines and Southeast Asia, the Spanish colonial period, culture during the Japanese Occupation, and general topics about history and geography. She earned her degrees in PhD History, MA History, and BA History (cum laude) from the University of the Philippines Diliman.

Mangrove Ecosystem Biodiversity of Peam Krasop and Koh Kapik, Cambodia

VANESSA HERRANZ MUÑOZ
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A comprehensive biodiversity assessment was conducted within the mangrove ecosystem of Peam Krasop Wildlife Sanctuary and Koh Kapik Ramsar Site on the northwest coast of Cambodia, including terrestrial and aquatic fauna and flora. Data were collected using camera traps and targeted rapid surveys over four months. The survey identified a remarkable array of species, including 62 plant species representing true mangroves and associated trees, vines, shrubs, and palms. Among the canopy dwellers, at least 16 and possibly as many as 19 distinct bat species were recorded, representing approximately a fifth of the known bats in Cambodia. The study captured more than 1,200 individual arthropods, comprising over 350 species. On the forest floor, 12 amphibian and 5 reptile species were identified during a week-long herpetological survey. In total, 157 bird species have been recorded in recent years, 15 of which are considered threatened. Over five days, researchers captured nearly 3,800 individual fish larvae and juveniles belonging to 74 species, including the threatened spotted seahorse. Additionally, 23 mammal species were identified, with nearly half considered threatened, such as the critically endangered Sunda pangolin, as well as threatened fishing cat, hairy-nosed otter and large-spotted civet.

The findings of this study underscore the critical role of Peam Krasop and Koh Kapik in conserving rare mangrove biodiversity, particularly endangered species and regionally significant mangrove forests. Further research is needed to understand the ecological interactions and threats facing this unique ecosystem.

Vanessa Herranz Muñoz is the Founder and Director of the Cambodia-based Fishing Cat Ecological Enterprise, Co., Ltd. ("FCEE"), a company managed as a social enterprise. FCEE spearheads mangrove habitat restoration within important community-protected areas, led by local women. Its vision is to revive Cambodia's wetland ecosystems, implementing actions in biodiversity monitoring, technical support for conservation, habitat restoration and supporting community livelihoods. Before moving to Cambodia in 2014, Vanessa worked as a technical writer of conservation guidance on behalf of the European Commission. Since 2017, Vanessa and the FCEE team have led ecological and social research and conservation actions in coastal sites, including a recent comprehensive mangrove biodiversity survey. Vanessa is presently completing a PhD in ecology and conservation of the fishing cat and other rare mammal species living in the mangroves and wetlands of Cambodia.

Myanmar's Mangroves: Lifeblood of Coastal Communities

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Myanmar is one of the mangroves-richest countries in the world. With about 500,000 hectares of mangroves along its 2832-km coastline along the Bay of Bengal and the Andaman, Myanmar has the largest area of mangroves in Asia after Indonesia and Malaysia. Because of its great latitudinal range and ecological diversity, Myanmar is also home to 34 of the world's 75 "true" mangrove species, a very high proportion and second only to Indonesia in Asia. According to the latest estimates by UN-REDD Programme, Myanmar's mangroves store an estimated 119 million tons of carbon in their biomass and soils. They also provide important ecosystem services to the people and habitats for birds and other wildlife such as Asian elephants and tigers. However, Myanmar's mangroves are undergoing pressures both from anthropogenic and from natural disturbances, resulting in high rates of deforestation and forest degradation. Although it is difficult to obtain accurate data, some estimates indicate that between 2000 and 2014, Myanmar had a net mangrove loss of 191,122 hectares at an alarming rate of 14,619 ha per year. The political crisis in 2021 also exacerbated environmental destruction due to a lack of law enforcement and increasing poverty. Despite these challenges, local communities and grassroots civil society organisations have been trying to prevent further deforestation and mangrove restoration. We hope to present recent efforts and experiences of community-based mangrove management in Myanmar including challenges and opportunities.

Myo Oo was born in one of Myanmar's southernmost townships – Myeik, where Myanmar's dense mangroves are found. After leaving his teaching job in 2012, he shifted his focus to mangrove conservation. At first, he visited village after village on his initiative with no formal support from any other organisation. The 46-year-old worked tirelessly on the mangrove conservation project, despite a disability that makes walking painful. His work is truly a passion project and a manifestation of his love for the area's communities and their mangroves. In 2017, He established and registered a non-profit organization called Green Network Tanintharyi Region Myanmar (GNTRM). The organization has to-date facilitated Community Forest certifications in 20 villages. This work was bolstered via collaborations with conservation organisations and universities, including FFI, WCS, UNDP, and Myanmar Environmental Rehabilitation-conservation Network. He holds a bachelor's degree in Zoology. He continues to work with local communities in mangrove conservation and livelihood development.

Saw Win Myo San is an Activity Manager and Mangroves Specialist at the United Nations Development Programme in Myanmar. His journey in the field of natural resource management began with rigorous academic training, which laid the foundation for his decade-long work. Throughout his career, he has demonstrated commitment to preserving and restoring natural ecosystems ranging from the Hkakaborazi landscape in the Himalayas to mangrove forests in the southeasternmost part of Myanmar. His extensive experience includes focusing on social forestry, where he has worked closely with local communities and civil society organisations to implement sustainable forestry practices. His dedication to social forestry has enhanced community livelihoods and contributed to the conservation of vital natural resources such as mangroves. A forester by training, he holds a master's degree in natural resource management from Kyoto University in Japan. He now works at UNDP Myanmar.

Kingship on a Mangrove Island: Protecting Pulau Kukup

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In 2018, the Sultan of Johor provoked a public outcry when the state government de-gazetted Pulau Kukup and reclassified it as sultanate land. A national park comprising a rare mangrove island off the coast of Pontian, Pulau Kukup had been inscribed as a RAMSAR site in 2003. The backlash prompted a re-declaration of the island as a national park, although its designation as sultanate land was not revoked. On what basis does this claim stand? This paper explores the socio-political history of Pulau Kukup as a lens into reflecting on the governability of mangrove ecosystems in Southern Johor more broadly. These mangroves were the living spaces of various Orang Laut groups, especially the Orang Seletar, who were at times allied to the Johor-Riau kings whose settlements at the coasts and river mouths taxed the trade along the Straits of Malacca. The refashioning of the Johor sultanate into a terrestrial kingdom patterned on British colonies in the peninsula brought an influx of Chinese migrants to work on the gambir and pepper plantations in Pontian, hiving off Kukup from neighbouring mangroves in Sungai Pulai and Tanjung Piai. Reclamation works that intensified with the Iskandar region development project in the early 2000s solidified the separation of the island from the mangrove ecosystems on the mainland. Seen in this light, the designations of Kukup, Sungai Pulai and Tanjung Piai as separate national parks index a long process of rendering the mangroves more vulnerable through legalized fragmentation rather than a move forward in securing protection.

Faizah Zakaria is an Assistant Professor in the Departments of Southeast Asian Studies and Malay Studies at the National University of Singapore. Her research interests centre on religion and ecology, environmental justice and indigenous movements in island Southeast Asia. Her first monograph *The Camphor Tree and the Elephant: Religion and Ecological Change in Maritime Southeast Asia* (2023) was published by the University of Washington Press. She is presently working on a research project on science and religion in volcanic eruptions and co-coordinates a digital humanities project on comparative Asian medicine. She received a PhD in history from Yale University in 2018.

A Link Between the Land and the Sea: Ethnobotany, Heritage and Conservation in Philippine Mangrove Histories

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In a 17th-century manuscript, *Declaracion de las virtudes de los árboles y plantas* (published posthumously in 1878), Dominican priest Ignacio Mercado listed four plants belonging to the mangrove family as identified by contemporary scientists. The manuscript provided a window to examine contact-period documentation of Philippine estuarine and, more importantly, of vernacular ecologies in the archipelago. The clergy chronicled the local names as well as the medicinal properties of the plants according to how the local inhabitants had utilized them. The first part of the paper surveys Mercado's accounts and other historical materials and examines how mangal was embedded in vernacular worldviews and practices. From food to fuel, sources reveal how mangroves were linked to Philippine island life.

The second part centers on stories from the islands of Panay and Guimaras where some rare species and a large extent of mangroves can be found. These Central Philippine islands also serve as important habitats for mangrove-specific algae and crustaceans and sites for mangrove research and successful reforestation projects. Utilizing 1950s oral history accounts and locally-produced scientific reports, the paper investigates the role of mangroves in the making of Visayan heritage — from the placenames of towns and villages to indigenous fisheries practices and conservation of estuarine ecologies.

Ruel V. Pagunsan is an associate professor at the Department of History, University of the Philippines Diliman. His research focuses on nature-making and nationalization of ecological spaces. He explored these themes for PhD History project. He has published articles in journals such as the *Philippine Studies: Historical and Ethnographic Viewpoints* and the *Journal of Southeast Asian Studies*. Currently, he is working on a book project examining the environmental history of nation-building in the Philippines.

Community-Led Mangrove Management in Indonesia: Integrating Traditional Ecological Knowledge into Conservation Efforts

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How can traditional ecological knowledge (TEK) of mangroves be integrated into national or international conservation policies? This study explores TEK in four Indonesian villages, namely Budeng (Bali), Golo Sepang (East Nusa Tenggara), Uwedikan (Central Sulawesi), and Darunu (North Sulawesi)—where local communities have long managed mangrove ecosystems through sustainable practices. By focusing on cultural values and active management to prevent ecological degradation, the study asks how these traditional practices can contribute to broader conservation frameworks. What if, in addition to modern scientific methods, adequate attention was given to community-driven approaches that not only protect biodiversity but also enhance local livelihoods through sustainable resource use? How can this wealth of local knowledge, with its deep ecological understanding of mangrove biodiversity, be integrated into formal conservation planning? Furthermore, as community-led initiatives gain increasing recognition under frameworks such as the Other Effective Area-based Conservation Measures (OECMs), this study examines the potential for scaling these models into national and international conservation strategies. By addressing these questions, the study seeks to bridge traditional ecological practices with contemporary conservation efforts.

Beby Pane is a Policy Advocacy specialist at Yayasan Pesisir Lestari, where she works to support sustainable coastal management in Indonesia. Since joining the organisation in August 2022, she has provided advocacy assistance to 54 coastal villages and played a pivotal role in the development of over 30 legal documents focused on marine conservation and local governance. Her work emphasises the integration of traditional ecological knowledge (TEK) into conservation strategies, aiming to enhance community resilience in the face of climate change. She has also contributed to knowledge-sharing efforts through the publication of scholarly works and policy papers, reflecting her deep commitment to environmental advocacy and community-based conservation.

**Mangroves of Vietnam:
Biodiversity, Benefits and Management**

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Vietnam is one of the Southeast Asian countries with large areas of mangrove forests. Vietnam mangroves were severely destroyed during the Vietnam War and then indiscriminately exploited during the 1980s until the late 1990s. The rate of mangrove loss has decreased in the past decades due to the increased public awareness of the role and value of mangroves. With the support of the government, policies on mangrove management and conservation have gradually met practical requirements. With the active participation of local people and the support of international organisations, Vietnam mangroves have been better managed. An overview of the current status and biodiversity of mangrove forests in Vietnam will be covered based on recent publications and unpublished works. The mangrove ecosystem services related to local people's livelihoods will be summarised. Some achievements and challenges in mangrove management and conservation in Vietnam will also be discussed.

Pham Hong Tinh has been working on Vietnam mangroves for about 15 years. He was involved in projects of mangrove ecology, human-mangrove interaction, mangrove management and restoration in Vietnam and recently in Madagascar. He is currently a lecturer in natural resources management at the Hanoi University of Natural Resources and Environment. He actively participates in field surveys and works with local communities to collect mangrove data, as well as provides consultation for community-based mangrove restoration projects.

**ASEAN Flyway Network:
Biodiversity Conservation of Wetlands and
Migratory Waterbirds in the ASEAN Region**

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The ASEAN Flyway Network (AFN), composed of national focal points, flyway site managers, experts, and other key stakeholders, was established by the ASEAN Member States, serving as a network that facilitates regional cooperation to ensure the conservation of the migratory waterbirds and the wetlands that support them along the East Asian-Australasian Flyway.

The AFN has since initiated the project "Improving Biodiversity Conservation of Wetlands and Migratory Waterbirds in the ASEAN Region", an initiative supported by the Japan-ASEAN Integration Fund (JAIF), implemented by the ASEAN Centre for Biodiversity (ACB), and led by the National Parks Board (NParks) of Singapore.

Yang Shufen is the Director of Sungei Buloh, Conservation Division of the National Parks Board, Singapore, and Chair of the ASEAN Flyway Network. She oversees the management of the Sungei Buloh Nature Park Network and Khatib Bongsu, and has been with the National Parks Board since 2006. Yang Shufen holds a Bachelor of Science (Honours) in Biology from the National University of Singapore.

Tasik Bera – A Unique Habitat for Freshwater Fishes in Peninsular Malaysia

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Freshwater fishes of Tasik Bera, a swamp-like lake in Peninsular Malaysia has been studied for many years. In the recent study, a total of 158 species from 36 families of freshwater fishes were reported from Tasik Bera and its tributaries – one of the most critical and unique freshwater ecosystems in Peninsular Malaysia. The updated checklist of ichthyofauna recorded here were dominated by Cyprinidae (30 species) and Danionidae (21 species). Families Cobitidae, Bagridae, Siluridae, and Osphronemidae shared the same number of species (11). At least two species previously known to Tasik Bera (*Balantiocheilos melanopterus* – Cyprinidae and *Pseudobagarius alfredi* – Akysidae) were not recorded and thought to be locally extinct. A few species could be new to science. The current available data shows that the fish diversity of the lake ecosystem is highly diverse. Despite the water surface is shrinking and water quality deteriorating, the diversity of aquatic inhabitants at Tasik Bera still can be conserved.

Amirrudin Ahmad is a lecturer at Universiti Malaysia Terengganu, Malaysia. He has been working on various groups of animals for almost 25 years and has published several papers on the systematics and taxonomy, species distribution and ecology of the fauna of Peninsular Malaysia. He is currently the Director of the Institute of Tropical Biodiversity and Sustainable Development. He also works on the conservation and ecology of freshwater fishes, aquatic invasive alien species (IAS) in Malaysia and actively participates in field expeditions.

Rapid Biodiversity Assessment in Peatland Ecosystems in Vientiane and Champasak Provinces, Lao People's Democratic Republic

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This report presents findings of rapid biodiversity assessment in peatland ecosystems, including Nong Youp and the surrounding peatlands in Vientiane province, and Beung Bahphat and the surrounding peatlands in Champasak province. The surveys of peatlands were carried out on 14-18 November 2021 in the peatlands of Vientiane province and on 9-14 December 2021 in the peatlands of Champasak province. The rapid biodiversity assessment of peatlands' multi-taxon biodiversity focused on plants, reptiles and amphibians, fish, macroinvertebrates, birds, and mammals. Both village-based interviews including a review of existing data from previous studies and field samplings were applied to assess the status of both fauna and flora as well as threats that occurred in those target peatland ecosystems.

Inthavy Akkharath was the former Director General of the Lao PDR Department of Water Resources. He received a Doctor of Philosophy in Forest Hydrology and Watershed Management from the Faculty of Forestry, University Putra Malaysia (UPM). He is well-known for his expertise in Forestry Hydrology and Watershed Management and experiences working in the region of the Faculty of Forestry University Putra, Malaysia and Mekong River Commission in Vientiane, Laos and Phnom Penh, Cambodia where he has spoken extensively on the subject and has had several articles published. Dr. Inthavy is a professional in Forestry and Water resources management, especially in modelling in water resources engineering during his time with the Water Resources Modelling team of the National Mekong Commission. His experience includes the Water and Water Resources Management and River Basin and Hydrological Management under Ministry of National Resource and Environment as a National Focal Point (NFP) to Secretariat of Convention of Combat Desertification (UNCCD) for Lao PDR Academy, United Nations Development Programme, United Nations Environment Programme, World Resources Institute and National Focal Point for UNCBD and NBSAP, Biodiversity Country Report Volume 5-2018 and Volume 6-2020. In addition, he gives much concern to natural peatlands or wetlands, particularly the edge in wetland management and conservation of peatlands.

Unravelling the Mystery of Food Webs and Impact of Land-use Change in Malaysian Peat Swamps

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Tropical peat swamps in Southeast Asia are among the most ecologically important, yet vulnerable ecosystems. They play an outsized role as global carbon sinks, regulators of hydrological regimes, and refugia for many endemic and stenotopic freshwater species. Peat swamps are also threatened by logging, draining and land use change across the region—particularly in Peninsular Malaysia where 94% of peat swamps have experienced anthropogenic disturbances but only 16% are formally protected. The impact of land-use change, specifically, may lead to the extinction of these specialized aquatic biodiversity that is not found anywhere else and may have cascading impacts for the rest of the ecosystem. However large gaps presently remain in our understanding of these impacts. Addressing these gaps (such as through understanding the food webs) will be key in informing restoration efforts as well as protected area zonation. This paper outlines a preliminary investigation of habitat disturbance and loss in one of the largest remaining intact peat swamp forests within Peninsular Malaysia. Through a combination of fieldwork and lab methods (gut content and stable isotope analysis), we characterise the swamp forest’s aquatic food web across a disturbance gradient to understand how land-use change can affect such ecosystems. Overall, the goal of this research is to better inform conservation and protection of peat swamp forests and the unique biodiversity within them.

Elysia Toh is a PhD student at the University of the Sunshine Coast, working on the freshwater and conservation ecology of tropical and subtropical peatlands. She has five years of experience in freshwater ecology of Singapore and previously did her MSc working on behavioural ecology of the critically endangered and endemic Singapore freshwater crab. Before her PhD, she was a research associate and project manager at Yale-NUS College, managing the project “Linking the digital humanities to biodiversity history in Singapore and Southeast Asia”, which utilized digital humanities tools to increase accessibility and awareness of biodiversity history of the region. Her recent contributions to the field of freshwater ecology include the updated *Singapore Red Data Book*, which provides information on the national conservation status of biodiversity from Singapore; and the *Singapore Terrestrial Conservation Plan* (a collaborative document on recommendations for conservation of terrestrial and freshwater ecosystems in Singapore).

Tech-Driven Conservation: How the SUPA Project Transformed Peatland Fire Management in Thailand

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The Sustainable Use of Peatlands and Haze Mitigation in ASEAN (SUPA) project plays a critical role in the conservation and sustainable management of peatlands in Southeast Asia, particularly in Thailand's Phru Khuan Kreng Peatland. This paper presents the results of the SUPA project in Thailand, highlighting the transformative impacts on peatland fire reduction and community engagement. The project addresses significant challenges such as lack of data-driven decision-making, insufficient safety equipment for peatland firefighters, and the critical need for local capacity building. Through innovative technological interventions, including IoT-enabled intelligent water level monitoring systems and drone surveillance, SUPA has significantly strengthened fire prevention and response capabilities. Community involvement, facilitated by citizen science networks, has been vital in the success of these efforts, fostering collaboration between local communities and fire management agencies. Notably, results from the 2023–2024 implementation period show a 95% reduction in fire-related damage, demonstrating the project's effectiveness in mitigating peatland fires. Additionally, SUPA's focus on elevating sustainable governance practices through policy frameworks like the Kuan Kreng Peat Management Plan (2023–2030) has provided long-term solutions for peatland sustainability. This paper provides insights into the project and implementation strategies, challenges, and tangible impacts on regional biodiversity and climate resilience. SUPA's approach serves as a model for integrating technology, community participation, and policy action to address peatland degradation and enhance environmental sustainability in Southeast Asia.

Thawatchai Palakhamarn is a Technical Professional at Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) Thailand, where he leads the Sustainable Use of Peatlands and Haze Mitigation in ASEAN (SUPA) project in Thailand. With a PhD in Environmental Science focuses on resilience and nature-based solutions. Thawatchai has substantial experience in sustainable development, public policy, and strategic management, contributing to projects related to disaster risk reduction, environmental governance, and climate change adaptation. He serves as an advisor to several governmental committees, including the National Early Warning Committee, the House of Representative's Committee on government budget, etc. His work supports regional strategies for peatland conservation, fire management, and addressing transboundary environmental challenges. Thawatchai has also contributed to research and regularly shares insights on sustainable development and disaster risk management at international forums.

Vegetation Structure, Zonation, and Plant Biodiversity in the Agusan Peat Swamp Forest, Philippines

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The Agusan peat swamp forest on Mindanao Island in the Philippines is the largest in the archipelago with an area of 56.3 km². Four kinds of vegetation are recognised in the swamp, forming a catena of subtypes from the perimeter (outer zone, *tall pole forest*) to the center (inner zone, *pygmy forest*), including two in the mid-zone (*tall intermediate forest* and *low intermediate forest*), shown in differences in canopy height, tree sizes, and plant species composition. Variations in vegetation structure suggest that these are interdependent with peat thickness and associated with the physical, chemical and hydrological conditions of the peat. A total of 101 species belonging to 81 genera and 56 families of vascular plants were recorded in the swamp, with the tall pole forest having the highest species diversity. A low *Lycopodium-Dicranopteris* dominated plant community, occurring arbitrarily as patches, was also observed. An examination of leaf size indices of seven species of trees occurring across the catena showed decreasing leaf size from the tall forest (average leaf area 614.22 cm²) to the pygmy forest (average leaf area 167.01 cm²). Three leaf size categories consisting of mesophyllous, mesophyllous-notophyllous, and microphyllous were observed, which correspond to the structure of the vegetation from the outer zone (tall forest), mid-zone (tall and low intermediate forest), and inner zone (pygmy forest). Decreasing leaf size indices were strongly correlated with soil nitrogen, acrotelm thickness, peat depth, phosphate in water, nitrogen and phosphorus in the plant tissue.

Edwino S. Fernando is a forest botanist and Professor Emeritus in the Department of Forest Biological Sciences, College of Forestry and Natural Resources, University of the Philippines Los Baños. He is also affiliated with the Institute of Biology, College of Science, University of the Philippines Diliman. Prof Fernando holds BSc and MSc degrees in Forestry from the University of the Philippines Los Baños, an MSc degree in Plant Taxonomy from the University of Reading (England), and a PhD degree in Botany from the University of New South Wales (Australia). His published works are in the fields of taxonomic botany, floristics, mangrove ecology, forest formations, molecular phylogenetics, nickel hyperaccumulators, and long-term ecological research plots. He continues to undertake research on the taxonomy and ecology of plants, now with more focus on ultramafics. He has a keen interest in and advocacy for plant conservation and the restoration of mined-out sites using native plant species.

Lowell G. Aribal is Professor and Department Chair of Forest Biological Sciences at the College of Forestry and Environmental Sciences at Central Mindanao University in Bukidnon, Philippines. He earned his PhD in Forestry from the University of the Philippines Los Baños. His research interests are primarily in plant taxonomy and ecology.

**UST's Aquatic Insect To Zooplankton (A To Z) Research and its
Contributions to our Knowledge about Aquatic Biodiversity and Ecology in
Major Inland Wetlands of the Philippines**

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Significant strides were made in the past 20 years to raise the quality of research undertaken in major inland wetland ecosystems in the Philippines. These studies have been conducted to understand better its contributions to overall estimates of Philippine biodiversity and the impacts of non-native and invasive species. They have also looked at its response to anthropogenic stressors and current and future climate change scenarios. This presentation highlights the efforts of the University of Santo Tomas – Biodiversity, Ecology, Systematics, and Taxonomy research group to contribute an increased understanding of some of the Philippines' major inland wetland ecosystems and provide insights on potential approaches that would help overcome challenges facing efforts to document, monitor, conserve and manage inland wetlands throughout the country.

Rey Donne S. Papa is a Professor at the University of Santo Tomas, Manila, teaching Zoology, Freshwater Biology, and Ecology. He established the UST Zooplankton, Ecology, Systematics, and Limnology (ZESL) research group in 2011. His laboratory houses the UST Zooplankton Reference Collection – the Philippines' first and only organized repository of freshwater zooplankton. In 2016, he was one of the lead organisers of the first-ever Philippine Symposium on Freshwater Biodiversity and Ecosystems (PSFBE) held at the University of Santo Tomas. Since 2018, he has served as the Vice President of the Philippine Society for Freshwater Science, established as an offshoot of the first PSFBE. He has been the National Ambassador of the Philippines to the International Society of Limnology since 2020. He has been the Dean of the UST College of Science since January 2020.

**Wings over Water:
Birds of Southeast Asian Wetlands**

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The tropical wetlands of Southeast Asia – peatlands, mudflats, mangroves, and freshwater swamps – harbour rich avian diversity. These habitats provide essential ecosystem resources that support a myriad of bird species, ranging from year-long residents to visitors on their annual migratory cycles. Here, I will highlight the unique adaptations of wetland birds, their roles in ecosystem health, and their cultural significance to local communities. We will delve into the challenges these habitats face, such as deforestation, climate change, and pollution, which threaten both biodiversity and the ecological functions these wetlands perform. We will also explore these threats and their impacts on wetland birds in the context of Singapore. By showcasing key species and their interdependence with these environments, I hope to raise awareness about the urgent need for conservation efforts and inspire appreciation for the intricate connections between birds and their wetland homes, fostering a commitment to preserve these invaluable ecosystems for many generations to come.

Tan Yen Yi is a Museum Officer and Assistant Senior Curator of Birds at the Lee Kong Chian Natural History Museum. An ornithologist at heart and evolutionary geneticist by practice, her research interests lie in avian population genomics and phylogenomics, as well as documenting Singapore's avifauna from a natural history perspective.

Integrated Solutions for Management of Tropical Freshwater Swamp Forest

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Freshwater swamp forest is a threatened and overlooked ecosystem in Southeast Asia. Characterised by predominantly mineral soils supporting a subset of flora and fauna of lowland forest, including important habitat specialists, freshwater swamp forest is constrained by an array of hydrological processes. The Nee Soon freshwater swamp forest, surrounded by three reservoirs and with rapidly urbanised areas, is critical to the retention of a large number of Red List plant and animal species in Singapore. Physical changes along stream banks have taken place to various degrees. Observation showed raised water levels in some areas, drying in other areas, and shifts in the boundary between swampy and dry land forests. There are concerns over alien invasive species, loss of big emergent trees, small population sizes and vulnerability of various endangered species, and the uncertain outcomes of changes in water quality and quantity. Research programmes on hydrology and biodiversity baselines were conducted in the last decade, including eco-hydrological modelling designed to understand the roles of the various ecological and hydrological components in freshwater swamp forest and to determine the effectiveness of different intervention and restoration scenarios. Restoration solutions to maintain the hydrological and ecological integrity of the swamp forest will be addressed, e.g. nature-friendly retention ponds for over-flooding; infiltrated “pipes and taps” filtered reservoir water for prolonged drought; rehabilitation of incised stream channel for reconnection of floodplains; enhancement of riparian zone to prevent bank erosion and minimize channel sedimentation; and installation of flap gate to prevent invasion of alien species through backflow from reservoir spillway. All restoration options will be considered holistically with the whole-catchment plan. Restoration priority of the proposed solutions will consider relevant issues, e.g. funding availability, cost-effectiveness, stakeholders and public perceptions.

Yixiong Cai is at the National Biodiversity Centre, National Parks Board, Singapore, where he works on the conservation of freshwater biodiversity, with research focusing on the ecological and hydrological characteristics of tropical freshwater streams. His primary research interest is in taxonomy, ecology, biogeography, and conservation of freshwater shrimps in East and Southeast Asia.

ABOUT THE ORGANISERS & CHAIRPERSONS

ANTHONY D. MEDRANO is the National University of Singapore (NUS) Presidential Young Professor of Environmental Studies at Yale-NUS College, and an assistant professor in the Department of History at the National University of Singapore. He also holds appointments at the Asia Research Institute and the Lee Kong Chian Natural History Museum. His teaching and scholarship look at the histories of biodiversity research in Singapore and Southeast Asia. Medrano is the editor of *Lala-Land: Singapore's Seafood Heritage* (Epigram, 2024), and he is completing his first book, *The Edible Ocean: Science, Industry, and the Rise of Urban Southeast Asia*, which is under contract with Yale University Press.

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ARVIN C. DIESMOS is an ecologist and taxonomist who specialises in herpetology. He is the Director of the Biodiversity Information Management unit of the ASEAN Centre For Biodiversity. He received his Bachelor of Science in Biology and Master of Science in Wildlife Studies degrees from the University of the Philippines and a PhD in Biology from the National University of Singapore. Arvin is a Career Scientist in the Philippines with a rank of Scientist III. He is also an Academician of the National Academy of Science and Technology. His research focuses on the ecology, systematic biology, biogeography, and conservation of amphibians and reptiles and the biodiversity of the Philippines and Southeast Asia. He has co-authored over 170 scientific papers and is the co-discoverer of over 80 species of frogs, lizards, snakes, insect arthropods, and bird species. He is a recipient of the 2008 Outstanding Young Scientist Award from the National Academy of Science and Technology of the Philippines and the 2015 Achievement Award in Biological Sciences from the National Research Council of the Philippines.

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DARREN CHONG JINN YEO is Head of the Lee Kong Chian Natural History Museum, National University of Singapore, and an Associate Professor in the Department of Biological Sciences, National University of Singapore, where he leads the Freshwater and Invasion Biology Laboratory. His main research interests are freshwater ecology and biodiversity, aquatic invasions, and freshwater crustaceans, which are investigated by the lab through studies of freshwater ecosystems in Singapore and other parts of tropical Asia.

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EUNICE JINGMEI TAN studies the behaviour and ecology of spiders and insects in Southeast Asia, China and Australia through a range of field and laboratory experiments. Eunice is currently an Assistant Professor at the National University of Singapore, Department of Biological Sciences. Eunice's research in arthropods aims to inform the management of forests and green spaces, to ensure that the vital ecosystem services that arthropods provide can continue.

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LIANG JIM LIM is the Group Director of the Conservation Division of the National Parks Board. Jim leads a team of 80 officers responsible for the management of, and research projects carried out in the four nature reserves in Singapore, as well as Pulau Ubin. Jim is concurrently the Senior Director of the International Biodiversity Conservation Division, which is tasked with leading Singapore's efforts in supporting the UN Convention on Biological Diversity, as well as supporting elements of the UN Framework Convention on Climate Change. Prior to this, Jim headed the National Biodiversity Centre (NBC) which administers the Nature Conservation Masterplan, a comprehensive action plan for national biodiversity conservation. Before joining NParks in 2009, Jim spent nine years in the Foreign Service. He is an ecologist and reptile taxonomist by training.

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MAITRII V. AUNG-THWIN is an Associate Professor of Myanmar/Southeast Asian History at the National University of Singapore. His research concerns nation-building, heritage, identity-politics, knowledge production and resistance in Myanmar. His publications include *A History of Myanmar since Ancient Times: Traditions and Transformations* (2013), *The Return of the Galon King: History, Law, and Rebellion in Colonial Burma* (2011), and *A New History of Southeast Asia* (2010). Dr Aung-Thwin is currently a trustee of the Burma Studies Foundation (USA), board member of the SEASREP Foundation, convener of the Comparative Asian Studies PhD Programme and editor of the *Journal of Southeast Asian Studies*.

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NUR HASANAH GAUCH serves as the Director of the Biodiversity Science Division at the Department of Biodiversity Knowledge Management, ASEAN Centre for Biodiversity (ACB), which is based in Los Baños, Philippines. She holds a background in ecology, initially focusing on insect biodiversity during her bachelor's and master's degrees. Nur later broadened her expertise to landscape management while working with UNESCO Jakarta, where she contributed to projects on UNESCO Natural World Heritage sites. She pursued her PhD in Environmental Systems Science at ETH Zurich, where her research centered on landscape management and ecosystem services. Prior to her role at ACB, Nur gained international policy and environmental economic experience working in the Economic and Trade Unit at the Indonesian Embassy in Bern, Switzerland.

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RENEE LORICA is a wildlife ecologist with twenty years of experience in research, conservation, and management of wildlife in natural and agricultural ecosystems in Southeast Asia. Renee has also trained partners in government, farmer groups, and volunteers on wildlife monitoring and pest management in various countries in SE Asia. Before joining the National University of Singapore's Centre for Nature-based Climate Solutions (CNCS) in April 2024, she worked with the ASEAN Centre for Biodiversity as Director of the Centre's Knowledge Management Division. At CNCS, she manages Carbon Integrity SG (CISG) – a research programme that seeks to address credibility and integrity pain points in nature-based carbon projects in Southeast Asian biomes by developing robust, intelligent and scalable carbon accounting techniques.

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