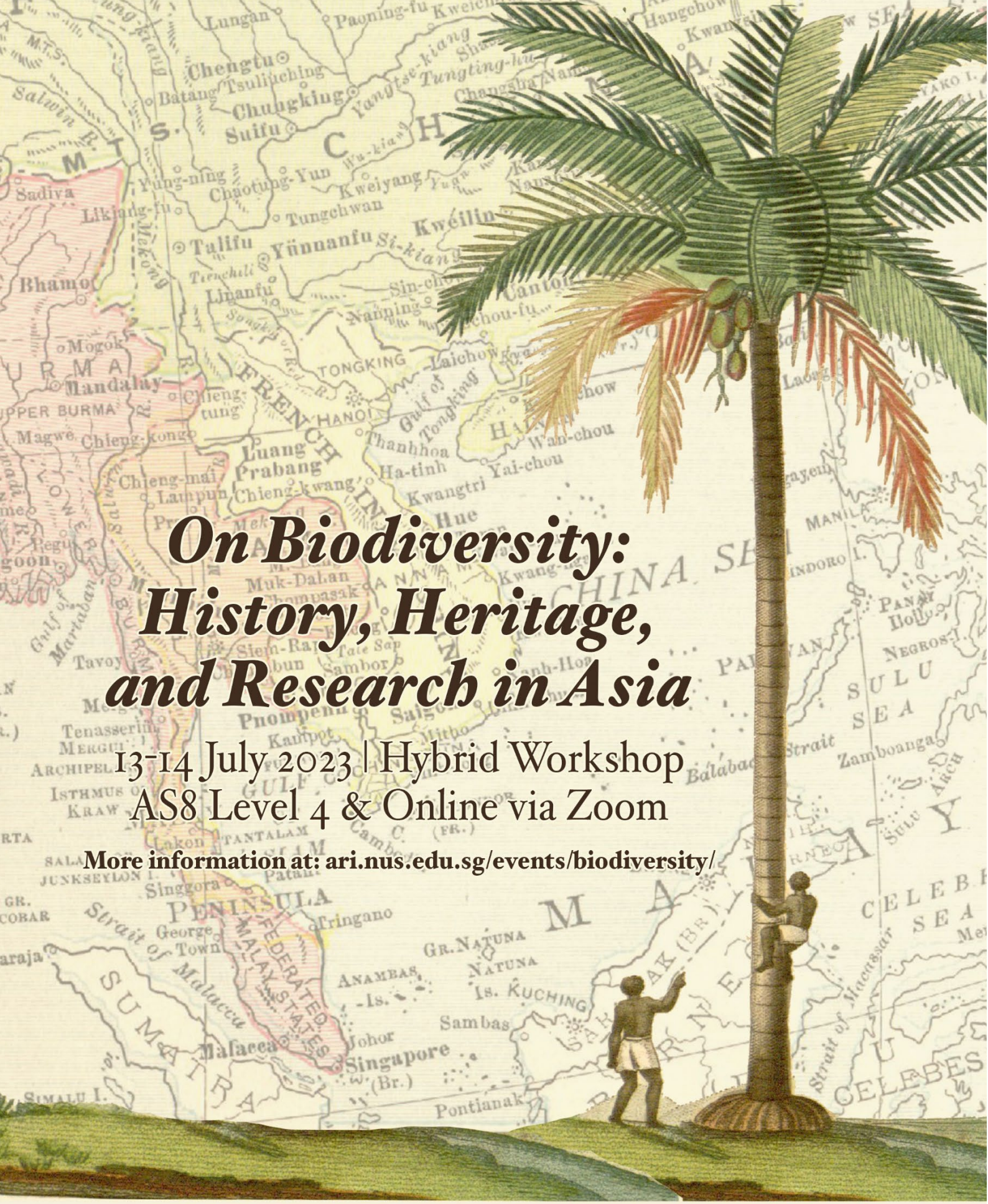

On Biodiversity: History, Heritage, and Research in Asia

13-14 July 2023 | Hybrid Workshop
AS8 Level 4 & Online via Zoom

More information at: ari.nus.edu.sg/events/biodiversity/

ARI
ASIA RESEARCH INSTITUTE
National University of Singapore

Yale NUS College

Organised by the Asia Research Institute, National University of Singapore (NUS); with support from Yale-NUS College, and funded by Singapore's Social Science Research Council (SSRTG Type A) project on "Linking the Digital Humanities to Biodiversity History in Singapore and Southeast Asia".

This conference is organized by the Asia Research Institute, National University of Singapore (NUS); with support from Yale-NUS College. This event is funded by ARI and the Singapore Social Science Research Council (SSRTG Type A) project on "Linking the Digital Humanities to Biodiversity History in Singapore and Southeast Asia".

Biodiversity research takes on a particular valence in Asia, home to some of the most bio-geographically important areas of the world. From the waters of Southeast Asia's Coral Triangle to the large river basins of the continent to the mountainous ecologies of the Himalayas, the many ecoregions encompassed within Asia are remarkably rich in flora and fauna. This biodiversity is, however, threatened in multiple ways—endangered by the consequences of rapid urbanisation, industrialisation, population growth, climate change, and multiple other concerns. Biodiversity change remains a pressing issue in this part of the world, made even more complex by the movement and circulation of species caused by the long history of regional interconnectivity and habitat decline. Within this context, we want to emphasize the significance of understanding the value of local and regional biodiversity, as well as taking steps to conserve that natural heritage and economic asset. Our conference will produce new insight into the causes and consequences of biodiversity change.

Building on our previous events highlighting scholarship in the environmental humanities and the ecology of non-native species, this conference will create a space for analysing the myriad historical vectors (or pathways) of biodiversity change in the region, while seeking ways to mitigate its impacts in the present. Colonial histories and inter-imperial species exchanges within Asia and the Pacific world; longstanding cultural and economic ties across the Malay world; online trade in plants and animals with the advent of digital communication technology—these are but a few of the vectors studied by academics and practitioners, such as our project members from Singapore's National Parks Board (NPARKS) and natural history museums, across a variety of historical/biological disciplines and time periods. In bringing together these bodies of research, our conference will foster a holistic and interdisciplinary environment to investigate the driving forces and impacts of biodiversity change.

CONFERENCE CONVENORS

Dr Stefan Huebner | Asia Research Institute, National University of Singapore
Dr Anthony D. Medrano | Division of Social Sciences, Yale-NUS College

SECRETARIAT

Ms Sheryl Teo | Yale-NUS College
Ms Valerie Yeo | Asia Research Institute, National University of Singapore

PROGRAM AT-A-GLANCE

DATE	TIME (SGT)	PANEL SESSION
13 Jul 2023 (Thu)	09:15 – 09:30	**WELCOME & INTRODUCTORY REMARKS**
	09:30 – 11:00	**PANEL 1**
	11:30 – 13:00	**PANEL 2**
	14:00 – 15:30	**PANEL 3**
	16:00 – 17:30	**PANEL 4**
	18:30 – 20:00	**WORKSHOP DINNER** *(For Presenters, Chairpersons and Invited Guests)*
14 Jul 2023 (Fri)	09:30 – 11:00	**PANEL 5**
	11:30 – 13:00	**PANEL 6**
	14:00 – 15:30	**PANEL 7**
	16:00 – 17:30	**PANEL 8**
	17:30 – 18:00	**SUMMARY & CLOSING REMARKS**

13 JULY 2023 • THURSDAY

09:15 – 09:30	**WELCOME AND INTRODUCTORY REMARKS**
	Stefan Huebner | *National University of Singapore*
	Anthony D. Medrano | *Yale-NUS College*
09:30 – 11:00	**PANEL 1**
Chairperson	**Gaetan Boisson** | *NUS Libraries*
9:30	A Digital Reference: Documenting Singapore and Southeast Asia's Non-Native Flora and Fauna **Tricia Cho** | *Lee Kong Chian Natural History Museum* **Yusri Bin Rosli** | *Yale-NUS College*
9:50	Charting An Ecological Odyssey: A Geovisual Exploration of Established Non-Native Species and Historical Pathways in Singapore **Rachel Lam** | *National University of Singapore*
10:10	A Digital Home for Natural History: Creating an Online Repository for Environmental History Research and Biodiversity Stories **Katherine Enright** | *Yale-NUS College* **Sheryl Teo** | *Yale-NUS College*
10:30	**QUESTIONS & ANSWERS**
11:00 – 11:30	**TEA BREAK**
11:30 – 13:00	**PANEL 2**
Chairperson	**Katherine Enright** | *Yale-NUS College*
11:30	The Two Afterlives of Sludge **Faizah Binte Zakaria** | *National University of Singapore*
11:50	Multispecies Mourning: Biodiversity Loss and Grieving as Resistance in the Papuan Plantation Nexus **Sophie Chao** | *University of Sydney*
12:10	A Voyage of Love and Longing: Alternative Modes of Curating Natural History Drawings **Syafiqah Jaaffar** | *National Museum of Singapore*
12:30	**QUESTIONS & ANSWERS**
13:00 – 14:00	**LUNCH BREAK**

14:00 – 15:30	**PANEL 3**
Chairperson	**Elysia Toh** | *Yale-NUS College*
14:00 *Online*	Metamorphosis of *Arowana* (*Chitala Ornate*) in Laguna de Bay from Invasive Alien to a Useful Naturalized Fish Species **Cynthia Neri Zayas** | *University of the Philippines*
14:20	Diversity of Freshwater Fishes in Singapore **Heok Hui Tan** | *Lee Kong Chian Natural History Museum*
14:40 *Online*	Food or Foe? Diversity of Freshwater Bivalves and Snails in Southeast Asia That Are Important for Humans **Ting Hui Ng** | *Universiti Malaysia Sabah*
15:00	**QUESTIONS & ANSWERS**
15:30 – 16:00	**TEA BREAK**
16:00 – 17:30	**PANEL 4**
Chairperson	**Kathy Poh** | *Lee Kong Chian Natural History Museum*
16:00	Makanan Kami, Cerita Kami (Our Food, Our Stories) **Firdaus Sani** | *Orang Laut SG*
16:20	New Ocean Literacies: Writing Indian Ocean History in the Face of Biodiversity Change **Tamara S. Fernando** | *SUNY Stony Brook*
16:40	*Don't Forget Yer Old Shipmate*: Lives, Afterlives and Archives of Shipboard Networks in Studying Biodiversity Histories **Martyn E. Y. Low** | *Lee Kong Chian Natural History Museum*
17:00	**QUESTIONS & ANSWERS**
17:30	**END OF DAY 1**
18:30 – 20:00	**CONFERENCE DINNER** *(For Presenters, Chairpersons and Invited Guests)*

14 JULY 2023 • FRIDAY

09:30 – 11:00	**PANEL 5**
Chairperson	**Darren Chong Jinn Yeo** | *National University of Singapore*
09:30	Museums as Repositories of Scientific Memory **Paul Smith** | *Oxford University Museum of Natural History*
09:50	Contributions of a 412-year-old Catholic University to Biology and Biodiversity Research in the Philippines **Rey Donne S. Papa** | *University of Santo Tomas*
10:10	Spatio-temporal Patterns in Singapore Biodiversity Data through Analysis of the Zoological Reference Collection (ZRC) **Jharyathri Thiagarajah** | *Lee Kong Chian Natural History Museum*
10:30	**QUESTIONS & ANSWERS**
11:00 – 11:30	**TEA BREAK**
11:30 – 13:00	**PANEL 6**
Chairperson	**Lily Chen** | *Singapore Botanic Gardens*
11:30	People, Plants and Plantations: Recollecting the Past and Present through Botany and Art **Syarifah Nadhirah** | *Visual Artist/Textile Designer* **Zikri Rahman** | *Pusat Sejarah Rakyat*
11:50	From Kampung Glam to Geylang Serai: Stories of Plants and Their Uses from One of Singapore's Oldest Jamu Shops **Siti Nurhuda Binte Saleh** | *Geylang Serai Market*
12:10	Tropical Botany: From Colonial to Singaporean **Kwek Yan Chong** | *Singapore Botanic Gardens*
12:30	**QUESTIONS & ANSWERS**
13:00 – 14:00	**LUNCH BREAK**

14:00 – 15:30	**PANEL 7**
Chairperson	**Stefan Huebner** | *National University of Singapore*
14:00	Unpacking "Ocean Desertification" in Jeju, South Korea: Preliminary Findings **Young Rae Choi** | *Florida International University*
14:20	Synthetic Nitrogen and the Cost of Modern Growth: Problems and Potentials of Fertilizer History in the Japanese Empire **Jonas Rüegg** | *University of Zurich*
14:40	Japan's Salmon Fisheries and Its Construction of an Ecological Empire in the Northern Sea Before the Second World War **Koji Ito** | *Osaka University*
15:00	**QUESTIONS & ANSWERS**
15:30 – 16:00	**TEA BREAK**
16:00 – 17:30	**PANEL 8**
Chairperson	**L. Roman Carrasco** | *National University of Singapore*
16:00	Biodiversity Loss in Southeast Asia: What Happens When We Fail to Protect Our Forests and How Do We Prevent its Loss **Yiwen Zeng** | *National University of Singapore*
16:20	Imperceptible Multitudes: Do Microbial Diversity and Abundance in Southeast Asia Constitute a Heritage? **Warwick Anderson** | *University of Sydney*
16:40	The Growth of Knowledge on the Natural History of the Philippines: Perspectives from the Last 300 Years **Arvin C. Diesmos** | *ASEAN Centre for Biodiversity*
17:00	**QUESTIONS & ANSWERS**
17:30 – 18:00	**SUMMARY & CLOSING REMARKS**
	Stefan Huebner | *National University of Singapore* **Anthony D. Medrano** | *Yale-NUS College*
18:00	**END OF WORKSHOP**

A Digital Reference:
Documenting Singapore and Southeast Asia's Non-Native Flora and Fauna

Tricia Cho
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Yusri Bin Rosli
Yale-NUS College
yusri@yale-nus.edu.sg

The project "Linking the Digital Humanities to Biodiversity History in Singapore and Southeast Asia" has documented the region's flora and fauna through the lens of naturalised/established species (i.e., non-native and reproducing) and their historical vectors. This presentation will examine the ways in which the research team utilised digital humanities and historical source materials to build and populate its plant and animal databases. We will also highlight specific species case studies to demonstrate the uses of the database and explain the differences between the plant and animal databases. Combined, this digital reference forms the foundation of this project, allowing for interdisciplinary research through map-based visualisation (GIS) and online repositories (Digital Gems), both of which will be covered later in this panel.

Tricia Cho and **Yusri Bin Rosli** are research assistants working on the digital humanities project "Linking the Digital Humanities to Biodiversity History in Singapore and Southeast Asia", heading the animal and plant databases respectively. **Tricia** is currently with the Lee Kong Chian Natural History Museum, previously obtaining her Bachelor of Science (Honours) with the National University of Singapore, studying the ecology of the introduced Greenhouse Frog (*Eleutherodactylus planirostris*) in her final year. **Yusri** is at Yale-NUS College and graduated with a Bachelor of Arts Honours (Distinction) in History from Nanyang Technological University in 2022. His research interest lies in the field of environmental history, in particular the interaction and relationship between plants and humans throughout history.

Charting An Ecological Odyssey: A Geovisual Exploration of Established Non-Native Species and Historical Pathways in Singapore

Rachel Lam
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The advancement of Geographic Information Systems (GIS) has opened up new possibilities for understanding spatiotemporal patterns and relationships through enhanced geospatial presentations and multi-modal data handling capabilities. In the domain of digital humanities applied to biodiversity history, our project, titled "Linking the Digital Humanities to Biodiversity History in Singapore and Southeast Asia", harnesses GIS as a powerful tool to support the interactive exploration of data extracted from published records and digitized materials. Established non-native species and historical pathways (e.g. land use land cover, climate, and anthropogenic factors), their spatiotemporal patterns, and more importantly, their geographic relationships and patterns can be visualized geographically for valuable geospatial insights for better management and early intervention.

This presentation will focus on showcasing how the databases from the project were utilised and visualized into geographic representations, using select species as illustrative examples. A demonstration of the geovisualization platform displaying the geospatial relationships between established non-native species and historical pathways in Singapore would be conducted and features of this platform, such as time-based control, querying, and other analytical capabilities, would facilitate data exploration for its users would be shown.

Rachel Lam is presently a Master of Social Sciences Research student in the Department of Geography, National University of Singapore (NUS). She received her bachelor's degree in environmental engineering with a minor in geosciences from NUS in 2018. Prior to joining the master's programme, she worked as an environmentally sustainable design consultant in the built environment industry for close to three years. Her research interests are in the field of geographical information systems and spatial data science, and specifically how geospatial technologies can facilitate gaining insights into the field of environmental history.

A Digital Home for Natural History: Creating an Online Repository for Environmental History Research and Biodiversity Stories

Katherine Enright
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Sheryl Teo
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The project "Linking the Digital Humanities to Biodiversity History in Singapore and Southeast Asia" has generated a wealth of data, digitised records, and research material regarding biodiversity heritage in Singapore and the surrounding region. This presentation will explore the research team's efforts in creating an archive for the project's materials and data through the Digital Gems Platform, hosted by NUS Libraries. In particular, the presentation will reflect on the importance of crafting digital humanities projects that are informed by public accessibility, collaborative work, and long-term sustainability. The sharing will present some of the insights and challenges that arose in creating such a digital repository, focusing on the necessary research skills that were cultivated in order to launch the Digital Gems collection.

This presentation will also launch Biodiversity Stories, a collection of visual essays that showcases the interdisciplinary possibilities of doing research with our project's biological data and archival materials. Each of the essays explores the cultural and environmental histories of non-native species in Singapore, from fish and mosquitoes to flowering vines and palm trees. This presentation will describe the process of editing Biodiversity Stories and highlight the digital humanities tools presented by Juncture, JSTOR Labs' visual essay platform, which allows students and researchers to craft and code interactive essays, think critically about working with archival materials, and share their research with the public.

Katherine Enright is a research assistant at Yale-NUS College working on the project "Linking the Digital Humanities to Biodiversity History in Singapore and Southeast Asia". A graduate of Harvard College with a bachelor's degree in History and Anthropology, her research interests lie at the intersection of the history of natural history in Southeast Asia and museum studies. She is particularly interested in advancing decolonial interpretations of the history of science in museum spaces and applying digital humanities tools to the study of natural science collecting and collections. Prior to arriving at Yale-NUS College, she worked as a research assistant at the China Biographical Database Project and Harvard's Fairbank Center for Chinese Studies. Her research and writing are featured in the Singapore Policy Journal, the Harvard Museums of Science and Culture's Extraordinary Things website, Dumbarton Oaks' Plant Humanities Lab, and Singapore Unbound's journal SUSPECT. In October 2023, she will begin an MPhil degree in Digital Humanities as a Gates Cambridge scholar at Trinity College, Cambridge.

Sheryl Teo is a research assistant with the SSRTG-funded project, "Linking the Digital Humanities to Biodiversity History in Singapore and Southeast Asia", and has been involved with the project since 2020. She currently coordinates digitisation and public education efforts for the project. Having graduated from Yale-NUS College with a Bachelor of Arts (Honours) in Anthropology, her research interests include the anthropology of religion, the role of the arts in Southeast Asian communities, as well as cross-border social, political, and historical flows in the region.

The Two Afterlives of Sludge

Faizah Binte Zakaria
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Electrification and modern sanitation are markers of modernity whose development have been the subject of many historical studies. Less examined, however, is the by-product that these processes generate and their afterlives as part of a hybrid ecosystem that harbours diverse lives, human and non-human. This paper focuses on sludge – waste semi-solid, semi-liquid residues left from power generation and sewage process – as a lens to understand these banalized by-products could be seen and unseen, managed and neglected. Through examining failed campaigns by the Singapore Nature Society in the 1990s to conserve the areas around a power station and sewerage treatment plants as nature parks, the paper highlights how a rich bird-life can coalesce around polluting edifices. It argues that in one afterlife, the biodiversity that can emerge from landscapes remade from sludge, especially the avifaunal, are rendered precarious less by the sludge's toxicity than by the perceived hybridity of the landscape. In another, the creative potential of sludge was managed and curtailed by a technocratic state, keen to leverage on nature's regenerative potential through a reconstructed approximation. How sludge is managed has significant implications for the kinds of biodiversity that are privileged in a city-state.

Faizah Zakaria is an assistant professor in the Departments of Southeast Asian Studies and Malay Studies. Prior to joining NUS, she was an assistant professor of history at Nanyang Technological University. Her research centres on the environmental history of maritime Southeast Asia, with a focus on religion and ecology, natural disasters as well as indigenous environmental movements. Her first monograph, *The Camphor Tree and the Elephant: Religion and Ecological Change in Maritime Southeast Asia* has been published by University of Washington Press in 2023. She is also co-PI for a digital humanities project on polyglot Asian medicine, funded by the National Heritage Board, with PI Michael Stanley-Baker. She is presently developing a new monograph project on the history of the Malayan Nature Society and their campaigns with charismatic fauna in the second half of the twentieth century.

Multispecies Mourning: Biodiversity Loss and Grieving as Resistance in the Papuan Plantation Nexus

Sophie Chao
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Drawing on eighteen months of ethnographic fieldwork undertaken in rural West Papua, this paper uncovers the cultural, political, and affective significance of more-than-human mourning among Indigenous Marind communities, whose intimate and ancestral relations to native plants, animals, and ecosystems – or what secular science might call "biodiversity" – are increasingly threatened by mass deforestation and monocrop oil palm expansion. The presentation focuses on three emergent practices of "multispecies mourning" in the West Papuan plantation nexus – first, the collective weaving of sago fronds, shoots, and barks into handmade bags as a form of healing; second, the creation of songs and stories prompted by Marind's frequent encounters with roadkill; and third, the transplanting of bamboo suckers as part of customary land reclaiming activities. Transmitted and inherited across genders and generations, practices of multispecies mourning offer potent avenues for Marind to memorialize the loss of more-than-human lives and relations prompted by entrenched histories of colonial-capitalist occupation and attendant landscape disfigurations. At the same time, these practices of multispecies mournings constitute a form of active resistance, creative refusal, and radical care in the face of extractivism's ecocidal logic and the ruined worlds that those inhabiting it inherit – one that insists on lamenting, exalting, and storying those lives deemed killable and ungrievable under technocapitalist regimes. Bringing together plants, animals, peoples, and places, their dispersed sentience and materiality offer hopeful pathways for multispecies solidarities, forged in and against the rubble of agro-industrialism and its necropolitical undergirdings.

Sophie Chao is of Sino-French heritage and lives on unceded Gadigal lands in Australia. She is currently a Discovery Early Career Researcher Award (DECRA) Fellow and Lecturer in the Discipline of Anthropology at the University of Sydney. Chao's research investigates the intersections of Indigeneity, ecology, capitalism, health, and justice in the Pacific, with a particular ethnographic focus on the Indonesian-occupied region of West Papua. She is the author of *In the Shadow of the Palms: More-Than-Human Becomings in West Papua* (Duke University Press Scholars of Color First Book Award 2021) and co-editor of *The Promise of Multispecies Justice.* Chao's current research examines Indigenous experiences and theories of hunger in West Papua and wildlife-human entanglements in settler Australia. At the University of Sydney, Chao is co-lead of the Sydney Environment Institute's Biocultural Diversities Research Theme and Executive Committee Member of the Sydney Southeast Asian Centre. She previously worked for the human rights organization Forest Peoples Programme in Indonesia, supporting the rights of forest-dwelling Indigenous peoples to their customary lands, resources, and livelihoods. For more information, please visit www.morethanhumanworlds.com.

A Voyage of Love and Longing: Alternative Modes of Curating Natural History Drawings

Syafiqah Jaaffar
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By the 19th century, natural history drawings such as the William Farquhar Collection of Natural History Drawings in the National Museum of Singapore (NMS) collection form part of an imperial knowledge nexus that sought to identify, catalogue and 'master' knowledge of the natural world in the colonies. Oftentimes, however, this comes with the erasure – intended or otherwise – of indigenous modes of knowledge and relationship with nature.

I suggest that postcolonial museums such as NMS are in a unique position to offer new modes of 'decolonial' curatorial practice in dealing with such collections through the act of decentring, be it subtle or overt. This paper looks at how the exhibition 'A Voyage of Love and Longing' aspired to do so via two main means: decentering the narrative focus of natural history drawings away from its credited owner towards the specimens' cultural heritage; and re-ordering the naming conventions of specimen featured.

Syafiqah Jaaffar (she/her) holds a BA and MA in History from the National University of Singapore. Her research interests and work sit on the interstices of visual art, literature and the history of the Malay world from the 19th century to the present. She is currently an assistant curator at the National Museum of Singapore, with her latest exhibitions being A Voyage of Love and Longing (2021) and Dislocations (2022).

Metamorphosis of *Arowana* (*Chitala ornate*) in Laguna de Bay from Invasive Alien to a Useful Naturalized Fish Species

Cynthia Neri Zayas
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This presentation is set in Laguna de Bay, a lake south of Manila. It is the largest lake in the Philippines and one of the five largest freshwater lakes in Southeast Asia, greater in size than Singapore City State. The main protagonist is an invasive alien species the locals call *arowana* (*Chitala ornate*) or scissor fish. The wildlife of Laguna de Bay is robust and diversified with around 24 species of macrophytes, 154 of phytoplankton, 36 of zooplankton, 31 of fish, and numerous crabs, mollusks, as well as birds that consume the lake's nutrients. At least three endemic species are found: *Gobiopterus lacustris*, *Leiopotherapon plumbers*, and *Zenarchopterus philippinus*. However, the appearance of *arowana* disturbed the wildlife in the lake. The BFAR authorized *arowana* to enter the country from Thailand. It is thought to have escaped and entered the lake following a 2009 flooding catastrophe brought on by Typhoon *Ondoy*. It is viewed as a pest because it preys on milkfish (*bangus*), tilapia, and some native fish species like catfish (*kanduli*), and silver perch (*ayungin*), the main sources of income for the local fishery. What is the position of the fish in the diet of the inhabitants around the lake is explored? Some claim that ambulant fish ball vendors use *arowana*. Others think it's a typical component of fish cakes in Chinese restaurants and the world of street cuisine. But locals never eat Arowana unprocessed. The presentation unravels how the fish metamorphosed from a villain to a useful species two decades later.

Cynthia Neri Zayas is formerly a Full Professor and Director of the Center of International Studies at the University of the Philippines and is currently Senior Lecturer at the said institution. Her ethnographic fieldwork is divided between the Philippines and Japan. Apart from fishing communities, and cultures of disasters, she has written on free women divers or ama, maritime sojourners, heritage and fish weirs, and indigenous/local knowledge. From 2016-2019 Zayas was appointed Coordinating Lead Author for Chapter 2.3. Status and Trends – Nature's Contributions to People (NCP) https://zenodo.org/record/5519476#.Y-2MUGlBw2w, by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) in connection with the assessments of knowledge on biodiversity and ecosystem program and their interlinkages at the global level (https://doi.org/105281/zenodo.3553579). Her latest publications for the year 2022 include “The persistence of bubo, fish trap in Philippine artisanal fishery” in *Bulletin of National Museum of Ethnology*, and “Natural Hazards, Risks, and Peoples in the Pacific World” in *The Cambridge History of the Pacific Ocean*, Volume 1 – The Pacific Ocean to 1800.

Diversity of Freshwater Fishes in Singapore

Heok Hui Tan
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Despite Singapore's relatively short history, the documentation of its freshwater fish has been quite comprehensive, though lacking from earlier years. An overview of non-native and native freshwater fishes in Singapore will be provided, based on recent publications and unpublished works. A few specific fish species will be detailed with notes on their introduction history. Some limited regional perspectives will also be discussed.

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 125 species to date. He is currently the Collections 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 actively participates in field expeditions and collection building.

Food or Foe?
Diversity of Freshwater Bivalves and Snails in Southeast Asia that are Important for Humans

Ting Hui Ng
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Freshwater molluscs (bivalves and snails) play a crucial role in maintaining healthy environments and provide valuable ecosystem services to humans. On the other hand, some freshwater molluscs are medically important or are known to be invasive species. In Southeast Asia, freshwater molluscs are commonly consumed and used by humans. In addition to being a food source, freshwater molluscs have other uses, including for ornamental and agricultural purposes. A number of species are particularly important in this region, e.g., the bivalves in the families Cyrenidae and Unionidae, and the snails in the families Ampullariidae, Viviparidae, and Pachychilidae. Freshwater molluscs in the region are vulnerable to threats including overharvesting, habitat loss or modification, and climate change. Because of their importance to humans, some freshwater molluscs have been introduced beyond their native ranges, and a small proportion have or may become invasive pests. Some freshwater snails serve as intermediate hosts for zoonotic parasites, making them of medical and public health concern. Meaningful conservation measures or long-term ecological studies are hindered by data gaps, e.g., unresolved taxonomy resulting in improperly identified species, a lack of updated native species checklists and distribution data, and an absence of information on the periods of first introduction and the introduction pathways of non-native species. To address some of these concerns, it would be vital to combine research on the biodiversity, ecology and distribution of species with a better understanding of the historical and social aspects related to the use of molluscs over time across the region. In this talk, I will provide case studies of freshwater molluscs and their importance to humans in Southeast Asia.

Ting Hui Ng is a senior lecturer at the Institute for Tropical Biology and Conservation, Universiti Malaysia Sabah, and honorary research affiliate of the Lee Kong Chian Natural History Museum, National University of Singapore. Her research interests include the biodiversity and ecology of freshwater molluscs and invasive species in Southeast Asia. She carried out her PhD research on the introduction and impacts of freshwater snails in Singapore, with the Freshwater and Invasion Biology Laboratory in the Department of Biological Sciences at the National University of Singapore, and conducted postdoctoral research on the diversity and distribution of freshwater apple snails of Thailand at the Animal Systematics Research Unit, Department of Biology, Faculty of Science, Chulalongkorn University, Thailand. Prior to her current job, she was a lecturer (museum officer) with the Lee Kong Chian Natural History Museum, NUS. In the past decade, she has collaborated with colleagues throughout the region, including most recently, with Thai and Cambodian colleagues on a capacity-building project to study aquatic intermediate hosts of zoonotic parasites, which include freshwater snails, in the Cambodian Mekong.

Makanan Kami, Cerita Kami (Our Food, Our Stories)

Firdaus Sani
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The sea and its biodiversity are integral to the Orang Laut/Pulau community. Not only a source of sustenance, but the sea is also a space for the community to practice their island traditions. This talk aims to explore the unique relationship between food and coastal traditions practised by the Orang Laut/Pulau community and share the challenges faced in shaping and preserving their island traditions in modern Singapore.

Firdaus Sani is a fourth-generation Orang Laut/Pulau descendant. His maternal grandparents used to live on Pulau Semakau until 1977. While growing up, Firdaus visited Pulau Semakau, where he learnt about his grandparents' traditions and ways of life. In 2020, Firdaus started Orang Laut SG (@oranglautsg) to retell the stories of Pulau Semakau. He shares his family's history through their unique cuisine, which is lovingly prepared by his mother, Mdm Noorani. Firdaus advocates for indigenous voices and believes in including indigenous knowledge in Singapore's mainstream education. Firdaus has shared his sustainability learnings on TedxYouth@Singapore and showcased his works at the Singapore Writers' Festival, Esplanade and Singapore Art Week.

New Ocean Literacies:
Writing Indian Ocean History in the Face of Biodiversity Change

Tamara S. Fernando
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How does recognizing the threat posed by biodiversity change shape, in turn, the tools and methods that historians deploy? [1] My contribution will be rooted in the field of Indian Ocean history and will offer a historiographic reflection as well as some ideas about what a more environmentally-inflected future for the field would look like. Indian Ocean history as a field has been undergirded by the consensus that peoples and places across the ocean share history and culture. The oceanic field of study was thus defined and determined by a shared material culture, religion, migratory patterns, trade relations, and diasporic belonging. In this paper, I ask how neo-materialist concerns and environmental exigency might force us to re-configure mobility and commonality across the region. Does attending to the materiality of the ocean and its life shape new stories of connection? That is, what if, in addition to ships, crew, and cargo, we had to also think about the movement of plastic, migratory birds, and invasive species? And if the former, alongside tectonic plates, deep-sea gyres, and coral polyps are to be integrated into historic narratives, what new fluencies in reading, evaluating, and integrating scientific literature will historians require? Finally, I will spend some time with core terms such as the imperial/non-imperial, transnational and the vernacular to ask how these concepts and their import might shift if biodiversity is the focus?

Tamara S. Fernando is an assistant professor in history at SUNY Stony Brook. She is a historian of the Indian Ocean world, with research and teaching interests at the intersection of labor history, environmental history, and the history of science. She is particularly interested in histories that lie "below the water line," anchored in shipwrecks, pearl-bearing oyster reefs, or deep-sea ports, for instance. Before starting at Stony Brook, she was a *Past & Present* postdoctoral research fellow in history at the Institute of Historical Research in London. She completed her PhD in 2021 at the University of Cambridge and has held fellowships at the Doha Institute (Qatar), the Rachel Carson Center (Munich) and Georgetown University (Qatar). Her current research project, *Shallow Blue Empire* (Harvard UP, forthcoming), is a history of vernacular and colonial knowledge about the shallow littoral of the Indian Ocean, told through a history of pearling across the Persian Gulf, the Gulf of Mannar, and the Mergui Archipelago. Her next project charts a submarine history for the Indian Ocean through three objects: the shipwreck, the deep-sea port, and the nuclear submarine. Her articles have appeared in *Past & Present* and *Comparative Studies in Society and History*.

[1] A related question is how we might write histories inflected by biodiversity when the notion of biodiversity (very much like environment, ecology or sustainability) itself is historically contingent, emerging out of a specific moment in conservation science in the 1980s, and quickly becoming a household term, now deployed for conferences such as this one. See Megan Raby, *American Tropics: The Caribbean Roots of Biodiversity Science* (Durham, NC: University of North Carolina Press, 2017), see Raby's recollection of the coining of the term by E.O. Wilson, Thomas Lovejoy, Paul Ehrlich, Peter Raven, Stephen Jay Gould, and Michael Soule among others at the "National Forum on Biodiversity" in Washington, DC in September 1986; Paul Warde, *The Invention of Sustainability, Nature and Destiny 1500 – 1870* (Cambridge, UK: Cambridge university Press, 2018); Peder Anker, *Imperial Ecology: Environmental Order in the British Empire, 1895-1945* (Cambridge, MA: Harvard University Press, 2002).

Don't Forget Yer Old Shipmate: Lives, Afterlives and Archives of Shipboard Networks in Studying Biodiversity Histories

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Ships can be generators of immense amounts of data. During the age of sail, the slower pace of voyages and the larger ship's complement (needed to work the vessel) seem to have resulted in many crew members being able to dedicate more time towards keeping diaries, sketchbooks and other written materials. These are in addition to the ship's log, the surgeon's log and other official voyage recording documents.

At the conclusion of the voyage, these materials often ended up being used for the voyage's official publications such as reports, the official narrative, and volumes of the scientific results. Some would also be published as popular (i.e., non-academic) travel narratives with the perceived novelty and exoticism of the places visited driving their demand.

The official materials are usually the most well-known of a voyage with the private or and semi-official material often being overlooked. I use examples from the first half of the nineteenth century to show how large the resulting materials from a voyage can be. I suggest that these can be considered as distinct but networked datasets. These can in turn provide a much clearer context for the data collected during the voyage. Lastly, I explore how these data can be used to study biodiversity histories.

Martyn E. Y. Low is a Research Associate at the Lee Kong Chian Natural History Museum (LKCNHM) at the National University of Singapore. His main research interest is biodiversity histories with a focus on using non-conventional sources to understand the environment in the past. He is also interested in natural history collectors and the resultant collecting networks. He also currently manages SIGNIFY: A Digital Archive of Singapore's Historical Biodiversity, an LKCNHM project that will digitise historically-important specimens collected from Singapore and now deposited in natural history museums worldwide.

Museums as Repositories of Scientific Memory

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Museums are often invoked as storehouses for community and societal memory, but the same is true of scientific collections as archives of planetary records. The oldest surviving natural history collections preserve specimens that span over four hundred years of collecting, and the Museum of Natural History at the University of Oxford is an example of one of those institutions. The founder collections were made by the Tradescant family, father and son, and the oldest specimens were collected in 1618 on an expedition to the Arctic. Collections assembled by the Tradescants, ranged from eastern North America to Arctic Europe and eastwards to western Asia and northern Africa.

The existence of collections extending back in age for over 400 years allows for a wide range of scientific enquiry. The anatomical and genomic records of recently, and less recently, extinct organisms are of course preserved, and in an Indian Ocean context, the remains of the dodo, *Raphus cucullatus*, provide an iconic example. Similarly, parasitic, symbiotic and commensal relationships may be preserved in historical collections, which are of increased interest in relation to zoonotic diseases. Of equal import, however, is the accumulation and preservation of time series data. The older natural history collections record ecosystems in a pre-industrial context, at the industrial peak and, in some cases, in a de-industrialised setting. The classical story of the response of the peppered moth, *Biston betularia*, to industrial pollution shows how museum collections have an important role from both a phenotypic and genotypic perspective. Other time series are preserved in collections in relation to trace element and isotope geochemistry and phenology, both of which can have a critical role to play in understanding large-scale environmental change. The presentation will examine the utility of collections across this wide range of enquiry, with a particular focus on SE Asia.

Paul Smith is Director of Oxford University Museum of Natural History and Professor of Natural History, and has spent most of his career working in university museums in Cambridge, Copenhagen, Birmingham and Oxford. Paul undertook his BSc in geology at the University of Leicester before moving to the University of Nottingham for a PhD on early vertebrates from the Ordovician of Greenland. He has over thirty-five years' experience of Arctic field expeditions and was awarded the Polar Medal in 2017. Paul's geological research is focused on the interactions of Earth systems and organisms from the late Neoproterozoic to the Ordovician, using a combination of palaeobiology, sedimentology and geochemistry. Paul also has interests in the application of new technologies to natural history museums, particularly in the areas of 3D visualisation, augmented reality and the evaluation of user experience. Much of this latter research is carried out in collaboration with Warwick Manufacturing Group, University of Warwick.

Contributions of a 412-year-old Catholic University to Biology and Biodiversity Research in the Philippines

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The Pontifical and Royal University of Santo Tomas, the Catholic University of the Philippines is known as the oldest existing university in Asia founded in 1611. The university has significantly contributed to the growth and development of many aspects of Filipino spirituality, history, culture and nationhood. As the oldest existing institution of higher learning in Asia, it has played an important role in the establishment and development of many academic disciplines, including the natural sciences. Important strides to document Philippine biodiversity in the university started with the establishment of the UST Museum of Natural Sciences in 1869. By 1880, Fr. Casto de Elera, OP started organizing the natural history collection of the museum. This initiative led to the 1895 and 1896 publication of his three-volume Catalogue of Philippine Fauna which was noted to be "one of the earliest, if not the first attempt at compiling a comprehensive systematic listing of the faunal diversity of the Philippines" (Diesmos and Diesmos, 2015). Other notable professors and alumni from the late 19th to the mid-20th Centuries have also made contributions to the growth and development of several scientific disciplines such as bacteriology, botany, freshwater biology, taxonomy & systematics, and aspects of organismic biology, including genetics despite the absence of a formal research agenda in the university until the establishment of the UST Research Center in 1962. However, many of these efforts were placed on the backburner when the focus shifted to applied research which oftentimes relegated biologists to "supporting" roles. This paper presents an overview of the development of biology and biodiversity research in the University of Santo Tomas from its beginnings and contributions to Philippine flora and fauna research to its "dark ages" and eventually its renaissance from the 2000's onwards, which has now led to the establishment of Biodiversity, Ecology, Systematics and Taxonomy as a recognized research cluster in the university, contributing significantly to the university's research productivity and providing important scientific data which helps this Pontifical university adhere to Pope Francis' call for the "care of our common home" in his encyclical *Laudato Si* apart from its national and regional impacts.

Rey Donne S. Papa (Professor of Biological Sciences - University of Santo Tomas, Manila) is a limnologist who finished his B.Sc., M.Sc. (cum Laude) and PhD (cum Laude) degrees at the University of Santo Tomas. A specialist in freshwater zooplankton ecology and systematics - he has published 75 articles in national and international peer-reviewed journals, 3 book chapters, edited 2 books and 1 textbook to date. He teaches Zoology and Ecology courses to graduate and undergraduate students and established the Zooplankton Ecology, Systematics and Limnology (ZESL) Research Group of the UST Research Center for the Natural and Applied Sciences. He has received grants, awards, and recognitions for his research from the US National Academy of Science and USAID, German Academic Exchange Service (DAAD), the International Society of Limnology, the University of Santo Tomas, the Commission on Higher Education, the Department of Science and Technology, the National Academy of Science and Technology (Outstanding Young Scientist 2021) and several professional organizations. At present, he holds administrative positions at the University of Santo Tomas such as Dean of the UST College of Science, Program Lead for Natural Sciences at the UST Graduate School, and UST's representative to the DOST SEI ASTHRDP National Science Consortium. He is actively involved in professional and scientific organizations. Since 2018 he has been serving as the Vice President of the Philippine Society for Freshwater Science and is the National Ambassador of the Philippines to the International Society of Limnology.

Spatio-temporal Patterns in Singapore Biodiversity Data through Analysis of the Zoological Reference Collection (ZRC)

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Natural history collections are a good source of primary biodiversity data because of their wide taxonomic and geographic coverage and their immense potential is widely acknowledged. It is also recognised that this data source is largely untapped due to inherent spatio-temporal unevenness. This study maps onto the Singapore urban/land-use planning areas, Singapore specimen records in the Zoological Reference Collections (ZRC) housed in the Lee Kong Chian Natural History Museum (LKCNHM) to elucidate spatial and temporal patterns within the collection and understand the potential of collection data in guiding local biodiversity research, exploration, and conservation management decisions. The Singapore records of the ZRC show spatio-temporal unevenness in geographical and temporal coverage, e.g., the largest number of ZRC records (>33,800 records) were collected from Singapore's four nature reserves and some offshore islands. The ZRC as mapped in this study identifies biodiversity data gaps that can support the designation of nature areas, and even potentially a second marine nature area in our western islands. This is the first comprehensive study on Singapore zoological specimen data.

Jharyathri Thiagarajah is a Senior Executive at the Lee Kong Chian Natural History Museum (LKCNHM) managing the outreach and education team at the Museum. She is also a part-time Masters student in the Biodiversity Conservation and Nature-Based Climate Solutions (BCNCS) programme at the National University of Singapore (NUS). Besides having a keen interest in effective biodiversity communication, her current research interests focus on using museum specimens to uncover biodiversity history stories of Singapore.

People, Plants and Plantations: Recollecting the Past and Present through Botany and Art

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In an ecological pursuit to comprehend the ephemerality and transformation of the ever-changing environment, Syarifah is fascinated in the recollection of geographical and natural history within the Malay archipelago, exploring themes of indigeneity and introduction of new species into existing landscapes. As the question of landscape intertwines with her main research interest of environmental-based praxis, she will present about her body of work and her artistic practice at Rimbun Dahan under the critically acclaimed Southeast Asian Arts Residency program. She will also speak about her self-published fully illustrated publication of Recalling Forgotten Tastes, a compilation of recollections and conversations on plants that matter to the Orang Asli in terms of consumption, medicinal purposes and cultural significance. On and off transitioning from similar themes, she finds herself in a microcosm of agroecological discourse surrounding matters concerning food sovereignty — all in a world fortified and seeded by market-based economic systems. Intrigued by this, she held her first solo exhibition in December 2022 — Measure of Seeds, focusing on colonial plantations, the migration of labor in Malaya and seed ownership here in present Malaysia, which she will also share on her ongoing work.

Syarifah Nadhirah (b. 1993) is a visual artist, textile designer and author based in Kuala Lumpur. Her art productions mostly dabble and experiment in the form of printmaking, watercolor and digital illustrations with the main interests reside in the cross-pollination of art and science, bridging both education and awareness. Her range of works manifest in the form of a visual documentation and publication, Recalling Forgotten Tastes, an introductory book centred on a garland of edible plants and food from the perspectives of the Indigenous communities in Peninsular Malaysia. Aside from that, she has collaborated with ecologists from Urban Biodiversity Initiative, where they conduct nature education workshops focusing on rediscovery of urban ecology and edible herbs. Currently, she is exploring ideas of memory and matter of plant migration and how some have significantly changed the social and economic outlook of this region. Trained and practised as an architect, she endeavoured into running her own co-founded design studio Paperweight Studio.

Zikri Rahman (b. 1990) has consistently embarked on collaborations with cultural activist groups in various socio-political projects. Buku Jalanan, a rhizomatic network of street library movement he co-founded in 2011, is a loose cultural and knowledge workers movement focusing on decentralizing the modes of knowledge production. He is also affiliated with Pusat Sejarah Rakyat, an independent archival research and documentation platform focusing on Malaysia and Singapore's people's history. With LiteraCity, he initiated Kuala Lumpur's literary and cultural mapping project and intervention of the city. Zikri Rahman is also a writer, independent researcher, translator, and podcaster for various ephemeral platforms.

From Kampung Glam to Geylang Serai: Stories of Plants and Their Uses from One of Singapore's Oldest Jamu Shops

Siti Nurhuda Binte Saleh
Geylang Serai Market

Jamu is a traditional herbal medicine originating from Indonesia. The practice of jamu involves the mixing of natural ingredients derived from local plants to create a medicine that treats ailments, maintain good health, and prevent illness. Various parts of the plants such as fruits, flowers, roots, barks, and seeds, are used in the making of Jamu. In Singapore, one can get Jamu and its various ingredients in a shop located in Geylang Serai Market. Mdm Siti Nurhuda binte Saleh, owner of *Siti Flower Power*, sells an assortment of medicinal plants and flowers in all sizes and form ranging from fresh to dried. Mdm Siti is the current successor of her family's long-standing trade that can be traced back as far as the 1920s in Kampung Glam. This presentation shall introduce the practice of Jamu through the sharing of Mdm Siti's experiences and expertise. The presentation will cover the history of Mdm Siti's shop, key elements of Jamu, as well as a sharing of specific plants and their significance in the story of Jamu in Singapore.

Siti Nurhuda Binte Saleh is the owner of Siti Flower Power shop located in Geylang Serai Market. Her shop mainly sells Jamu products and Jamu ingredients of various sizes, shapes and forms. Mdm Siti is well versed in the botany of Jamu, and she actively improves her knowledge by conducting research and attending classes in Indonesia.

Tropical Botany: From Colonial to Singaporean

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Perhaps unbeknownst to many, Singapore is the most heavily-botanized country in Southeast Asia, probably also in Asia, and possibly also in the world. Like much else about Singapore's successes today, much of this is due to its geography in terms of location and area, but there were also other fortuitous circumstances. One of these circumstances was the interest and efforts by European—mostly British—botanists during the colonial era of Singapore's modern history, and the establishment of the Singapore Botanic Gardens as a base. We (re-)trace the development of local botanical knowledge that accompanied the transformation of Singapore's landscape over the past 200 years. Since much has already been written about the first 150 years of Singapore's botanical history, we also summarise the developments over the recent few decades. This will update the context for an outlook on the future of botany in Singapore and the case study that Singapore provides for the rest of Asia. Progress in Singapore botany draws on and contributes to progress in botany in the region. At a time when botany as a discipline is disfavoured by institutions of higher learning and research funding programmes around the world, but is in fact ever more important to address global problems such as biodiversity loss, food insecurity, and climate change, how can we ensure that such progress in botany continues? What lessons can we draw from the continuing story of Singapore botany?

Kwek Yan Chong is a Senior Researcher at the Singapore Botanic Gardens, a Division of the National Parks Board of Singapore, where he coordinates a Tropical Forest Ecology Research programme. He is also an adjunct Assistant Professor at the Department of Biological Sciences, a research affiliate of the Centre for Nature-based Climate Solutions, and an honorary affiliate of the Lee Kong Chian Natural History Museum, at the National University of Singapore. His research interests are in vegetation ecology, urban ecology, and invasion ecology.

Unpacking "Ocean Desertification" in Jeju, South Korea: Preliminary Findings

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In Jeju, known as "the frontline of the climate crisis in South Korea," seaweed-rich ocean floors with the island's signature black lava rocks are being rapidly covered with pink and gray crustose coralline algae. This phenomenon called *Gaetnokeum* or "Ocean Desertification" is observed in most parts of Jeju today, with a potentially significant ripple effect on the communities, cultures, and economies of the island. Disappearing macro sea algae results in the decline of such invertebrates as conches and abalones, which in turn weakens the *haenyeo* (women divers) societies, local culinary traditions, and related seafood industries, all dependent on the harvesting of the algae and the invertebrates. Recognizing these risks, marine conservation organizations, fisheries institutes, and the Jeju provincial government are making efforts to suppress the growth of the crustose coralline algae and repopulate the seabed with their familiar seaweed species.

This paper unpacks the phenomenon of ocean desertification from multiple angles. While acknowledging that it is a serious threat to the marine biodiversity as well as the well-being of coastal communities of the island, I contend that interpreting the phenomenon as a threat alone does not help understand the complex interplays of various human and nonhuman actors and processes underlying the phenomenon and the variegated impacts and implications to each actor. As preliminary findings of the research project on ocean desertification in Jeju, this paper highlights the concept of biodiversity as a nature-culture assemblage, the notion of socionature and care, the politics of ecological (un)knowledge, and the usefulness of a multispecies perspective. These findings suggest that ocean desertification is a multi-layered phenomenon that cannot be simply tackled by the existing logics of cause-effect and problem-solution.

Young Rae Choi is a human-environmental geographer with interests in the field of marine and coastal governance and East Asian studies. Using political ecology and critical political economy, her research interrogates the complexity and interwovenness of development-conservation relations with a geographical focus on East Asia. Her past projects include the political economy of coastal reclamation in South Korea and China, sustainability controversies around ecocities built on reclaimed land in China, the emergence of neoliberal fisheries and fishing communities, and the spatial rationalities of the Blue Economy. Her current projects include the modern history of South Korea's tidal flats (*getbol*), a global-scale analysis of urban coastal reclamation 2000-2020, and the politics of Spartina in the Yellow Sea. Her work has been published in various venues, including Environment & Planning E, Political Geography, Dialogues in Human Geography, Ocean & Coastal Management, and Marine Pollution Bulletin.

Synthetic Nitrogen and the Cost of Modern Growth: Problems and Potentials of Fertilizer History in the Japanese Empire

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Synthetic fertilizers are essential ingredients of modern agrarian growth, but their application in industrial agriculture comes at social and ecological costs. A substance emitted beyond "planetary boundaries" today, synthetic nitrogen endangers aquatic ecosystems and exacerbates global warming. Just like fossil fuels, synthetic fertilizers today represent both essential propellants for the global economy, and an existential threats to the global ecology. How did this paradoxical situation come about historically? This presentation revisits some core tensions in fertilizer history and discusses possible implications Japanese experiences could have for wider notions of sustainability, ecological modernity, and biodiversity.

Japan, the world's third-largest economy, is a revealing case to study, as it brought about complex commercial systems since the seventeenth century that depended on an expanding terraqueous resource base. Home to Edo (Tokyo), the largest city of the early modern world, Japan was a site of intense agricultural land use. By the late nineteenth century, it became a non-western pioneer in the "scientific" reinvention of agriculture and the systematic expansion of resource bases at sea and onshore.

My presentation revolves around the mapping of two processes: the geography of profit and sacrifice in the making of Japan's modern agriculture shows how the expansion of nutrient bases was a process of continuous exhaustion and further expansion of terraqueous resource frontiers. Marine resources continued to play an important role to fuel the pelagic Japanese empire's metabolism. The second process is the scaling of the fertilizer economy under the shift from organic to energy-intensive mineral and synthetic resources. Unlike major Western economies, Japan only scaled synthetic nitrogen fixation as its chief source of fertilizers in the postwar period, in conjunction with newly gained access to the Middle Eastern petroleum necessary in the process. From a neo-materialist point of view, Japan's postwar high growth was thus enabled by changing energy regimes and expanding resource bases.

Jonas Rüegg teaches Environmental History of Japan, East Asia, and the Pacific at the University of Zurich, Switzerland. He is currently working on a book titled "The Kuroshio Frontier: Business, State, and Environment in the Making of Japan's Pacific," which investigates Japan's role in the making of the modern Pacific, and the role of oceanic environments and marine technologies in the making of modern Japan. Jonas has published his research on the Tokugawa shogunate's colonization of the Ogasawara (or Bonin) Islands in the 1860s and on the ways in which Japanese expansion to the Pacific wrought critical cultural and economic changes on the eve of Asia's first industrial transformations. As his second monograph project, Jonas is studying the *longue durée* history of the Nitrogen Cycle in Japan and its resource empire. Having grown up in Switzerland, Jonas received his B.A. from the University of Zürich and served the Swiss embassy in Japan before his graduate studies at Harvard University. In the context of his dissertation, he has conducted research at Tokyo University and Academia Sinica in Taipei.

Japan's Salmon Fisheries and Its Construction of an Ecological Empire in the Northern Sea Before the Second World War

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On the eve of the Second World War, Japan constructed a dynamic and vast ecological empire through salmon fisheries in the northern waters geographically defined as the Sea of Okhotsk and the Bering Sea. The number of salmon ascending rivers and streams in Hokkaido dramatically declined in the mid-1880s. It was mainly because the industrialization of fisheries and the democratization of fishing grounds allowed commercial Japanese fishermen to overexploit the fish on the island. Once strict conservation measures for salmon fisheries took effect in Hokkaido, Japanese fishers turned to distant foreign waters to which they could "outsource" their fishing pressure and began engaging in salmon fisheries in the Russian Far East. Japan's expansive salmon fisheries gradually integrated the waters of the Russian Far East into its ecological empire as a "biosphere of influence," a peripheral "undeveloped" space where Japanese fishermen could catch as many salmon as they liked without paying attention to devastating ecological impacts their plundering extractive activities would have. The development of Japan's salmon fisheries in Russian waters was contingent not only on shifting Russo-Japanese relations but also on the uncontrollable and unpredictable ecology of salmon. To promote plundering salmon fisheries in Russian waters and consequently reduce fishing pressure on the fish in Hokkaido, Japanese scientists affiliated with the Imperial Fisheries Institute made efforts to identify migration routes and periods of salmon by studying the physicochemical structure of Russian waters and conducting tagging experiments there. When the symptom of Russian salmon overexploited appeared in the mid-1930s, Japanese fishers turned to more distant, "undeveloped" fishing grounds and Japan's ecological empire expanded into Alaskan waters across the Bering Sea.

Koji Ito is an assistant professor at Osaka University, Japan. Ito obtained his bachelor's and master's degrees in American Studies from Osaka University in 2008 and 2010, respectively. He also received his PhD degree in History from the University of Illinois at Urbana-Champaign in 2021. His dissertation studies the historical development of salmon fisheries in Bristol Bay located in Southwest Alaska with a focus on scientific knowledge production by American and Japanese fisheries scientists. Ito's areas of expertise are U.S. history and the history of U.S.-Japan relations with special interests in the relationship between marine biological resource extraction, the development of science and technology, and colonialism in Southwest Alaska after 1867. Ito's major publications include "Contesting Alaskan Salmon: Fishing Rights, Scientific Knowledge, and a U.S.-Japanese Fishery Dispute in Bristol Bay in the 1930s," *Japanese Journal of American Studies* 31 (2020): 179-200.

Biodiversity Loss in Southeast Asia: What Happens When We Fail to Protect Our Forests and How Do We Prevent its Loss

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Forests are the dominant habitat type for Southeast Asia's biodiversity, with over 15,000 species of terrestrial vertebrates and insects depending on these habitats for their survival. However, the Southeast Asia's forests are also threatened by human activities such as agriculture and logging. As such, protecting these forests through the creation and maintenance of nature reserves are vital to the long-term survival of the region's rich biodiversity. In this presentation, we will cover research that explores what happens to the region's biodiversity when we fail to protect forests, and what happens when existing protections fail. We will also explore potential mechanisms that could increase the financial sustainability of such conservation actions in the region.

Yiwen Zeng is a spatial-ecological modeller who focuses on tropical conservation and sustainability. A large part of his research is aimed at finding ways to conserve nature and biodiversity that are both socially responsible and ecologically sound. His goal is to develop research that can directly inform and shape conservation and sustainability policies. He has worked and published research on invasive species, the Sustainable Development Goals, area-based conservation and nature-based climate solutions. His current research focus involves utilizing remote sensing and geospatial analyses to evaluate and plan conservation strategies, particularly across the Southeast Asian region.

Imperceptible Multitudes: Do Microbial Diversity and Abundance in Southeast Asia Constitute a Heritage?

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Microbial diversity troubles binaries such as native and non-native, Indigenous and alien, waste and value. Can we even talk about native or Indigenous or valuable microflora? Can we even imagine a distinctive regional microbiome? The invisibility and abundance and mutability of microbes make them hard to reckon with in conventional discussions of biodiversity. The complexities of their taxonomic and functional differences, multispecies promiscuity, and propensity for horizontal reproduction, often add further confusion. It proves easier to confine our consideration of biodiversity to studies of charismatic vertebrates and poised eukaryotes. But I want to propose a microbial turn in biodiversity discourses. This entails further reflection on the impact on regional microbial diversity of hygiene and sanitary measures, the profusion of antimicrobials (and resistance to them), climate change, urbanization, land clearing and deforestation, and increased movements of organisms. It means the further study of consequent changes in immunity and community, evolutionary dynamics, the crossing of species barriers, and the occupation of new environmental niches—issues made more pressing by outbreaks (flourishing) of coronaviruses and influenza viruses. Microbial diversity and ecological dynamics should be factored into regional understandings of biological and ecological processes.

Warwick Anderson is Janet Dora Hine Professor of Politics, Governance and Ethics in the Department of Anthropology and the Charles Perkins Centre at the University of Sydney. Additionally, he is an honorary professor in the School of Population and Global Health at the University of Melbourne. He has published widely on histories of disease ecology and currently, he leads a research project on the conceptual development of planetary health. In 2023, the Society for Social Studies of Science awarded him the John Desmond Bernal Prize for distinguished contributions to science and technology studies.

The Growth of Knowledge on the Natural History of the Philippines: Perspectives from the Last 300 Years

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Situated at the Asian-Australian faunal zone interface, the Philippines—the second largest archipelago in the world next to Indonesia, is one of the most spectacular examples of evolutionary radiation of land vertebrates on Earth, with unparalleled levels of species endemism. This remarkable faunal diversification resulted from a complex geological history of the island systems with long periods of isolation from major landmasses in the region.

European scholars and merchants were the first to document the biological resources of the archipelago and made cursory explorations of major islands during the Spanish colonial period from the 17th century to the end of the 19th century. Scientific explorations resumed during the American colonial period (1898–1946) but were implemented in a more organised and systematic fashion, exploring numerous localities throughout the archipelago. Filipino naturalists who were active during both periods also contributed significantly in advancing scientific research in the islands. Much of the knowledge on the flora and fauna of the Philippines today, in fact, was drawn from scientific explorations in the last two hundred years.

While the European period paved the way for scientific exploration of the islands, the American era laid the foundations for sustained studies of the natural environment through the establishment of key scientific institutions. However, it is also important to highlight the distinct and enduring systems of exploitation of the natural resources that were also developed and expanded during these colonial periods.

This presentation traces the growth of knowledge on the natural history of the Philippines in the last 300 years. It also examines the legacy of European and American colonial rule on science and the socio-political dimension to help explain the prevailing condition of Philippine biodiversity.

Arvin C. Diesmos is an ecologist, taxonomist, and specializes in the field of herpetology. He is 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.

ABOUT THE CHAIRPERSONS

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