The Geological Turn in Asia

Empires, Geological Knowledge, and Geological Agencies

4-5 September 2025

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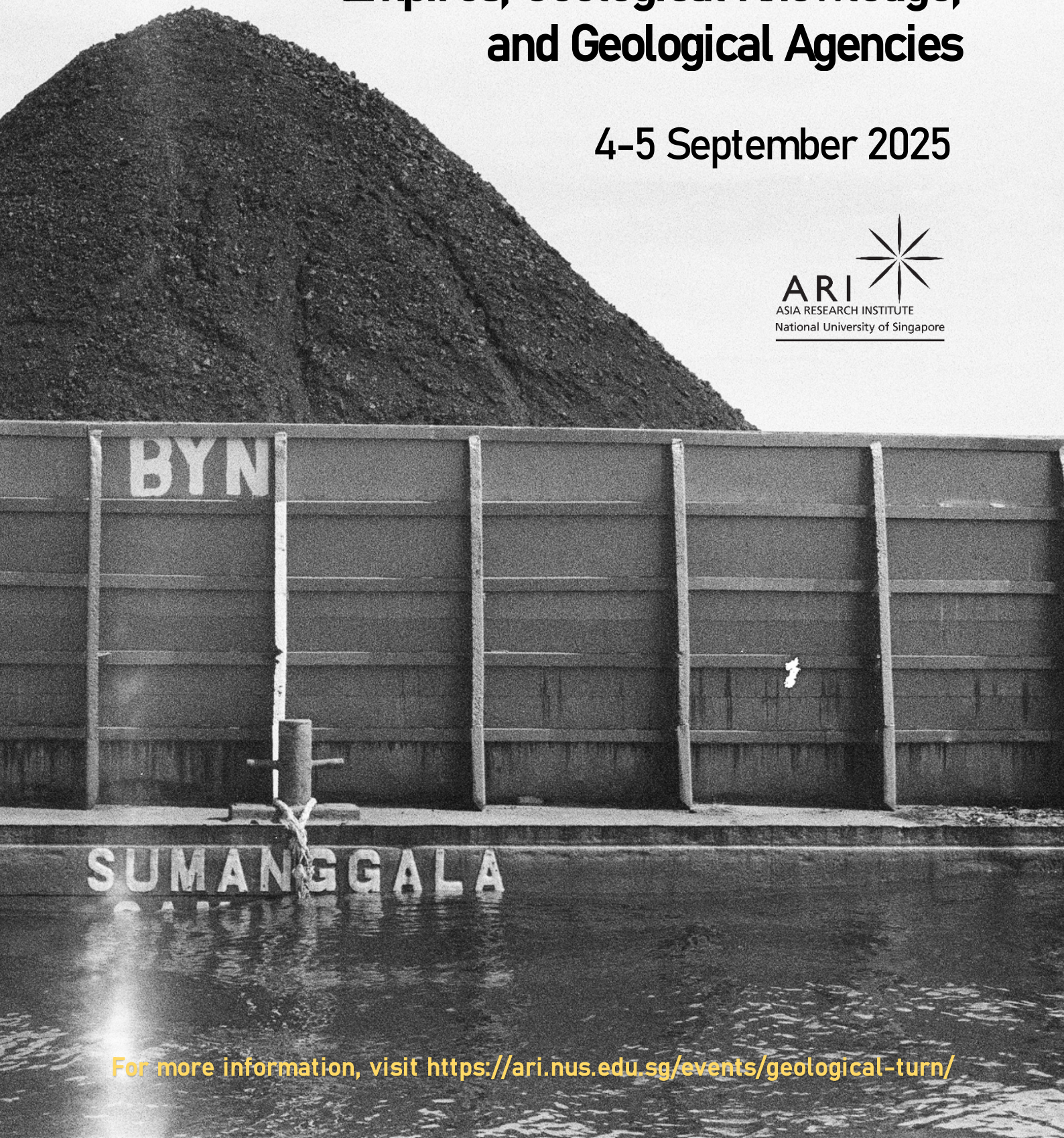

For more information, visit https://ari.nus.edu.sg/events/geological-turn/

This workshop is jointly organized by the Inter-Asia Engagement and Science, Technology and Society clusters at the Asia Research Institute, in collaboration with the Department of Southeast Asian Studies at the National University of Singapore.

The geological turn marks a significant intellectual shift in the humanities and social sciences, focusing on the intricate and often overlooked relationships between human societies and geological materials. This conceptual shift is influenced by the emergence of the Anthropocene, a term used to describe the epoch in which human activity has become a dominant force shaping Earth's geological processes. This workshop departs and moves beyond the Anthropocene and situates the geological turn at the intersection of geology as science, geological materials, empires, nonhuman – geological entities and socio-ecological transformation specifically within the context of Asia.

As the workshop addresses the development of modern geological knowledge, a central question emerges: to what extent have colonial legacies shaped the formation of geological institutions in Asia? Colonial powers often viewed geology as a tool for resource extraction and control, thus influencing the methods and priorities of scientific inquiry. The legacy of this empire approach continues to shape geological institutions and practices in many parts of Asia, suggesting that modern geological knowledge in the region cannot be divorced from its colonial history. Understanding this connection helps illuminate the political economy of geology, wherein political entities, corporations, and scientists work together — sometimes in collaboration, sometimes in conflict — to develop geological knowledge that aligns with geopolitical and economic interests. In this sense, geology is not a neutral science but one deeply embedded in power dynamics. This leads us to themes such as scientific collaboration, geological practices in border areas, and mining geology.

The early twentieth-century receives particular attention as a moment of generative ferment, especially in Southeast Asia where colonial scientists worked intensively with local communities to produce new understandings of the geological forces shaping the spaces they had colonized. This collaborative working relationship went far beyond imperial tutelage and top-down knowledge diffusion, often resulting in unintended consequences. The nonhuman agents and geological entities further enriches this analysis by addressing how natural forces such as volcanic eruptions, earthquakes, and tsunamis act as active agents in shaping not only the physical landscape but also political and social structures. These geological events often transcend human control, revealing the vulnerability of societies to forces beyond their influence.

Geology was both a theoretical and practice venture as much of this emergency branch of knowledge was contemporaneously applied to extractive projects, such as mining. Mining brings us to sites often seen peripheral to national and international political concerns: rural Cambodia, karst landscapes in Southwest China, caves in Malaysia and small towns in central Java. These sites were, nonetheless, at the frontline of geological discovery and transformed considerably when geological knowledge was put to use. Such transformations situate these spaces as part of a global resource frontier that opened and ruptured under the discipline of geology. Understanding the implications and legacies of applied scientific knowledge is key to developing an agenda for a future research in the geological turn in Asia.

The Geological Turn in Asia also explores several emerging themes, including toxic geology, media-mediated geology, and urban geology. While geological discussions have historical dimensions, the issues related to the impacts of geological material extraction are often treated as separate from geological studies. Toxic geology, for instance, highlights the close relationship between waste, environmental pollution, and other forms of environmental damage with geological materials and extraction processes. Media-mediated geology examines the relationship between humans and the Earth, a connection that is influenced by various forms of media, including tools, devices, technology, and even art. By understanding these multiple media through which humans interact with geology, we can gain a deeper insight into the geological turn in Asia. Urban geology posits that cities are intimately connected to the geological formations that underpin them. In this context, a city can be regarded as a space where humans engage with different geological entities and processes, which collectively contribute to the formation and development of the city itself.

By connecting these themes and various geological dimensions, the workshop seeks to offer a comprehensive view of how area studies in Asia have been shaped by geology both historical and contemporary forces, as well as how it can be reimagined through more inclusive, the future of the earth in Asia.

WORKSHOP CONVENORS

Dr Fathun Karib
Asia Research Institute, National University of Singapore

Asst Prof Faizah Zakaria
Department of Southeast Asian Studies, National University of Singapore

Professor Tim Winter
Asia Research Institute, National University of Singapore

PROGRAM AT A GLANCE

DATE	TIME (SGT)	PANEL SESSION
4 SEP 2025 (THU)	09:30 – 09:45	**WELCOME & INTRODUCTORY REMARKS**
	09:45 – 10:45	**KEYNOTE ADDRESS**
	11:15 – 12:45	**PANEL 1** – GEOLOGY, SCIENTIST AND SCIENTIFIC COLLABORATION
	14:00 – 15:30	**PANEL 2** – GEOLOGICAL PRACTICE IN THE BORDER ZONE
	16:00 – 17:30	**PANEL 3** – MINING GEOLOGY
	18:00 – 19:30	**WORKSHOP DINNER** *(For speakers and chairpersons only)*
5 SEP 2025 (FRI)	10:30 – 12:00	**PANEL 4** – TOXIC GEOLOGY
	13:00 – 14:30	**PANEL 5** – MEDIA-MEDIATED GEOLOGY
	15:00 – 16:30	**PANEL 6** – URBAN GEOLOGY AND GEOLOGICAL AGENCIES
	16:30 – 17:00	**SUMMARY & CLOSING REMARKS**

Image © Adam Bobbette

4 SEPTEMBER 2025 • THURSDAY

09:30 – 09:45	**WELCOME & INTRODUCTORY REMARKS**
	TIM BUNNELL	*National University of Singapore* **FATHUN KARIB**	*National University of Singapore* **FAIZAH ZAKARIA**	*National University of Singapore*
09:45 – 10:45	**KEYNOTE ADDRESS**
Chairperson	**FAIZAH ZAKARIA**	*National University of Singapore*
09:45	Reflections on a Geological Turn in Asia: Territory, Matter, Politics **ADAM BOBBETTE**	*University of Glasgow*
10:25	**QUESTIONS & ANSWERS**
10:45 – 11:15	**MORNING TEA BREAK**
11:15 – 12:45	**PANEL 1 – GEOLOGY, SCIENTIST AND SCIENTIFIC COLLABORATION**
Chairperson	**TOM ÖZDEN-SCHILLING**	*National University of Singapore*
11:15	Learning by Occupying: The Development of the Japanese Oil Industry in Nanpō **NAOSUKE MUKOYAMA**	*University of Tokyo*
11:30	Volcano Monitoring and Scientific Collaboration along the Pacific Ring of Fire: Japan, Philippines, and Netherlands Indies 1900–1920 **GHAMAL SATYA MOHAMMAD**	*Murdoch University*
11:45	Hidden Agents of Decoloniality: French Presence in 19th-Century British Malaya **ANNE VANESSA VINCENT**	*National University of Malaysia* **SHANTHINI PILLAI**	*National University of Malaysia*
12:00	The Production and Circulation of Geological and Archaeological Knowledge at Bumiayu, Central Java, 1920s–1930s **GREGORIUS ANDIKA ARIWIBOWO**	*National Research and Innovation Agency*
12:15	**QUESTIONS & ANSWERS**
12:45 – 14:00	**LUNCH BREAK**

14:00 – 15:30	**PANEL 2 – GEOLOGICAL PRACTICE IN THE BORDER ZONE**
Chairperson	**JAMES D. SIDAWAY** | *National University of Singapore*
14:00	"The Stones, They Come From Up the Mountain, More Will Come": Earth Stories from Cambodian Borderlands **HARRIET HAWKINS** | *Royal Holloway University of London* **LY VOUCH LONG** | *Independent Researcher, Cambodia*
14:15	Amber Science Ethics: How Paleontologists Came to Debate an Asian War **LAUR KIIK** | *University of Oslo*
14:30	Rituals of Rupture: Seismic Events and Sacred Geographies in Assam, c. 1850 **SHREYA KHAUND** | *University of Warwick*
14:45	Karst Studies and the Geological Recasting of Southwest China **SUE ZHOU** | *University of Washington*
15:00	**QUESTIONS & ANSWERS**
15:30 – 16:00	**AFTERNOON TEA BREAK**
16:00 – 17:30	**PANEL 3 – MINING GEOLOGY**
Chairperson	**JACK GREATREX** | *Singapore Management University*
16:00	The Jewels in Ground: The Geopolitics of Knowledge in the Early Modern Eurasian Gem Trade **CLAIRE C. SABEL** | *University of Vienna*
16:15	"In Malaya There is Nothing Old but Nature": Cave Exploration, Guano Harvesting, and Prehistory in the Malay Peninsula, c. 1880–1930s **KATHERINE ENRIGHT** | *University of Cambridge*
16:30 *Online*	"The Much Abused Feng Shui": Coal Mining and Unthinkable Resistance in Qing China **ANAÏS WALSDORF** | *University of Warwick*
16:45	Theorizing Transition in Geological Politics: Comparing Malaysia and Canada **HUI YUN CHER** | *National University of Singapore* **TOM ÖZDEN-SCHILLING** | *National University of Singapore*
17:00	**QUESTIONS & ANSWERS**
17:30	**END OF DAY 1**
18:00 – 19:30	**WORKSHOP DINNER** *(For speakers and chairpersons only)*

5 SEPTEMBER 2025 • FRIDAY

10:30 – 12:00	**PANEL 4 – TOXIC GEOLOGY**
Chairperson	**HUI YUN CHER** | *National University of Singapore*
10:30	Women, Toxic Geologies, and More-than-Human Mekong Ecologies: Vernacular Resistance in the Patchy Anthropocene of Chiang Khong, Thailand **MAYA DANIA** | *Mae Fah Luang University*
10:45	Toxic Granite: Rise and Fall of Hong Kong's Early Geological Anxieties (1843–1893) **MAXIME DECAUDIN** | *National University of Singapore*
11:00	Volumetric Toxic Geology: Attuning to Waste Pollution in Cambodia **JUSTIN CHUN-HIM LAU** | *National University of Singapore*
11:15	Ruinous Frontier: Mudflow Disaster, Toxic Geology and Women Bodies **FATHUN KARIB** | *National University of Singapore*
11:30	**QUESTIONS & ANSWERS**
12:00 – 13:00	**LUNCH**
13:00 – 14:30	**PANEL 5 – MEDIA-MEDIATED GEOLOGY**
Chairperson	**HARRIET HAWKINS** | *Royal Holloway University of London*
13:00	Speculative Strata: Extending Geology through Art **DEBBIE DING** | *Nanyang Technological University*
13:15 *Online*	A Time for the Earth: Trains, Tremors, and Temporality in the Aftermath of the 1897 Assam Earthquake **DEBJANI DUTTA** | *University of Southern California*
13:30 *Online*	Geology and Geo-power of the Ocean: Sensing (Deep) Time, Undersea Archaeology and Mining in South China **SIN YI (EMILIE) CHOI** | *City University of Hong Kong*
13:45	Forgetting the Wave?: The Material Politics of Tsunami Risk Reduction Infrastructure in Post-Disaster Aceh **ARUM BUDIASTUTI** | *Universitas Airlangga* **RIZANNA ROSEMARY** | *Universitas Syiah Kuala*
14:00	**QUESTIONS & ANSWERS**
14:30 – 15:00	**AFTERNOON TEA BREAK**

15:00 – 16:30	**PANEL 6 – URBAN GEOLOGY AND GEOLOGICAL AGENCIES**
Chairperson	**MAXIME DECAUDIN** | *National University of Singapore*
15:00	Aquifers as Conduits: The Politics of Seepage in Kathmandu Valley **SAYD RANDLE** | *Singapore Management University*
15:15 *Online*	Geological Airscapes: More-than-Human Atmospheres in Bangkok's Green Lung **LEONIE HUEPPE** | *Chulalongkorn University*
15:30 *Online*	Political Geo(morpho)logy and the Sediments of the Anthropocene **WILLIAM JAMIESON** | *Royal Holloway, University of London*
15:45	The Dumpster of Everything: Cascading Hazard and Community Resilience in Karangligar **HANA AFIFAH AMINI** | *Lokahita Research Center for Sustainable Ecology and Geospatial* **PRIZA MARENDRAPUTRA** | *National University of Singapore* **YUSTINA OCTIFANNY** | *National University of Singapore*
16:00	**QUESTIONS & ANSWERS**
16:30 – 17:00	**SUMMARY & CLOSING REMARKS**
	FAIZAH ZAKARIA | *National University of Singapore* **FATHUN KARIB** | *National University of Singapore*
17:00	**END OF WORKSHOP**

KEYNOTE ADDRESS

Reflections on a Geological Turn in Asia: Territory, Matter, Politics

ADAM BOBBETTE
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This presentation explores what it might mean to develop a political geology of Southeast Asia. I begin by exploring some of the origins of political ecology in Southeast Asia in the 1980s and try to draw some meaningful distinctions between political ecology and political geology. Namely, I examine evolving conceptions of the politics of geological expertise and the social and territorial effects of geological narratives of the region. I consider geological work in colonial Malaya and emerging theories of the region's historic connections with the ancient continent of Gondwanaland, the identification of exploitable tin deposits, and the territorial consolidation of the Straits Settlements. I also explore the geopolitical significance of the theory of plate tectonics in post-colonial Southeast Asia and the convergence of novel deep time narratives with new visions of Third World mineral prosperity. The presentation concludes with an attempt to conceptualise how the depth, volume, and temporalities of the earth become uniquely enlisted in political projects and what a non-extractive political geology might entail.

Adam Bobbette is Lecturer in Political Geology at the School of Geographical and Earth Sciences, University of Glasgow. His book *The Pulse of the Earth: Political Geology in Java* won the 2025 Harry J. Benda Prize for outstanding first book. He is co-editor of *New Earth Histories: Geo-cosmologies and the Making of the Modern World* (Chicago 2023) and *Political Geology: Active Stratigraphies and the Making of Life* (Palgrave 2018). His current project *Earthworks: Political Geology in the Age of Critical Minerals* (Verso) develops a new geophilosophy of minerals at the intersection of biography, speculative mineralogy, and the politics of critical mineral extraction and trade.

Learning by Occupying: The Development of the Japanese Oil Industry in Nanpō

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How did states learn from each other in the period of imperialism? Traditional accounts often conceptualize knowledge and technology transfer during the colonial period as vertical processes—either from metropole to colony or through direct engagement between dominant and subordinate states. This paper challenges that framework by introducing the concept of inter-imperial learning mediated by occupation. It examines how Japan, a latecomer imperial power, inadvertently acquired advanced technological and managerial expertise in the oil industry during its occupation of Southeast Asian territories (Nanpō) during the Second World War. Rather than importing knowledge directly from Western states, Japanese engineers and officials gained access to sophisticated oil infrastructure, technical documents, and practices left behind by Dutch and American companies. Crucially, this transfer was facilitated by local engineers and workers who had been employed by those firms, making them central agents in the exchange. Through this triangular dynamic—linking new and old imperial powers via subaltern intermediaries—the case complicates conventional models of diffusion and development. It suggests that occupation can serve not only as a tool of extraction but also as an unintended mechanism of industrial learning, reshaping how we understand imperial competition and technological advancement in international relations, global history, and beyond.

Naosuke Mukoyama is Associate Professor of Global Governance at the Institute for Future Initiatives, University of Tokyo. His research examines the emergence and development of the sovereign state, covering state formation, resource politics, and historical international relations. He is the author of *Fueling Sovereignty: Colonial Oil and the Creation of Unlikely States* (Cambridge University Press, 2024). His work has appeared in European Journal of International Relations, Comparative Politics, and Democratization, among others. Before joining UTokyo, he was a Postdoctoral Fellow at the Department of Politics and International Studies at the University of Cambridge. He received his DPhil (PhD) from the University of Oxford, and his MPhil and LLB from the University of Tokyo.

Volcano Monitoring and Scientific Collaboration along the Pacific Ring of Fire: Japan, Philippines, and Netherlands Indies 1900–1920

GHAMAL SATYA MOHAMMAD
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This paper examines the emergence of volcanological institutions and the exchange of scientific knowledge among Japan, the Philippines, and the Netherlands Indies (Colonial Indonesia) along the Pacific Ring of Fire between 1900 and 1920. Although volcanology was still an emerging science during this period, the urgency to comprehend the nature of numerous active volcanoes intensified following several significant eruptions at the beginning of the Twentieth Century, notably Mount Taal (1911), Mount Sakurajima (1914), and Mount Kelud (1919). In each country, scientists' initiatives were pivotal in advancing systematic volcanological research and observation. These efforts were strengthened by the governments' increasingly humanitarian and technocratic responses to catastrophic natural disasters. In 1900-1920, Japan emerged as the leading country in developing an integrated volcano monitoring system, establishing the first permanent observatory in the region, and advancing instrumental volcano seismology through the work of its scientists. Japan's model of integrating scientific expertise with state-supported institutions influenced developments in other country, particularly the Netherlands Indies, which led to the establishment of the Volcano Monitoring Service. In contrast, institutional constraints hindered the progress of the Philippine Weather Bureau. Drawing on a range of historical sources, this paper demonstrates that the development of volcanological research and monitoring in these three countries relied heavily on the transmission and exchange of information about volcanism among scientists across colonial and imperial boundaries.

Ghamal Satya Mohammad (BA Universitas Indonesia, BA Leiden University, MA (Res.) Leiden University, PhD Murdoch) is an early-career historian and Honorary Research Associate at the Indo-Pacific Research Centre, Murdoch University. His research primarily investigates the historical interactions between human societies and active volcanoes, with broader interests in the development of (colonial) science in Southeast Asia, the history of royalty and nationalism in the region, and the evolving role of pusaka (heirlooms) in Javanese culture. Ghamal is a former recipient of the Southeast Asia Environmental History PhD Scholarship Award (2019) from the Asia Research Centre, Murdoch University.

Hidden Agents of Decoloniality: French Presence in 19th Century British Malaya

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This paper explores the uncharted role of French geological explorers as agents of decolonial knowledge production in nineteenth-century British Malaya. Grounded in Walter Mignolo's theory of *decoloniality* (2018), it examines the expeditions of John Errington de la Croix (1880), Xavier Brau de Saint-Pol Lias (1882), and Jacques de Morgan (1884), whose geological work spanned complex terrains marked by indigenous presence and expertise. While their activities were situated within broader imperial networks, these French explorers differed from their British counterparts by actively engaging with and recording local knowledge systems.

Indigenous expertise particularly in jungle navigation, reading the terrain, tin cultivation, and survival was central to the success of these missions. Rather than dismissing such knowledge, the French geologists acknowledged and incorporated it into their scientific narratives, thereby recognising indigenous epistemologies within their accounts. In stark contrast, British geological writings of the same period made no mention of indigenous contributions, despite the fact that local communities inhabited and worked within tin-rich interior regions. This omission reflects a broader pattern in British colonial discourse, where non-Western knowledge was often neglected, marginalised, or excluded in order to uphold imperial authority.

This paper argues that the French engagement with indigenous knowledge, however, partial or shaped by colonial motives constitutes an instance of epistemic disobedience, challenging the hegemony of Western scientific frameworks. Drawing on Mignolo's concepts of border thinking and the colonial difference, the paper contends that the French presence in British Malaya inadvertently opened up space for alternative ways of knowing the land. These geologists thus emerge as hidden agents of decoloniality, whose writings complicate the colonial archive and gesture towards a more plural and relational understanding of geological knowledge in Asia—one informed not only by imperial science, but also by the often-overlooked contributions of the colonised.

Anne Vanessa Vincent is a PhD candidate at the Faculty of Social Sciences and Humanities, Universiti Kebangsaan Malaysia (UKM). Her research focuses on the French presence in 19th-century Malaya, examining the role of the French as a paracolonial figure during British colonisation. Her work engages with postcolonial theory and historical analysis, seeking to uncover nuanced narratives within transnational contexts.

Shanthini Pillai is Associate Professor at the National University of Malaysia (UKM) and Associate Research Fellow at the Institute of Ethnic Studies. She actively researches on ethnic diversity, diaspora, and transnationalism, focusing on global Tamil communities. Her work also explores the cultural identity of Catholic communities and Catholic French missionary networks in Malaysia. She has led multiple research projects and held visiting research fellowships in Australia, Singapore, and France. Her articles have appeared in various high-indexed academic journals, and she has also published in scholarly presses such as Multilingual Matters, de Gruyter and Bloomsbury Academic. She is currently Editor-in-Chief of 3L: *Language, Linguistics, Literature: The Southeast Asian Journal of English Language Studies* and serves on editorial boards of journals related to language, sociology, and Asian Christianity.

The Production and Circulation of Geological and Archaeological Knowledge at Bumiayu, Central Java, 1920s–1930s

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This paper seeks to elucidate the intellectual and material dimensions of knowledge production, circulation, and collaboration of Dutch colonial scientists at Bumiayu, Central Java, Indonesia. Since the early twentieth century, the *Geologische Dienst van Nederlandsch-Indië* (Geological Survey of the Netherlands East Indies) established Bumiayu as a significant scientific research center. Through interdisciplinary collaboration among colonial geologists, archeologists, and paleontologists such as C. ter Haar, J. van Es, and C.H. Oostingh, Bumiayu became renowned for its abundant fossil deposits and complex geological structures. This leads to a key question: how did colonial-era geological research in Bumiayu contribute to the production and circulation of knowledge? Geological research in the colonial period extended beyond resource surveys, serving as a collaborative arena for scientists in geology, zoology, paleontology, and archaeology. The recent geological turn in Asia emphasizes the importance of examining how geological research in colonial periphery, especially at sites like Bumiayu in Java, has influenced the flow of scientific knowledge both regionally and globally. The study employs a historical and archival approach, analyzing primary sources, including colonial archives, geological reports, and scientific publications from the colonial period. It emphasizes the institutional role of *the Geologische Dienst van Nederlandsch-Indië* in knowledge production, circulation and the collaborative space that the institute provides for interdisciplinary research. The analysis foregrounds the knowledge mobility that circulated, adapted, and evolved during the late Dutch colonial period of the early nineteenth century. Bumiayu presents a significant case for understanding the dynamics of geological knowledge production, circulation, and collaboration, which serves as the foundation for today's diverse and multidisciplinary research landscape in Indonesia and connected globally.

Gregorius Andika Ariwibowo is a historian and researcher at the Research Center for Area Studies, National Research and Innovation Agency (BRIN), Jakarta. His research interests encompass cultural heritage, gastronomic history, sustainable tourism, and urban heritage studies. He has published several academic papers, including "From Panchuran to Waterleiding: Clean Water Solutions in Colonial Bandung, West Java, Dutch East Indies (1898–1934)" (*History of Science and Technology*, 2023), "Heritage in Motion: Safeguarding the Cultural Legacy of Wayang Kulit Kedu, Indonesia" (*Trames*, 2024), and "Sustainable Urban Cultural Heritage Policy in the City of Yogyakarta, Indonesia" (*Journal of Heritage Management*, 2025). Currently, Andika is developing a research project entitled "Colonial Railways and Deforestation in Southern Sumatra, Indonesia (1895–1927)", which examines the environmental and social impacts of colonial railway infrastructure projects in Indonesia. His scholarly works are available through his ORCID ID: https://orcid.org/0000-0002-1877-0535 and Scopus ID: 58476432800.

"The Stones, They Come From Up the Mountain, More Will Come": Earth Stories from Cambodian Borderlands

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This paper takes the form of four earth stories exploring the geological knowledge of artisanal gemstone miners working in a forested region at Cambodia's North-Western borderlands. It is based on three years of ethnographic fieldwork with mining communities, archival research in colonial archives in Cambodia, France and the UK, and collaborations with local artists. We frame our discussion of the miners' geological knowledge through D'Avignon's (2022) idea of "ritual geologies." In other words, the "practices, prohibitions and cosmological engagements with the Earth that are shaped across a regional geological formation" (2002:5). Importantly, these rituals are both sacred and non-sacred, and draw together localized embodied practices with the region's complex *geo*politics. This includes the multiple colonial forces past and present at work in this contested contact zone, long a location of complex trans-state politico-military linkages.

At our paper's core are examples of mining practices; siting pits, digging, panning and local gemological practices used to identify stones. We explore how the miners' geological and geomorphological understandings emerge from often messy and fraught intersections of different forms of knowledge. These include local cosmologies and embodied philosophies of human-spirit interactions, embodied knowledge of landscapes, rivers, soil and stones honed through experience, as well as understandings of Geological Science gained by word of mouth and from social media. In addition, local mining practices have long been shaped by the incorporation and adaptation of the knowledge and techniques of miners, cutters and dealers migrating from territories now known as Thailand, Myanmar, and Vietnam.

Exploring how miners' geological understandings intersect local, embodied experiences and understandings with global stories of Imperial flows of people, knowledge and materials we have two aims. We seek to contribute both to understandings of geological materials, and, to reassessments of artisanal mining that seek to trouble the binary of artisanal-industrial mining which has long cast artisanal miners as the 'absolute' other of modernity.

Harriet Hawkins is Professor of Geography at Royal Holloway, University of London. For the last five years, she has led the major European Research Council-funded project 'Thinking Deep' exploring creative approaches to the challenges posed by understanding the subsurface. She leads a team of six academics and over 30 affiliate researchers and artists and working around the world using creative methods and artistic research practices to explore themes including subsurface infrastructures, geology, cosmologies and extraction. Her own fieldwork on 'Subsurface Lives' in Cambodia has focused on artisanal gemstone mining in collaboration with Cambodian researchers, miners and artists.

Ly Vouch Long is a research fellow on the Thinking Deep project and an independent researcher leading the Cambodian research team working on the 'Subsurface Lives' project. In his past research collaborations with academics from US, UK, and Australian Universities, he explored questions of climate change, rural development, and labour. He is the co-author of a number of journal articles and conference papers and has presented his research around the world.

Amber Science Ethics: How Paleontologists Came to Debate an Asian War

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The 99-million-year-old fossils that are found inside amber from the Burma–India–China borderlands have become a key source of human knowledge about life-forms, ecology, and evolution in the time of dinosaurs. Yet, some Western paleontologists have pushed to boycott this research for using "blood amber" from a war zone—in northernmost Burma (Myanmar)—especially if it might profit the Burmese military. Thus, this amber, the local Kachin people, and the Burmese war have recently become the topic of a prominent ethics debate among Western and Chinese paleontologists. This article explores this international ethics debate among paleontologists—but does so from an Asian Studies perspective. Drawing on ethnographic fieldwork among Kachin people since 2010, and among paleontologists since 2024, the article asks: How can Asian Studies best contribute to such military-political debates among natural scientists? The article addresses five themes of this journal Special Issue: the decolonization of the geological sciences ("decolonize paleontology"); geological institutions in Asia (paleontology institutions in China and Burma); nonhuman agents and geological entities (ambers, fossils of ancient life, and ecologies); the political economy of geology (the mining, trade, consumption, collecting, and science of ambers and fossils); and the relationship between geology and biology (as in paleontology–paleobiology).

Laur Kiik has done ethnographic research among ethnic Kachin people in the Burma–China–India borderlands since 2010. He studies nationalism, inter-ethnic relations, natural resource grabbing, and wildlife conservation amid war. To do this, he tries to learn from and integrate insights from across the humanities, social sciences, and natural sciences. Currently, he is a postdoctoral research fellow at Oslo University in Norway.

Rituals of Rupture: Seismic Events and Sacred Geographies in Assam, c. 1850

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In 1839, Captain McLeod of the East India Company, stationed in Burma, documented the great earthquake that struck Ava, the capital of the Burmese Kingdom. In his journal, he described the state of the earth, noting deep fissures and large quantities of water discharged. He also recorded the local perceptions of earthquakes, stating that "the Burmese attributed earthquakes to the movement of some animal in the earth."

The underground is not inert. Marked by complex patterns of flow and material transformation, subterranean spaces are characterized by multiple forms of movement. Substances leak, ooze, and percolate through the soil, accumulating and dispersing over time. Centering such motion, this paper considers how efforts to know and direct underground seepage can intersect with urban spatial politics. For centuries, the shallow aquifers of Nepal's Kathmandu Valley were managed as crucial sites of water circulation. Indigenous Newari communities constructed and maintained networks of canals and ponds to transport and infiltrate flows to supply aquifer-fed stone water spouts (known as *hiti* in the Newari language and *dhunge dhara* in Nepali). The system was developed around an assumption of groundwater basins serving as permeable conduits for the resource via ongoing replenishment modulated extraction. But the valley's dramatic urbanization and political transformation since 1900 – which accelerated rapidly during and after Nepal's 1996-2006 civil war – has compromised these long-term arrangements of resource circulation. Paving over ponds and canals, state-led and informal development alike have limited the volume of water flowing into the shallow aquifers. As a result, while many *hiti* spouts remain intact, a growing number have run dry or provide water contaminated by nitrates and *e.coli* that have seeped into the local groundwater basins. The movement of both water and pollutants into and through the aquifers, mediated by urban growth, has emerged as a management challenge for municipalities across the valley – and knowledge about those flows, a vital site of aspiration. Examining efforts to restore the underground's historic water provision function, the paper develops an account of the stakes of approaching subterranean spaces as lively, porous conduits.

By focusing on the asymmetrical exchanges of knowledge within both the social and natural worlds of Assam and Burma, my paper explores how natural disasters influenced perceptions of what it meant to 'see' and what was considered 'seen' in colonial landscapes. I argue that this significantly shaped the nature and trajectory of science under the British Empire.

Shreya Khaund is a first-year PhD researcher funded by the AHRC Collaborative Doctoral Partnership at the University of Warwick and the Royal Geographical Society (with IBG), London. Her project, *Mapping Fossil Colonialism in Asia, c. 1810–1914*, investigates the history of coal mining industries in the British Empire, with a focus on how fossil fuel resources were understood, extracted, and governed in the Northeast frontier regions of India and the uplands of Southeast Asia between 1810 and 1914. Bringing together environmental history and new imperial history, her research examines the social, ecological, and scientific dimensions of imperial energy systems. Her interests lie in drawing from a wide range of scientific tools—including maps, surveys, and visual materials—to explore the multi-scalar development of colonial mining industries and their enduring legacies. Her recent research activities include presenting a paper titled *False Trails: Subversive Tactics and Colonial Prospecting in Nineteenth-Century Assam* at *Leviathan and After: A Celebration of the History of Science, the Field, and Its Future*, a joint conference hosted by UCL STS and the Science Museum.

Karst Studies and the Geological Recasting of Southwest China

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The institutional emergence of karst studies in twentieth-century China marks a structural shift from premodern to modern extractivist surveying under the guise of rationalized geology. This transformation was not merely technical but deeply political. As the Chinese state and foreign observers increasingly mapped karst formations, geological language began to mediate territorial governance and resource access, abstracting assessment from localized knowledge and socio-ecological context. The codification of karst into formal geological frameworks, particularly after the founding of the Geological Society of China in 1922 and later with the publication of *Carsologica Sinica* in 1982, provided a reservoir of state scientific authority for the ongoing development of economic geology. This trajectory coincided with, though was not reducible to, the rise of ethnic economics as a parallel institutional project in Southwest China.

Drawing on archival mining investigation reports from the Qing dynasty (1644-1912) and early twentieth-century surveys, alongside discursive analysis of geological journals, this paper traces quantitively and qualitatively how state-led projects translated landscapes into the language of karst terrains. It highlights the epistemological transition from imperial surveys shaped by administrative imperatives to scientific rationalism aligned with developmentalist goals. Despite shifts in method and institutional form, the grammar of statist extraction remained consistent. The formalization of geological knowledge became a technology for monopolizing access to subsoil resources, legitimating intensified intervention in response to both internal unrest and external geopolitical threats such as global wars and revolutionary upheaval. By foregrounding karst as a formalized epistemic category, this paper argues that geological science in modern China reconfigured earlier extractive regimes by translating them into a new technical and institutional language. Rather than rupturing past practices, this process reframed the grammar of extraction through the idiom of scientific neutrality and modernization, consolidating state authority under a renewed guise of objectivity and developmental purpose.

Sue Zhou is currently a PhD candidate at the University of Washington, she is an environmental historian of Southwest China. Her research engages with borderland histories, focusing on how state political control and non-state livelihoods unfolded in the Qing dynasty and early twentieth century. She explores the entangled dynamics of geological processes, socio-ecological transformation, and the emotional and sensory dimensions of life in the borderland—a space shaped by both indigenous continuity and migratory flux. Further examining how both the state and local communities engaged with environmental knowledge and shifting resource regimes, her research contributes to broader discussions in environmental history, the history of science, and the role of non-state armed forces, foregrounding a stronger emphasis on non-state and multilingual perspectives in both premodern and modern China.

The Jewels in Ground:
The Geopolitics of Knowledge in the Early Modern Eurasian Gem Trade

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This paper explores the geopolitics of gemstones in the seventeenth century and their role in the early modern earth sciences. Until the mid-eighteenth century, most of the precious stones in global circulation were mined in Asia -- especially important were the world's only known diamond localities in the Deccan (India) and Kalimantan (Indonesia). Gems' economic value and highly specific geographical locations made them the subject of considerable investigation among natural philosophers in Europe, a region with few sources of precious stones. New networks created by the Dutch and English East India Companies established direct connections between European consumers and the existing Indian Ocean gem trade for the first time, and throughout the seventeenth and eighteenth centuries, European knowledge of precious minerals depended on colonial trade in Asia. The paper will follow the exchanges between commercial and scientific actors that spanned mining sites, marketplace transactions, and laboratory experiments. I argue that the study of gems, a formative topic for the early modern earth sciences in Europe, both depended on embodied knowledge and labor of miners in South and Southeast Asia and was limited by local sovereigns' regional control over gem deposits. In contrast to later colonial efforts to map natural resources in the nineteenth century, when regional territorial sovereignty and control over mineral resources had been significantly weakened, European colonial actors in the early modern period were limited in what they could know about precious stones. While emphasizing the limitations that sovereign control over economically and politically significant minerals imposed upon early modern scholars, I also suggest that gems illustrate a consistent preoccupation with foreign mineral resources in investigations of the earth's composition over the longue durée. By revealing the early commercial and colonial precedents of geological surveying practices, I show that that the history of geology is as much indebted to changing political economies of resource control as to theories of the earth-system.

Claire C. Sabel is a postdoctoral researcher at the University of Vienna, where she is affiliated with the ERC project SCARCE (https://scarce.univie.ac.at/). Her research explores how knowledge about the earth and environment were shaped by European imperialism and overseas trade, especially in Southeast Asia. Claire received her PhD in History of Science from the University of Pennsylvania in 2024, where her dissertation focused on the connections between the Indian Ocean gem trade and the early modern earth sciences in Europe. She is also in the early stages of a new project exploring women's involvement in mineral resource extraction in the early modern world.

"In Malaya, There is Nothing Old but Nature": Cave Exploration, Guano Harvesting, and Prehistory in the Malay Peninsula, c. 1880–1930s

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The end of the 19th century saw growing interest in speleology: the study of caves. In the Malay Peninsula, this coincided with expanding British territorial claims and the acceleration of surveying and mapping efforts. Beginning in the 1880s, scientists embarked on cave surveys of the Malay Peninsula, including at the Batu Caves in Selangor and in Perak. These explorations were at once geological, zoological, and anthropological. How did these caves and their multispecies denizens figure into colonial capitalist discourses on the peninsula's past?

This paper draws on the recent work of Pratik Chakrabarti and Adam Bobbette, both of whom explore how 19th and 20th century geologists, engineers, and orientalists tried to reconcile their projects of colonial modernity with evidence of antiquity (in India and Java, respectively). At the turn of the 20th century in Malaya, however, I argue that what became naturalised was not prehistory but its absence. The impression that there was no deep history in Malaya—as H. N. Ridley reported from his excavation of the Batu Caves in 1898—persisted for several decades. How did geologists and archaeologists explain this apparent absence?

One answer lies in the cave floor, where guano deposits were transformed both into a valuable mineral resource and a potential medium for prehistory. Scientists often reported arriving at a cave only to find it been disturbed by "guano diggers", presented as anonymous saboteurs destroying evidence of stratigraphy, fossils, or artefacts. As British interests in phosphate resources intensified, so did guano harvesting, and both planters and the colonial state sponsored chemical analyses of guano from Malayan caves. This paper draws on a rich archival basis on competing interests in cave deposits, including geological reports and applications for guano harvesting licenses. It concludes by considering how colonial speleology and geology shaped post-colonial investigations into Malaysia's prehistory.

Katherine Enright is a PhD candidate at the University of Cambridge in the Faculty of History and the University Museum of Zoology. Her doctoral project focuses on the practices, products, and legacies of expeditionary science in the Malay Peninsula at the turn of the 20th century. Her research interests lie at the intersection of histories of field sciences, including natural history and anthropology, and museum studies. She served as a guest curator for the exhibition Measuring Difference (2024-2025) at Harvard University's Collection of Historical Scientific Instruments. She has also worked at Yale-NUS College, Singapore, on a multidisciplinary research project on biodiversity history. At Cambridge, she co-convenes the History of Science and Medicine in Southeast Asia Reading Group. Her research has appeared in the Dumbarton Oaks Plant Humanities Lab, *SUSPECT, TAXON*, and the *Singapore Policy Journal*. She holds an MPhil (Distinction) in Digital Humanities from Cambridge as a Gates Cambridge Scholar and a BA *summa cum laude* in History and Anthropology from Harvard College.

"The Much Abused Feng Shui": Coal Mining and Unthinkable Resistance in Qing China

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The UK's Science Museum houses the collection of British government metallurgist John Percy (1817-1889). The collection of over 3,700 specimens represents an archive of British imperial geological extractivism during the nineteenth century, including thirteen coal specimens from China. Chinese people had been mining and using coal for over eight thousand years, but the years following the Opium Wars represented an era of increased European ambition for coal exploitation in the region. Following from Andreas Malm's statement that the nineteenth century was "the century when racism and fossil fuels were originally conjoined", this paper focuses on the commodifying and racialising narratives about coal-rich areas that helped justify British imperial extraction.

This paper traces the journey of one coal specimen from a failed coal mining venture, allowing for the problematisation of histories centering individual European men and providing insights into the diverse actors involved in the encounters between coal and British imperialism. This paper explores the tensions between British geologists and mining investors, Qing imperial officials, leaders of the Self-Strengthening Movement, and local communities. It puts forward the suggestion that the utilization of the traditional Chinese geomantic practice of feng shui by local Qing communities was a tool of resistance that surpassed British colonial orientalist imaginations of tradition and modernity.

This paper contributes to a small but growing amount of research investigating the colonial histories of natural history and science museum collections. Centering specimens within wider histories of geological resource extractivism can reveal details of agency, resistance, and local geological knowledge.

Anaïs Walsdorf is an AHRC-funded Collaborative Doctoral Partnership PhD researcher working between the History department at the University of Warwick and the Science Museum in London. Her thesis, *Metallic Empire: Science, Energy, and Industrial Imperialism in the John Percy Collection, 1817–89*, focuses on the metallurgical collection of John Percy, and explores histories of colonial extraction, collecting, metallurgy, and 19th century industrial imperialism. Anaïs has a BA in Development Studies from the University of California, Berkeley and a MSc in Empires, Colonialism and Globalisation (International History) from the London School of Economics. Prior to beginning her PhD, Anaïs worked as a museum, library, and archive professional with institutions such as the 1947 Partition Archive, Wellcome Collection and Library, the Migration Museum, and the International Coalition of Sites of Conscience (ICSC).

Theorizing Transition in Geological Politics: Comparing Malaysia and Canada

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Over the past four decades, the global mining economy has radically expanded, and geotechincal capacity-building initiatives designed to help governments locate new mineral reserves and expand existing mines have proliferated throughout the world. Recent initiatives have focused on similar processes to those supported by colonial and other governments since the birth of Western academic geology in the early 19th century: namely, the training of new experts, the construction of new maps and data archives, and the development and deployment of new analytical techniques and technologies. As this article aims to show, however, contemporary capacity-building initiatives have also demonstrated a remarkably diverse range of political orientations, which in turn belie a rapidly broadening range of relationships between geoscientific knowledge-making, diplomacy, and visions of the good society. Geological knowledge and its affordances, like the geology of the earth itself, are constantly evolving. This article focuses on the changing relationship between geological knowledge production and statecraft between the early 1990s and the present, a period of tremendous organizational change both within the mining industry and within many of the governing institutions responsible for regulating mining activity. Amidst these rapid institutional and legal transitions, perhaps the most substantial new "constant" across the global mining industry has been the consolidation of an idealized image of industry consistency, and an attending faith in predictable paths from geological knowledge production to "sustainable" mineral wealth. This article delves into two resource-rich states—Malaysia and Canada—whose evolving approaches to geological governance encapsulate the kinds of transitions and tensions that have come to surround geotechnical capacity building initiatives since the 1990s, and that have made geoscience-informed promise-making into such a powerful, if volatile, terrain for contemporary politics. What might happen to our sense of geology's politics, we ask, if we focus not on specific configurations of institutions and geological concepts, but on the dynamism and pressure that causes these configurations to be continually replaced?

Hui Yun Cher is Postdoctoral Fellow with the Science, Technology and Society (STS) Research Cluster at the Asia Research Institute, National University of Singapore. She received her PhD in history and economics from Institut National des Langues et Civilisations Orientales (Inalco), Paris. She is affiliated with the French CNRS international research network – ASEAN-China Norm; Centre Asie du Sud-Est (CASE-EHESS-CNRS) and the Institute Pondok Perancis. She is working on the environmental history of the mining industry in Malaysia since the early twentieth century in comparison with strategies and techniques of European, Japanese and Chinese companies for coping with mining pollution. She is extending her research to regional environmental governance in this context.

Tom Özden-Schilling is Presidential Young Professor in the Department of Sociology and Anthropology at the National University of Singapore. His first book, *The Ends of Research: Indigenous and Settler Science after the War in the Wood* (Duke, 2023), is a historical ethnography of twenty-first century environmental deregulation in British Columbia, Canada, and its effects on both Indigenous and settler researchers' struggles to maintain long-term forestry experiments and sovereignty projects. Tom's current project examines the emergence of new critical minerals exploration and research and development initiatives in Australia, Malaysia, and the American Mountain West.

Women, Toxic Geologies, and More-than-Human Mekong Ecologies: Vernacular Resistance in the Patchy Anthropocene of Chiang Khong, Thailand

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This paper explores how colonial and technocratic geological systems, shaped by imperial legacies, corporate extraction, and state hydropower development, continue to cause ecological and epistemological violence in Southeast Asia's river borderlands. Focusing on Chiang Khong, a district in Thailand's Chiang Rai Province, along the Mekong River in the Golden Triangle, this examination explores how upstream dam discharges and arsenic-rich mining in Myanmar's Shan State generate toxic flows that destabilize multispecies ecologies and local ways of life downstream. Based on ethnographic research along the Mekong River with the local women's community (Mae Ying), the study investigates how hydrological inversion, sediment disturbance, and arsenic contamination break apart long-standing kinship ties between women, water, and more-than-human actors. It highlights the livelihood and ritual practices of local women who depend on seasonal harvesting of Mekong algae (Kai). Mae Ying practices what can be called vernacular geologies: embodied, fluvial knowledge acquired through tactile sediment sensing, Kai classification, and ritual attunement to ecological rhythms. These practices challenge dominant geological knowledge, which is institutionalized through colonial dam surveys, modern hydrological science, and mining geology, and support arsenic-heavy extraction across the Mekong borderlands. To resist epistemic erosion, Mae Ying enacts vernacular resistance by rejecting artificial flood cycles, refusing technocratic Kai farming interventions, and interpreting toxic fish deaths and Kai disappearance as signs of a cosmological rupture. Rituals invoking the Naga, serpent-beings believed to protect the Mekong, are revived to recalibrate human–river relations. Current field tests in Chiang Rai's tributaries show arsenic levels up to 19 times above WHO standards, increasing material anxiety and spiritual unease. Framed by Anna Tsing's "Patchy Anthropocene" and Donna Haraway's concept of posthumanism, "making kin," the paper argues that Chiang Khong's crisis is not only ecological but also capitalogenic and colonial. It contributes to a decolonial geological movement by recognizing Mae Ying's multispecies relational practices as insurgent epistemologies of survival in Asia's fractured geoscientific frontiers.

Maya Dania is Assistant Professor of Sociology and the Assistant Dean at the School of Social Innovation, Mae Fah Luang University in Thailand. She recently earned her PhD in Social Sciences from the Faculty of Social Sciences at Chiang Mai University. Her dissertation examines the Anthropocene in the Mekong River through the lens of political ecology, multispecies ethnography, and feminist theory, highlighting the disrupted connections between human and non-human communities during ecological crises. She currently manages several research projects, including grants from the Research Institute for Humanity and Nature (RIHN), the Sumitomo Foundation, and the Japan Society for the Promotion of Science (JSPS). In 2025, she began leading a university-funded project on arsenic contamination and toxic sediment flows in the Mekong borderlands. In 2015, she was a Fellow of the ARI-NUS Asian Graduate Student Fellowship. This influential experience shaped her ongoing research on decolonial critique, feminist ecology, and community-based environmental governance in Southeast Asia.

Toxic Granite:
Rise and Fall of Hong Kong's Early Geological Anxieties (1843–1893)

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This paper examines the nineteenth-century controversy over Hong Kong's decomposing granite as a putative source of colonial disease, situating it within the broader frameworks of medical geography, miasma theory, and the politics of empire. In the decades before germ theory, British physicians, administrators, and commentators struggled to explain the colony's devastating fevers, often linking them to toxic emanations from disturbed soil. Among the most striking and contested claims was treasurer Robert Montgomery Martin's "granite theory," which argued that Hong Kong's disintegrating rock emitted poisonous gases akin to putrefying organic matter. While ridiculed by medical professionals, Martin's arguments echoed contemporary zymotic theories and found resonance in colonial anxieties about environmental determinism. Drawing on official reports, medical writings, and travel accounts, this study shows how debates over geology, soil, and disease reflected deeper tensions between scientific authority, colonial governance, and the material realities of life in the tropics. Even after the microbial revolution, the persistence of fears about toxic soil underscores the enduring entanglement of environmental perception, imperial ideology, and medical uncertainty in shaping the history of health in Hong Kong.

Maxime Decaudin is a Senior Lecturer in Landscape Architecture at the National University of Singapore (NUS). His research explores the intersections of landscape studies and environmental history, with current projects on Singapore's green heritage and the history of the landscape profession in Southeast Asia. He earned his PhD from Sorbonne Université in 2021 and previously taught at the University of Hong Kong. At NUS, he teaches in both the Bachelor and Master of Landscape Architecture programmes, with a focus on history and theory courses.

Volumetric Toxic Geology: Attuning to Waste Pollution in Cambodia

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This article explores the politics of formulating interventions against waste pollution in Phnom Penh Cambodia, where the realities of toxicity are multiple and divergent. It argues that the manifold versions of and claims about toxic realities are animated and subtended by geological processes. Critical scholarship has shed important light on how toxicity is (un)known and (un)noticed, calling for the need to take variegated lived experience of toxicity into account. Building on and broadening this approach, which is centred around 'knowing', this article suggests that the attention to forms and aesthetics of toxicity offers new insights into the way interventions take hold. Through an ethnographic analysis of waste pollution elimination strategies, the article seeks to develop a volumetric framework with three heuristic devices to comprehend the diverse outcomes of these measures. 1) 'Density' reveals how concerns about polluted sites are congealed; 2) 'Volume' turns one's attention to why certain concerns are amplified and/or muted; 3) 'Velocity' explains the time and speed of toxic manifestations. A volumetric framework contributes to the extant literature on toxicity by foregrounding the geological substrates of toxic realities.

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Ruinous Frontier: Mudflow Disaster, Toxic Geology and Women Bodies

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In May 2006, an underground eruption triggered by the natural gas drilling activities of the Lapindo Brantas Corporation led to significant mudflows in the Porong region of Sidoarjo, East Java, Indonesia. Geological scientists anticipate that these mudflows will persist for about two decades, burying villages under thick layers of mud. As the earth continues to produce mud, methane, and other chemicals, what happens to the villagers in the surrounding environment after experiencing socio-ecological changes in the ruined frontier due to the geological activity of gas extraction? This continuous methane production exemplifies toxic geology, as the materials from the mud may be contaminated with harmful substances, potentially including substances that could affect the bodies of villagers. Ruins are not just a condition of mud material produced by an extractive geological activity, but an ongoing process of *ruination* that will continue to affect villagers' lives. This work combines insights from Jason W. Moore's work on commodity frontiers and Ann Stoler's analysis of ruination to propose the idea of a *ruinous frontier*. It argues that capitalism, as a way of organizing nature, not only works through frontier-making but also operates through ruin-making. Two women's stories from different eras—colonial and post-New Order—explore how women's bodies throughout Porong's history are entangled with the accumulation of misery. I deploy an ethnographic strategy of following the bodies adapted from John F. Kasson (2007) to understand the process of the *ruinous frontier* that produces misery in women's bodies. Frontier is not limited to physical, geographical, and material spaces external to the human body, but also encompasses psychological, cultural, and mental spaces. In this regard, the human body is a frontier, a zone of encounter between capitalist incorporation, discipline, accumulation, ruination, misery, and resistance.

Fathun Karib is a joint appointment postdoctoral fellow under the DIJ-ARI Research Partnership on Asian Infrastructures and affiliated to the Inter-Asia Engagements and Science, Technology, and Society clusters at Asia Research Institute (ARI), National University of Singapore. Karib also works as a sociology lecturer at the Department of Sociology, UIN Syarif Hidayatullah Jakarta. He holds a PhD in Sociology from the State University of New York at Binghamton. His current research interests are energy and environmental history, critical agrarian studies, Anthropocene/Capitalocene, the political economy of disaster, commodity frontiers, and the history of geology as a science. While at ARI, he will work on a research project titled "Global Gasification: The Emergence of the Indonesian Natural Gas Frontier and the Making of Gas Assemblage". This project is part of his dissertation, 'Living in the Ruins of the Capitalocene', which is being developed into a book manuscript.

Speculative Strata: Extending Geology through Art

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This paper presents a practice-led inquiry into how artistic methods contribute to an alternative geological knowledge production in Southeast Asia and study of geology as a political force. Drawing on over a decade of my work in Singapore – including physical soil excavation, field-based research, and virtual worlds, I argue that artistic practice offers alternative methods for understanding and reflection on geology's entanglements with memory, colonialism, and urban transformation. From soil as material to immaterial geologies, I explore how artists have excavated and extended geological knowledge.

In *Soil Works* (2018), I collected soil from transitional urban sites as counter-archive and as witness to histories of geology and governance. This extended into the virtual world through the work *Data Mining Jurong* (2021), which visualises a descent into a tunnel into a speculative subterranean strata, where viewers encounter fragments of historical objects and infrastructure of Jurong. The motif of descending through geological strata emerges as a critical method for examining geology in digital form.

I argue that artistic works extend material engagements with geology as a practice of embodied navigation through nonhuman strata that renders unseen forces – colonial, industrial, environmental – that shape both land and memory in Asia. This paper contributes to decolonial approaches in geological knowledge by situating artistic practice as a mode of reimagining geology beyond the Anthropocene, engaging with the circulation of soil and memory.

Debbie Ding is an artist-scholar working across the intersection of artistic research, technology and game studies – with professional experience as a design educator, interaction designer, and game designer-developer. Notable exhibitions include Ars Electronica, "Radical Gaming" at HeK Basel, "Worldbuilding" at Julia Stoschek Foundation Düsseldorf, "Wikicliki" at Singapore Art Museum, "Radio Malaya" at NUS Museum, "Construction in Every Corner" at NTU Museum, Kochi Biennale, and the Singapore Biennale. Scholarships include the NTU Research Scholarship and NAC Postgraduate Scholarship (Visual Art), and funded residencies with the Australian War Memorial (Canberra), Dena Foundation (Paris), and Goethe-Institut Singapore. She is currently a PhD candidate, School of Art Design and Media, Nanyang Technological University, Singapore. Her practice-based PhD research explores psychogeography in virtual worlds.

A Time for the Earth:
Trains, Tremors, and Temporality in the Aftermath of the 1897 Assam Earthquake

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While the role played by the railways in fostering time discipline is widely documented, this paper argues that the scientific study of earthquake phenomena was also significant in the introduction of a uniform time system in India. I read the history of train networks alongside the geological history of the region, focusing on the Great Assam earthquake of 1897 as an event that set in motion the adoption of a rationalized time order. The calculation of earthquake time was crucial to understanding geological patterns and required extremely precise time observations. Faced with a wide variety of timekeeping practices in the subcontinent, seismologists from the Geological Survey of India turned to the newly emerging train system to provide them with accurate information in the aftermath of the earthquake. Even as the organized collection of scientific data came to rely on the timeliness of infrastructures of transport and communication, the earthquake led to massive disruption of these technologies and the dominant representational idioms associated with them. The epicenter of the earthquake was located in a region marked by a riverine ecology that had experienced frequent flooding and damage to agriculture and property as a result of the railway system. These gradual and often invisible processes rarely found representation in official depictions, which portrayed trains as engines of temporal, social, and moral transformation. This paper looks at the earthquake as a rare moment in time when the narrative of trains as vehicles of civilizational progress comes undone and the impact of colonial technologies on climate change is laid bare. Drawing on the work of Walter Benjamin, I engage with geological photographs that documented the damage caused by the earthquake to railway infrastructure and argue that they open up an experience of time not as linear advancement but as a shock or jolt that ruptures any notion of stability. Standing in stark contrast to other genres of visual materials depicting trains, I ask how these photographs can help us reflect on a history that precedes the time of modernity as well as the many futures unleashed by it.

Debjani Dutta is a Phd candidate in Cinema and Media Studies at the USC School of Cinematic Arts. She holds a Masters degree in Sociology and an M.Phil in Cinema Studies from the Jawaharlal Nehru University in New Delhi. She has also previously worked as a film programmer with the Korean Cultural Centre in India. Her PhD dissertation, 'Tremulous Media: Nature, Technology and the Seismic Imagination' looks at technological, visual, and aural mediations of earthquakes.

Geology and Geo-power of the Ocean: Sensing (Deep) Time, Undersea Archaeology and Mining in South China

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In the contested waters of the South China Sea, China has extended its sovereign presence not only through surface-level militarization and surveillance but also through deep-sea activities such as undersea mining and archaeology. These practices open new frontiers and "contact zones" that manifest what anthropologist Aihwa Ong terms "blue territorialization." This study investigates how geology and geo-power are mobilized in this maritime region through the environmental media practices of sensing and excavation.

This study adopts sensing as both method and conceptual lens to interrogate these two critical undersea acts. Sensing encompasses technical infrastructures and embodied perceptual processes that mediate human-nature relations and shape the production of environmental knowledge (Gabrys, 2014). Through this lens, I examine how China's undersea mining and archaeological projects are framed in state policies, commercial ventures, and public discourse, drawing on discourse analysis informed by new materialist perspectives. Particular attention is given to the Chinese documentary series Undersea China (2020–2024)—the first comprehensive visual documentation of underwater cultural heritage across China—as a site for examining how material-political arrangements and discursive formations of geo-power operate beneath the ocean's surface.

Drawing on the insights from media archaeology, this study approaches the ocean not only as volumetric space but also as a temporal archive. It argues that through the excavation of sedimented time and "forgotten or hitherto invisible layers and events" (Zielinski, 2006), China's deep-sea governance reclaims both spatial territory and historical narrative. Ultimately, Ultimately, this research contends that environmental control in the South China Sea extends beyond the present, shaping the temporal, material, and epistemic conditions that determine the future and the past of the ocean.

Sin Yi (Emilie) Choi is a PhD candidate at the School of Creative Media, City University of Hong Kong. Her dissertation examines ocean sensing and the digital environment across Hong Kong, Taiwan, and South China, focusing on how environmental governance and knowledge production are shaped through both technical infrastructures and cinematic/artistic practices. Her interdisciplinary research interests include film and media studies, environmental humanities, and science and technology studies (STS) in East Asian context. Her peer-reviewed papers have been published in *Film Quarterly* and *Modernism/modernity*. She is also the co-editor of a forthcoming special issue titled "Post-2019 Hong Kong Cinema: Paradox and Polarization" in the *Journal of Chinese Cinemas*, as well as a forthcoming anthology on Hong Kong cinema. She has also presented at international conferences such as Society for Cinema and Media Studies 2024 & 2025, Association for Asian Studies Annual Conference 2022. Currently, she is a junior research fellow at the Digital Narratives Studio at the School of Journalism and Communication, Chinese University of Hong Kong.

Forgetting the Wave?:
The Material Politics of Tsunami Risk Reduction Infrastructure in Post-Disaster Aceh

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Nearly two decades after the 2004 Indian Ocean tsunami, many of the early warning tools installed in Aceh have gone silent. This paper explores the life and afterlife of Tsunami alert tools. Rather than viewing these devices solely as technical instruments, we approach them as cultural and political objects. Using insights from Science, Technology, and Society (STS), material culture, and communication studies, we trace how these systems were introduced, how they worked (or failed), and what their neglect tells us about how people and governments remember—or forget—disaster.

Our qualitative research is based on analysis of news coverage, policy documents, and conversations with residents in tsunami-affected coastal communities in Aceh. We find that tsunami alert systems were once highly visible symbols of recovery and resilience. But as time passed, public attention faded and state resources moved elsewhere. Local communities were often excluded from maintenance, while the tools themselves became disconnected from everyday life.

From a material culture perspective, these tools can be seen as "geological memory objects"—bridges between human societies and nonhuman forces like tectonic plates and ocean swells. Their current conditions serve as an example of how geological knowledge and disaster mitigation are intertwined in political economies, which are often influenced by the geopolitics of aid, donor objectives, and postcolonial governance. We contend that the silence of these neglected tools is not just a technical failure, but a social and political one— exposing the disparities in how disaster risk is perceived, managed, and experienced. Using the case of Aceh, this paper reflects on the fragile infrastructure of care surrounding disaster preparedness in Asia, unfolding questions of shared responsibility, memory, trust, and the quiet persistence of those who refuse to let resilience fade.

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Aquifers as Conduits: The Politics of Seepage in Kathmandu Valley

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The underground is not inert. Marked by complex patterns of flow and material transformation, subterranean spaces are characterized by multiple forms of movement. Substances leak, ooze, and percolate through the soil, accumulating and dispersing over time. Centering such motion, this paper considers how efforts to know and direct underground seepage can intersect with urban spatial politics. For centuries, the shallow aquifers of Nepal's Kathmandu Valley were managed as crucial sites of water circulation. Indigenous Newari communities constructed and maintained networks of canals and ponds to transport and infiltrate flows to supply aquifer-fed stone water spouts (known as *hiti* in the Newari language and *dhunge dhara* in Nepali). The system was developed around an assumption of groundwater basins serving as permeable conduits for the resource via ongoing replenishment modulated extraction. But the valley's dramatic urbanization and political transformation since 1900 – which accelerated rapidly during and after Nepal's 1996-2006 civil war – has compromised these long-term arrangements of resource circulation. Paving over ponds and canals, state-led and informal development alike have limited the volume of water flowing into the shallow aquifers. As a result, while many *hiti* spouts remain intact, a growing number have run dry or provide water contaminated by nitrates and *e.coli* that have seeped into the local groundwater basins. The movement of both water and pollutants into and through the aquifers, mediated by urban growth, has emerged as a management challenge for municipalities across the valley – and knowledge about those flows, a vital site of aspiration. Examining efforts to restore the underground's historic water provision function, the paper develops an account of the stakes of approaching subterranean spaces as lively, porous conduits.

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Geological Airscapes: More-than-Human Atmospheres in Bangkok's Green Lung

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This paper explores how air—manifesting as heat, wind, and dust—acts as a more-than-human geological force shaping the relationship between Bangkok and the peri-urban zone of Bang Kachao. Commonly portrayed as the city's 'green lung,' Bang Kachao has become relevant to urban sustainability discourses in Thailand's capital. However, this research asks: How do perceptions and materializations of air flows between Bangkok and Bang Kachao structure this relationship? And how does air's agency reconfigure development, governance, and everyday life in the space?

The research draws on sensory ethnography, interviews with residents, and document analysis to examine how air is sensed, governed, and mobilized in Bang Kachao. Conceptually, the study brings together theories of affective atmospheres, more-than-human urbanism, and environmental governance to argue that air is not merely a passive background but an active geological medium of urban transformation. Thinking with air—as a carrier of particles, pressure, and affect—reveals new geological imaginaries of the city, where atmosphere is not detached from the earth but co-produces its urban forms and environmental relations. Findings show that Bangkok's urban sustainability approaches depend on Bang Kachao's air-producing capacity, treating its landscapes as atmospheric infrastructure. At the same time, residents experience air through what I call an atmospheric culture—a shared way of sensing, interpreting, and adapting to shifting qualities of air. This culture reflects both sensory attunements and the lived realities of wind, dust, and heat that shape everyday practices, emotions, and relations with place.

By foregrounding air as a geological and affective agent, this paper contributes to rethinking urban environmental relations through more-than-human entanglements. It calls for development approaches that attend to the materiality and meaning of air, and to the shifting geologies of urban life in the Anthropocene.

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Political Geo(morpho)logy and the Sediments of the Anthropocene

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Sediment, as a meeting ground of the geological and the elemental, has been enrolled in the uneven urbanization of the planet, with its mounting extraction causing social and ecological devastation. Urban resilience amidst rising tides is becoming increasingly figured through sediment, but as of yet, social scientific engagements with Anthropocene theory have not yet noticed the role played by this cunning interlocutor between land and water. Elsewhere, I have posed sand's granular materiality as capitalism's ecological regime of sediment. This paper seeks to situate how a political *geomorphology* might supplement recent accounts of political geology and geosocial theory, in which the production geological knowledge, however imperfectly, subtends colonial and postcolonial social formations, whereas for the granular geographies of Anthropocene point towards the *destruction* of geomorphological knowledge as a condition for urbanization.

The underbelly of sand extraction, and its tendency to be facilitated by politically connected mafias, cartels, and state violence, in addition to opaque and environmentally destructive supply chains, will be theorised alongside its 'resilient' urban and infrastructural frontiers, through the history and future Singapore's land reclamation project. Singapore's land reclamation project, responsible for its status as exceptional importer of sand, is driven in part by its logistical and maritime ambitions, with generation after generation of surplus territory grafted onto its shores charting the instrumentalization of sediment in the formation of territory to anticipate the demands of the world market from the colonial era onward, and will continue to do so, as it plans to reclaim land until 2100 as part of a bold strategy to mitigate sea level rise. . In doing so, this paper aims to explore how sediment unsettles the terrestrial bias of Anthropocene theory through its geomorphological dynamism.

William Jamieson is a writer and geographer, and currently a postdoctoral research associate in Geography at Royal Holloway, University of London. His work is concerned with the integration of political geography and literary theory through critical-creative writing methods to interrogate capitalism's geographic practices. His research explores the global sand crisis, land reclamation, urbanization, and Singapore's subsurface expansion. His fiction has appeared in *Ambit, The Evergreen Review* and *Wasafiri,* and nonfiction has appeared in *e-flux* and *Failed Architecture*. His fiction pamphlet, *Thirst for Sand*, was published by Goldsmiths Press in 2019.

The Dumpster of Everything: Cascading Hazard and Community Resilience in Karangligar

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Karangligar village faces chronic land subsidence and inundation due to the geological formation of clay soil. The low permeability coefficient, high rainfall intensity, and overflow from the nearby Citarum River have permanently inundated nearly half of the villages for over a decade. Land subsidence and inundation are also driven by anthropogenic processes such as industrial groundwater extraction, ineffective drainage, failed irrigation systems, and redirected runoff from nearby affluent areas, which significantly exacerbate waterlogging and frequent flooding from 2007 to 2023. As part of Karawang, situated further east and separated by Bekasi, Karangligar experiences spillover effects from the rapid urban expansion of the Jakarta Metropolitan Area (JMA), concentrating negative impacts of development in peripheral regions. Since the 1990s, Karawang has seen accelerated industrialization, while pressured to maintain its agricultural hub and act as JMA's residential extension. However, excluded from JMA's planning and infrastructure framework, Karawang, including Karangligar, must face high vulnerability to environmental neglect despite its proximity to the JMA. The cascading disaster from a geological hazard, where the shifting geological terrain actively reshapes human settlements amid ecological neglect. Despite a hazardous environment, many residents continue to stay due to immobility induced by financial limitations, social dependencies, and cultural attachment to the land. Demonstrating remarkable collective and place-based ecological resilience and alternate imaginaries, the community has adapted by using stagnant floodwaters, polluted and littered, as fishing grounds for sustenance and recreation. These waters have become critical for food, income generation, and attracting visitors, reflecting an adaptive response born from necessity. Karangligar underscores complex interactions between socio-economic constraints, resilience, and geological agency within uncontrolled urban expansion, illustrating unintended consequences of unchecked mega-urbanization, highlighting how marginalized communities navigate towards severe environmental degradation and geological instability. Karangligar's resilience reveals both vulnerabilities and adaptive capacities shaped by exclusion from formal urban planning and infrastructure investment.

Hana Afifah Amini is a young researcher based in Payakumbuh, West Sumatra, Indonesia. She holds a Master of Engineering in Global Engineering for Development, Environment and Society, focusing on Transportation Studies from Tokyo Institute of Technology (2019) and a Bachelor of Science in Urban and Regional Planning from Bandung Institute of Technology (2015). Currently affiliated with Yayasan Lokahita, she contributes to research and projects on environmental carrying capacity, environmental impact assessment, flood-risk zoning, and sustainable urban development. Hana's recent work explores the sustainable transition of transportation toward net-zero emissions, using frameworks such as Avoid-Shift-Improve (ASI), multi-level perspective, socio-technical systems, and socio-ecological systems. She has previously contributed to studies on carbon emissions, accessibility influences on property value, urban livelihood, and bicycle path improvement. Her interests include an interdisciplinary approach that connects sustainable transport, urban ecology, and the social dimensions in emerging cities to support the development of sustainable cities.

Priza Marendraputra earned his PhD in *Environment and Resources* from the University of Wisconsin-Madison in 2023. His research focuses on political ecology, examining human-environment interactions to understand the complexities of urban development. He has taught courses on climate policy, green urbanism, planning studios, infrastructure planning, spatial information systems, and statistics at institutions in Wisconsin, Hawaii, and Indonesia. At ARI, he is actively involved in the Capitals of the Future: Place, Power, and Possibility in Southeast Asia project. His recent publications include the chapter Political Ecology of Land Degradation from Urban Expansion of Jakarta Metropolitan Area in Planning Jakarta in the *Post-Suburban Era* (University of Hawai'i Press, 2025). Additionally, he has two forthcoming chapters on urban livelihoods and Indonesia's post-decentralization era, both set for publication in 2026 in Routledge and Edward-Elgar Publishing. His ongoing research explores urban transformations, environmental governance, and socio-political dynamics, with multiple articles under review in high-impact journals.

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Faizah Zakaria is 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 currently working on a research project on the intersection of 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.
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