

HEARING THE FOREST

Through the Trees...



Scan the code above to listen to the accompanying audio.

An adult female southern grey gibbon (Hylobates muelleri) sings great calls – accompanied by squeals from her presumed offspring – in a tiny parcel of forest within a small village where Indonesia's new capital city will be sited (recording by Wendy Erb).

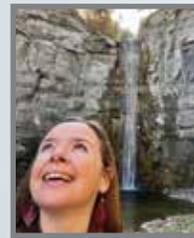
WAS THIS A DREAM? As my sleeping brain caught up to my rousing ears, I recognized an unmistakable tune. In an instant, I shot out of bed, grabbed my recorder, strapped on my headlamp, slipped into my sandals, and darted out of the homestay. Still in my pajamas, I switched on my recorder and listened in the darkness.

Sonic Entanglements in Nusantara

Less than 10 km from “*titik nol*,” the ‘ground zero’ of Indonesia’s planned new capital – where ten months before, the president and governors of Indonesia had brought together soil and water from each of Indonesia’s 34 provinces in a national ceremony of unity – two groups of gibbons sang defiantly to each other across separate fragments of forest, each no more than a couple of hectares. Standing on the roadside in the middle of town, I listened in amazement to their ‘**great calls**’ of resilient co-existence in this shared, squeezed place. As dawn approached, the chorus of gibbons co-mingled with the sounds of the awakening village: buzzing motorbikes carrying commuters to company jobs, rumbling trucks hauling logs from the eucalyptus plantation up the road, and the morning call to prayer floating from the mosque atop the hill.

Tiny bats returned to roost in the deep folds of banana leaves, squeaking a finale of soprano notes, as the nocturnal orchestra transitioned to day. As the gibbons faded to the background of the busy morning, I wondered: how long will this iconic sound endure in Borneo’s soundscape? What will happen if the gibbons’ song disappears, can no longer be heard over an urban din, or is missed by ears attuned to different sonic worlds? What knowledge will be forgotten, what histories fragmented, what relationships lost?

—Wendy’s journal entry



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Gibbons’ Great Calls...

Gibbons (Family Hylobatidae) are small apes who are distributed across Asia, from India to Indonesia. Typically residing in small family groups comprising an adult pair and their offspring, gibbons are famous for their musical vocal performances. The great call is a species-specific vocalization produced by adult females (sometimes accompanied by their maturing daughters and often involving contributions from their male partners) that appears to serve an important role in the establishment and maintenance of their family’s territory.





The authors and UNMUL research partners enjoy a nature walk in a mangrove forest near the southern border of Indonesia's new capital city (L-R: Wendy Erb, Walker DePuy, Rustam Fahmy, and Chandra Boer, photo by Wendy Erb).

A Green Dream or a Neoliberal Fantasy?

In August 2019, Indonesia announced plans to relocate its national capital from Jakarta to a newly constructed city – Nusantara – in Borneo, one of the richest and most imperiled cultural and biodiversity hotspots on Earth. Situated in a vast mixed-use landscape in East Kalimantan, where corporations and local communities practice diverse land uses amidst key endangered species' habitats, Nusantara's construction has begun.

The dream of relocating Indonesia's capital traces back to the country's first president, Sukarno, who hoped to reorient the nation's economic and political center away from the island of Java and towards Kalimantan. This rationale remains central to the creation of Nusantara along with the desire to reduce the environmental burdens facing Jakarta. The current administration sees the construction of Nusantara

as a way to realize Indonesia's commitments to social justice and climate change mitigation by creating a "forest city" centered around ecological restoration, renewable energy, and culturally inclusive economic prosperity.

There is much debate, however, about the rationales, feasibility, and ultimate effects of the plan. Myriad civil society organizations and academics have voiced concerns about potential social and environmental consequences, citing other nations' experiences of relocating their capitals as well as Indonesia's long history of mega-projects and ongoing issues with urban and infrastructure expansion across Southeast Asia. Key amongst these concerns are the fragmentation of critical habitats for endangered species and anticipated inequities regarding political representation, economic opportunities, and land rights for the area's local and indigenous residents. As Indonesia enacts its vision for a more sustainable and pros-

perous future, the question remains: what will this "forest city" really mean for Nusantara's local and indigenous communities and the forests that hold so much of their history, sources of livelihoods, and cultural identities?

Unearthing Borneo's Sonic Worlds

Within this context, our interdisciplinary research team of American, Indonesian, and Malaysian scientists (see our partners below) is working to inform sustained health and longevity of the region's ecosystems, and to support the rights and needs of the human and non-human communities who rely on them. Indonesia's capital relocation presents a unique opportunity to investigate wide-ranging and intersecting social-ecological change across Borneo's shared landscapes. In particular, we see soundscapes as a potent yet under-utilized avenue for elucidating and monitoring human-environment relationships.

An entire discipline – bioacoustics – is dedicated to studying sounds in nature. By deploying remote autonomous recording units (ARUs), bioacousticians monitor wildlife populations, identify biodiversity, and assess ecosystem health in marine, freshwater, and terrestrial environments worldwide. Beyond its ecological functions, sound also plays an essential role in shaping how people understand and experience space and place. Sounds can hold cultural meaning, represent environmental knowledge, and shape individual and community identities and practices. While ARUs can provide snapshots of sound events in space and time, people are living sensors, whose situated and embodied sensory knowledge can enrich and challenge our understanding of sound- and landscapes. By combining bioacoustics and

Our research team comprises partners from Cornell University (Drs. Holger Klinck, Director of the K. Lisa Yang Center for Conservation Bioacoustics, Shorna Allred, Professor, Departments of Natural Resources and Environment and Global Development; and Carol J. Pierce Colfer, Visiting Fellow, Southeast Asia Program), Universitas Mulawarman (Dr. Chandra Boer, Professor, Rustam Fahmy, Lecturer, and Dr. Emi Purwanti, Expert Assistant and Teaching Staff, Forestry Department, and Universiti Malaysia Sarawak (Drs. Poline Bala, Director of the Institute of Borneo Studies and Narayanan Ramaiyer, Director of the Institute of Social Informatics and Technological Innovations).



The authors and community research partners pause for a brief pre-lunch prayer next to a dock where eucalyptus logs are loaded for shipment down Balikpapan Bay to other islands in the archipelago (photo by Rizky Ramadani).

anthropology, thereby engaging soundscapes as perceived and experienced by local people, we hope to uncover previously unseen (and unheard) understandings of landscapes.

Unpacking the development of Nusantara and its impacts will require bringing together theories and methods from a range of disciplines in the social and natural sciences. By focusing on soundscapes, we hope to examine existing and emergent relationships among humans and nonhumans. Through the co-development of this research with communities, our long-term goal is to establish a longitudinal participatory monitoring program that centers communities' knowledge and expertise, allows Western and indigenous knowledges to co-mingle, and fosters more complete understandings of human-environment relationships.

Laying the Groundwork for Community-Led Soundscape Research

Since arriving in Indonesia in November 2022, we have focused our attentions and dedicated our efforts to

building relationships with research collaborators. One component of this has been connecting with the local civil society ecosystem, which has for decades advocated for environmental and social policy changes. Crucially, with our research partners in the Forestry Department at Universitas Mulawarman (UNMUL), we have sought to develop relationships with area communities at the frontiers of Nusantara's development. These communities' generosity of time and knowledge has provided an invaluable glimpse into the complex histories and overlapping drivers of social-ecological change that shape these landscapes.

Following multiple sweet-tea-fueled discussions and tours of their territories by land and water, we reached preliminary agreements to collaborate with Balikpapan communities whose customary lands lie within Nusantara's planned borders. These communities have, for decades, experienced increasing restrictions on their use of their ancestral territory as it has been absorbed into the national forest estate and partitioned out to logging and industrial

agriculture companies. They now face the possibility of permanent relocation that would sever their relationship to a landscape that holds generations of their history, culture, and sources of traditional livelihoods. Customary leaders have expressed their strong interest in studying local soundscapes and documenting their territory's history, value, and meaning. Combining participatory soundwalks and passive acoustic monitoring of community-selected sites that hold biocultural importance, together we will practice the art of listening to study shared sonic worlds.

Our work in East Kalimantan builds on a pilot study I (Wendy Erb) conducted with Lun Bawang communities in northern Sarawak last September. These communities possess rich and complex knowledge of their landscapes and share a strong desire to document and preserve their forests and culture for future generations. Working with community members, we uncovered myriad meanings behind the sounds of birds, insects, and other animals. One animal routinely mentioned was the gibbon – locally called *kelabet* – whose



Community research partner, Cikgu Sang, retrieves a Swift recorder from one of the recordings sites in Ba'Kelalan, Sarawak (photo by Wendy Erb).



Audio: Groups of northern grey gibbons (*Hylobates funereus*) sing great calls in a large tract of selectively logged forest in the highlands of Sarawak in the 'Heart of Borneo' (recording by Wendy Erb).



Wendy Erb (center) and community research partner Seliman Lakung (seated on her right) celebrate a successful program with the students (grades 4-6), teachers, and principal of the Long Semadoh elementary school (photo by Wong Kee Heng).

songs (reflected in the audio above) help them keep time, predict the day's weather, and identify humans nearby (which, in one story, reunited lost travelers who had been separated in the forest overnight) . As one Lun Bawang hunter explained,

"At the start of the morning, around 5:30 or so, the gibbon calls from the top of the mountain there. So that day, of course the weather will be sunny, that's a good day. Actually they know but we humans don't know unless we look at the sun, we look at the situation in the sky, then we know the weather is good. But these gibbons surely know first."

During my stay, we deployed ARUs in areas where there was interest in recording forest sounds. We then held

community listening sessions to review recordings, discussing local history, culture, and the names and meanings of a range of sounds. These experiences demonstrated that soundscapes can hold great interest and value for local and indigenous communities as a rich repository of place-based knowledge about human and more-than-human lives and entanglements – but we have only begun to scratch the surface. "It is worth passing down to younger generations," a Lun Bawang teacher reflected. "It's a traditional knowledge, I (Wendy Erb) would say. Even though we have the watch now, but it's good to know something that has been used by our ancestors."

Grounded in values of equity and sharing, our work emphasizes capacity-sharing not only in our research,

but through a broader range of activities that engage diverse audiences and participants. In Sarawak, I was generously invited by two village elementary schools to talk about bioacoustics and listen to the sounds of the surrounding forests. My community counterparts, in turn, shared with students the rich local knowledge those sounds held. I also equipped local leaders with research tools and training to record and analyze sounds of interest to support their ecotourism, education, and outreach efforts in their communities.

Since arriving in East Kalimantan, I (Wendy Erb) have also trained more than a dozen undergraduate students in the UNMUL Forestry Department. After just three days of introduction to the theory and methods of bioacoustics, students' capacity and enthusiasm



Above: The authors with UNMUL faculty partner, Rustam Fahmy (back row, third from right) conduct bioacoustics research training for undergraduate forestry students in UNMUL's Lempake Education Forest (photo by Ifal).

Right: The authors at "titik nol," the ground zero of Indonesia's new capital and future site of the president's palace situated in a vast eucalyptus plantation (photo by Wendy Erb).



Audio: Black hornbill (*Anthracoceros malayanus*) recorded in UNMUL's Lempake Education Forest, a 100-ha parcel of forest located on the edge of Samarinda city (recording by Wendy Erb).

for passive acoustic monitoring shone brightly. In fact, ideas are already percolating for multiple thesis projects for the recorders we deployed in the university's education forest – a small parcel on the city's edge where, in a 24-hour period, we recorded a surprising number of threatened species (listen to audio above) – and across the broader Nusantara landscape. Through the magic of Zoom, I'm also able to stay connected with a network of research teams across the archipelago – from Peninsular Malaysia to Papua. As one of the co-founders and mentors of the Yang Center's 'Bioacoustics Equipment, Training, and Mentorship Program,' I have the honor of learning with inspirational leaders from local universities and NGOs and supporting their efforts to establish exciting and impactful conservation research. Together, we are imagining and co-creating a more inclusive bioacoustics, where local people pursue culturally-appropriate solutions to conservation problems that they are uniquely positioned and qualified to solve.

When We Listen Together...

We see this collaboration as a rare and exciting opportunity to study how human and non-human communities exist, interact, and respond to rapid and wide-ranging social-ecological change. Learning with and from local communities, we hope to show how an inclusive, sound-based research praxis can lead to improved understandings of the connections among people, nature, and place. In documenting a long-term evidence base that braids Western and indigenous ways of knowing, this research seeks to honor and advance communities' capacity to advocate for their rights in the face of potential political and economic injustice.

We recognize the ambitious nature of this project and are not naive as to its challenges and inherent contradictions. As we build on our personal research histories with indigenous communities in Indonesia, this work challenges us to rethink methods, question assumptions, and confront biases as we cautiously and respectfully move this partnership forward. Through the practice of listening together, we make space for muted voices, work to restore



damaged and severed kinships, and unfurl knowledge over space and time.

Acknowledgements

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