T20 Policy Brief

G20 BRASIL 2024

T20 Brasil 2024 Let's rethink the world

Task Force 02

SUSTAINABLE CLIMATE ACTION AND INCLUSIVE JUST ENERGY TRANSITIONS

Nature-based Solutions - Fostering an Inclusive Approach to Technological Innovations by Marginalised Voices

Pyrou Chung, Director, Knowledge for Development (Thailand)

Dona Mathew, Research Associate, Digital Futures Lab (India)

TF02

Abstract

Leaders at COP28 emphasized the pivotal role of nature-based solutions (NbS) in addressing the climate crisis, highlighting its significance in establishing resilient food systems and preserving oceans. However, these discussions often neglect examinations of institutional power dynamics embedded in these agendas, leading to NbS without true free, prior, and informed consent agreements with communities. Integration of technological innovation into these conversations poses a genuine risk of NbS perpetuating exploitative practices if not thoughtfully implemented.

In this brief, we address the risks associated with technology-enabled NbS solutions, such as epistemic injustice and the commodification of nature. In the context of low and middle-income countries in Asia, the absence of strong human rights and regulatory frameworks on land tenure has led to displacement and fueled discrimination and oppression of Indigenous Peoples and marginalised resource-dependent communities. While technological solutions are hailed as a panacea in the pursuit of NbS, these will play out in the context of digital divides, driving the concentration of power in the hands of a few actors.

By unpacking the dynamics at play, we urge a nuanced understanding of technology's potential within the context of preserving and restoring our natural environment. The brief presents a set of recommendations for policymakers, advocating for a cautious approach in investing in these solutions, informed by self-determination and reciprocity.

Introduction

In recent years, **Nature-based Solutions (NbS)** have received renewed global attention. In the context of Asian countries, including members of the G20, threats to biodiversity make interest in NbS especially crucial. The Indo-China hotspot is one of the richest biodiverse regions in the world, yet the expansion of human activities is threatening its critical biodiversity. Urgent action is needed to address this biodiversity crisis and build climate resilience.

Technology is being leveraged to further NbS in Asia. This brief discusses this intersection and the risks and limitations of current technology-enabled approaches to NbS. We then recommend an approach underscored by the principles of self-determination and reciprocity.

Diagnosis of the Issue

The concept of NbS is synonymous with the environmental stewardship practices of Indigenous Peoples (IP). For generations, IP in Asia have sustainably managed their lands and natural resources through Traditional Ecological Knowledge (TEK). As the world faces escalating environmental challenges, there is growing recognition of the importance of integrating Indigenous wisdom with modern technology for climate action.

In March 2022, the United Nations Environment Assembly passed a resolution adopting a multilateral definition for NbS to conserve ecological systems, *"while simultaneously providing human well-being, ecosystem services and resilience and biodiversity benefits"* (UNEP, 2022).

Examples include initiatives for habitat restoration (Asian Development Bank, 2023), regenerative agriculture (Shakya, 2023), and forest carbon projects (Sarira et.al., 2022). While NbS approaches can address social inequalities, boost livelihoods, and promote climate resilience, technology adoption for NbS adds layers of complexity while raising questions around resource extraction and ethical applications.

There is a push for digital technology solutions and more environmental data on planetary scales—like Artificial Intelligence (AI) using big data, to analyze, track, monitor, model, and discern 'better' decisions in near real-time, with greater accuracy and objectivity (Nost and Goldstein, 2021). The proliferation of research and development (R&D) and large-scale investments into climate technological innovations is being accelerated by private sector actors, academics, philanthropies, and governments. This R&D is also supported by the United Nations Climate Technology Centre and Network (CTCN) which promotes technology-enabled NbS, including AI for climate action.

Data and technology have many applications for NbS, including monitoring and tracking (e.g., Global Forest Watch)[1], data analytics (e.g., Climate AI)[2], and digital twins for simulations (e.g., flood risk management). Remote sensing and drones are used to collect data on land use, forest cover, fires, and surface temperature (e.g. FIRESmart). AI

[1] Global Forest Watch uses timely satellite imagery and location data to track deforestation activities.

[2] Climate AI uses climate science and AI to analyze historical data, satellite imagery, and other factors to understand climate risks and encourage climate change adaptation.

and machine learning are used to analyse the data and identify patterns such as carbon storage capacity in forests (Purwar and Akhter, 2023).

A commonality of these NbS solutions is limited real-world interactions and context that contribute to the models—most importantly from IP and the global majority. This is highlighted by current NbS narratives that reflect colonial power imbalances. Although heralded as transformative by many, critics worry that NbS are deployed as a distraction and co-opted to continue unsustainable practices (Melanidis and Hagerman, 2022). Agendas and definitions are driven by organisations like United Nations agencies, while multilateral financial institutions—such as USAID and the EU—partner with large technology companies to steer investments in climate AI. This leads to investments in technologies that represent reductionist views rooted in empirical western science. Climate science applying this approach extracts environmental data and generates knowledge disconnected from social and environmental inequalities, thus perpetuating harms and profiting from the result (Nost and Colven, 2022). Dang's (2021) research to gather NbS data uses the Land Utilisation and Capability Indicator (LUCI) model to map climate parameters of the Vietnamese Mekong Delta, although the study utilises high resolution imagery, it acknowledges the lack of community engagement and local knowledge. The data is spatially and temporally bound, thus siloed with an inability to manage uncertainties and unexpected environmental changes. These types of expert 'climate data' models are abundant, and AI is a tool suggested to connect these NbS information repositories and allow for more intuitive machine learning methods to not only facilitate knowledge acquisitions but more efficiently and effectively design NbS approaches. TEK is often neglected, or worse, used to legitimize mainstream science and

thus enable practices that contribute to its elimination and potentially undermine land claims.

A significant amount of current NbS are carbon financing projects. Driven by nation-states' net zero commitments, current design and implementation patterns undermine the rights of impacted communities. For example, under Thailand's Voluntary Emissions Reduction Program, companies[3] have signed 99 agreements with communities. However, based on the authors' examination of the contracts, only 20% of the shares are allocated to the communities. It is unclear if communities had any input into the terms of the agreements.

Often funded by development agencies, NbS can be well-intended; however, in contexts where safeguards for human rights, rule of law, and democracy are weak, they can be abused by powerful actors to advance their agendas at the expense of the less powerful. For instance, the traditional conservation practice of demarcating lands into protection zones denies IP stewardship and access to natural resources, as occurred in Cambodia, where the Indigenous Chong peoples have called the Cardamom Mountains home for centuries. According to a Human Rights Watch report, the Ministry of Environment and Wildlife Alliance embarked on a REDD+ project without free, prior, and informed consent (FPIC), violating IP rights under international law. IP were prevented from farming on their land and jailed for collecting tree resin (Hofschneider, 2024).

[3] Including some of the largest fossil fuel companies in Thailand—PTT Public Company Limited, Thai Oil Public Company Limited, and Bangchak Corporation Public Company Limited.

The introduction of data-driven technologies can further exacerbate injustices in these vulnerable contexts, as technocentric approaches often reduce complex human-environment relationships in ways that fail to account for social relations and power dynamics (Nost and Colven, 2022).

- **Epistemic injustice and capture of means of knowledge production**

The knowledge systems that data-driven technologies create often displace or misappropriate TEK. The CTCN notes that: *"technology and education on NbS are limited due to the significant lack of previous practical implementation and scientific evaluation"* (Lee and Song, 2024). Such statements are indicative of the perceived tension between 'rational scientific knowledge' and TEK. Even if the concept of NbS emerges from IP traditional practices, the primacy accorded to empirical scientific evidence relegates these practices to an inferior status—at least until some financial value is extracted from it.

Remote sensing modeling divides ecosystems into slices that are amenable to data processing and analysis, universally comparable and exchangeable (Gabrys et.al., 2022). Analysing satellite imagery using GIS relies on expert-driven knowledge, yet technicians that define forest classifications and algorithms are often far removed from the lived experiences of forest inhabitants. Thus, remote observation tools and models have the potential to promote dominant western siloed definitions of forests, defining values and interpretations of forest dynamics disjointed from IP world views (Gabrys et.al., 2022). For instance, in Nagaland, India, carbon datafication projects led to the valuation of Tropical Moist Deciduous Forests and Tropical Mountain zones, ascribing higher

economic value to the latter—a distinction that did not exist in Indigenous perspectives (Pongen, 2023).

The reappropriation of IP knowledge into data ecosystems is leading to epistemic harms, while NbS narratives legitimize these approaches as socially and environmentally equitable and inclusive. Additionally, climate AI narratives are quick to affirm objectivity, but data is never unbiased and climate models inevitably reflect the makers' values (Nost and Goldstein, 2021).

- **Commodification of nature**

At the heart of NbS is the commodification of environmental systems through carbon financing mechanisms aimed at offsetting emissions through unregulated voluntary markets. Reducing nature to economic terms oversimplifies our understanding of natural resources, allows private interests to determine what deserves to be exploited and to what extent, and shapes political decisions impacting citizens' rights like access to public forests (Ruiz, 2024). Narrowly defined solutions can disrupt local livelihoods, traditional knowledge, and ways of living, leading to "nature-enabled dispossession" (Miller and Taylor, 2024; Anguelovski and Corbera, 2022). Although big data and machine learning can play a significant role in natural resource management, and carbon capture and storage, it must contextualise inferences and insights with the needs and lived experiences of impacted communities.

Compounding this issue, the monetary returns of natural commodification is not equitably shared with communities (Dev, 2023). In the context of pervasive digital divides coupled with weak environmental human rights frameworks across Asia (Lei,

2024), the technological leanings of NbS narratives raise questions as to whether benefits from adopting these solutions will be fairly distributed.

- **Risk of misuse without adequate safeguards**

Digital environmental data sourced from electronic tags, online scientific publications, and "citizen science" databases are susceptible to misuse by poachers and illegal collectors (Welz, 2017). Moreover, as in Thailand and Cambodia, data from these initiatives are often used against Indigenous communities to exclude them from revenue and access to natural resources.

- **Perpetuating technology dependencies**

Transfer of climate adaptive technology and expertise from developed to less developed countries are promoted for NbS initiatives. These top-down processes can further entrench inequalities and make receivers of the technology dependent on developed countries for maintenance and operational costs, which often do not account for resource consumption and carbon footprint (Knapp and Ohnsman, 2023). Dependency on top-down technologies, which often are not contextualized, can represent a form of digital colonialism, whereby technology firms colonize less developed countries and these citizens become the backbone of their data empires. In this scenario, the global majority often has little to no involvement in climate AI technology governance structures or in deciding outcomes.

Recommendations

Digital technology can generate social and environmental harms when designed, governed, and driven by decisions based on blackbox scenarios. They are physical and material infrastructures created from extractive practices that can do as much harm as good to broader environments and further human rights violations (Gabrys et.al., 2022).

To ensure that NbS technologies uphold environmental protection and safeguard IP rights, we propose the following recommendations for policy makers:

- **Self-determination:** Uphold Indigenous rights to self-determination and allow for legitimised access to land rights. In this way, Indigenous ways of knowing the environment would be integrated and respected within NbS.
- **Data sovereignty:** Establish robust data governance frameworks that prioritize Indigenous control over data collection, ownership, and use, while safeguarding against data exploitation, unauthorized access, and privacy violations. Existing models like the Asian Indigenous Knowledge and Data Sovereignty (IKDS) Framework offer blueprints for mainstreaming IDS-related concerns and challenges into decision-making processes that feed climate AI systems.
- **FPIC:** Governments, corporations, and NGOs should respect the principle of FPIC as a fundamental safeguard for Indigenous rights and require meaningful consultation and consent from IP communities, supporting their rights and agency to affect change before implementing technology-enabled NbS that impact their lives and livelihoods.
- **Inclusive and participatory engagement:** IP and resource-dependent communities should be equal partners in the design, development, and implementation of technology-enabled NbS. This can create solutions that are

culturally sensitive, locally relevant, and led by IP knowledge and world views. Technology design, content, and user interfaces should adapt to Indigenous languages, cultural norms, and TEK, and promote respect, responsibility, and reciprocity. Governments should establish mechanisms for meaningful engagement, dialogue, and collaboration with Indigenous representatives throughout the decision-making lifecycle.

- **Governance structures for decision-making processes:** Greater transparency around the decision-making processes derived from climate AI systems is needed. This requires the ability to access and understand algorithms and datasets to reproduce results, ensuring accountability among all stakeholders. Accessible and transparent mechanisms for resolving conflicts, addressing grievances, and seeking redress for violations of Indigenous rights in the context of technology-enabled NbS must be established.
- **Education and training for stakeholders:** Training and capacity building of policy makers, developers, and investors to build interdisciplinary understanding of TEK and IP world views is needed to allow sustainable and responsible engagement with these ancient knowledge systems.

Scenario of Outcomes

If stakeholders implement recommendations for greater representation and inclusion of IP, it could shift power imbalances that govern modalities for NbS.

Project: Indigenous Peoples NbS for forest conservation

Background: *The government seeks to reduce carbon levels per their national action plans. They need to protect 1,000 ha of land to maintain enough viable standing forest to sequester the required amount of carbon. Resident IP protect the land and derive their livelihoods from it. The government, having recognised the IPs' self-determination and rights to designated territories that meet offset criteria, approach the communities to learn about needed resources, training, and partnership support.*

Months-long consultations take place. Potential benefits and limitations of each NbS approach are discussed along with the risks the project poses. There are tensions between the stakeholders who each have their objectives. Ultimately, the government pushes for development, with IP leading the directives, and supports them with resources to execute the initiative. The support mechanisms contribute to their ability to direct technology development alongside existing traditional conservation practices that meet local livelihoods needs while maintaining innovation that is respectful of IDS and upholds TEK.

Implementing interdisciplinary approaches to co-creation of technology and education that promotes tech for good rather than commodification of data for scaling data economies isn't easy. It's costly and requires investments into equalizing resources and

capacities. To sustainably implement and enforce these approaches, new legal and legislative frameworks are required that promote decentralized governance for greater human rights protections, including digital transformation regulations and traditional conservation frameworks—a long and laborious process that is not guaranteed due to political shifts.

The benefit of the suggested framework would be a trajectory towards more sustainable NbS solutions that would alleviate climate change, improve human wellbeing, and provide for equitable economic and social development.

Acknowledgements

We thank the East West Management Institute and Digital Futures Lab, for providing the time and resources required to complete this policy brief. Our special thanks to Chelsea Newhouse (EWMI) for editorial support and the T20 Task Force 2 reviewers for their helpful feedback.

References

Anguelovski, Isabelle and Esteve Corbera. 2023. “Integrating justice in Nature-Based Solutions to avoid nature-enabled dispossession.” *Ambio 52*, 45–53.

Asian Development Bank. 2023. *How Nature-Based Solutions Can Help Fight Climate Change.* March 22. Accessed March 31, 2024. https://www.adb.org/news/features/how-nature-based-solutions-can-help-fight-climate-change.

Dang, N.A. et.al. 2021. “Ecosystem Service Modelling to Support Nature-Based Flood Water Management in the Vietnamese Mekong River Delta.” *Sustainability 13*(24), 13549.

Dev, Trishant. 2023. *Discredited: The Voluntary Carbon MarketCarbon Market in India.* October 6. Accessed March 31, 2024. https://www.cseindia.org/discredited-the-voluntary-carbon-market-in-india-11885.

Gabrys, Jennifer, et.al. 2022. "Reworking the political in digital forests: The cosmopolitics of socio-technical worlds." *Progress in Environmental Geography* 58-83.

Hofschneider, Anita. 2024. *New report slams carbon offset project in Cambodia for violating Indigenous rights.* March 13. Accessed March 31, 2024. https://grist.org/equity/carbon-offset-project-cambodia-slammed-by-human-rights-watch/.

Knapp, Alex, and Alan Ohnsman. 2023. *Current Climate: Big Tech’s Massive Carbon Footprint.* April 3. Accessed March 31, 2024. https://www.forbes.com/sites/alanohnsman/2023/03/04/current-climate-big-techs-massive-carbon-footprint/?sh=3cb6ea2d4e1d.

Lee, Woo-Jin, and Jaeryoung Song. 2024. "Innovative strategy for enhancing nature-based solutions during climate technology transfer process." *International Journal of Engineering Business Management.*

Lei, Liang. 2024. *As Asean environmental rights draft takes shape, advocates fear weakened safeguards.* March 28. Accessed March 31, 2024. https://www.eco-business.com/news/as-asean-environmental-rights-draft-takes-shape-advocates-fear-weakened-safeguards/.

Melanidis, Marina Stavroula, and Shannon Hagerman. 2022. "Competing narratives of nature-based solutions: Leveraging the power of nature or dangerous distraction?" *Environmental Science & Policy,* 273-281.

Miller, Michelle Anne, and David Taylor. 2024. "A transboundary agenda for nature-based solutions across sectors, scales and disciplines: Insights from carbon projects in Southeast Asia." *Ambio 53*, 534–551.

Nost, Eric, and Emma Colven. 2022. "Earth for AI: A Political Ecology of Data-Driven Climate Initiatives." *Geoforum,* 23-34.

Nost, Eric, and Jenny Elaine Goldstein. 2021. "A political ecology of data." *Environment and Planning E: Nature and Space,* 3-17.

Pongen, Osensang. 2023. "Reconceptualizing carbon datafication through indigeneity." *Digital Geography and Society.*

Purwar, Abhilasha, and Zoya Akhter. 2023. *Enabling Nature-based Solutions in Global South with AI.* March 30. Accessed March 31, 2024. https://blueskyhq.io/blog/enabling-nature-based-solutions-in-global-south-with-satellite-data-and-ai.

Ruiz, Ingrid Campo. 2024. *Controlling the environment with Artificial Intelligence risks intensifying social inequalities and colonization [version 1; peer review: 2 approved*

with reservations]. Accessed March 31, 2024. https://open-research-europe.ec.europa.eu/articles/4-16.

Sarira, Tasya Vadya, Yiwen Zeng, Rachel Neugarten, Rebecca Chaplin-Kramer, and Lian Pin Koh. 2022. "Co-benefits of forest carbon projects in Southeast Asia." *Nature Sustainability,* 393-396.

Shakya, Bandana. 2023. *Nature-based solutions essential for future of the Himalayas.* January 5. Accessed March 31, 2024. https://www.thethirdpole.net/en/nature/opinion-nature-based-solutions-essential-for-future-of-the-himalayas/.

UNEP. 2022. "United Nations Environment Assembly." *Resolution adopted by the United Nations Environment Assembly on 2 March 2022.* March 7. Accessed March 31, 2024. https://wedocs.unep.org/bitstream/handle/20.500.11822/39864/NATURE-BASED%20SOLUTIONS%20FOR%20SUPPORTING%20SUSTAINABLE%20DEVELOPMENT.%20English.pdf?sequence=1&isAllowed=y.

Welz, Adam. 2017. *Unnatural Surveillance: How Online Data Is Putting Species at Risk* . September 6. Accessed March 31, 2024. https://e360.yale.edu/features/unnatural-surveillance-how-online-data-is-putting-species-at-risk.

G20 BRASIL 2024
BUILDING A JUST WORLD AND A SUSTAINABLE PLANET

T20 Brasil 2024
Let's rethink the world

Let's rethink the world

CEBRI Rethink Tank

FUNDAÇÃO ALEXANDRE DE GUSMÃO

ipea
Instituto de Pesquisa Econômica Aplicada