From nickel mining to carbon trading: Growing threats and resistance struggles of mangrove communities in Indonesia

The concept of sustainable development created in 1987 is based on the idea that development could meet human needs without compromising future generations' ability to meet theirs. However, the past 40 years has revealed its anthropocentric and capitalist character. Moreover, capitalism and its constant need to expand has led to much more destruction. This has been the case in Indonesia with an economy based on the extractivism model, compromising the future of numerous grassroots communities.

Over the past few years, extractivism has particularly advanced towards coastal areas, the oceans and small islands in the archipelago. The main threats for these vulnerable areas include mining of nickel, rare earth minerals, iron sand and tin; building smelters for processing minerals and metals; building new export-oriented ports; expansion of the 'energy' industry with (gas and) steam power plants, hydroelectric and geothermal power plants; building of more infrastructure including toll roads; creation of 'new land' or grabbing islands through reklamasi plans, which means appropriation of space for private and public interests and benefits like corporate-led tourism; building of a giant 'sea wall' along the Northern coast of Java; and the aquaculture industry for large-scale fish and shrimp farming. Many, if not all of these projects are earmarked as 'economic' and ´sustainable development´ and some, more recently, as contributing to ´clean energy´ such as nickel mining for electric vehicle batteries.

These developments have significantly reduced the mangrove area in Indonesia, sacrificing livelihoods of traditional fishing communities. These communities are facing yet another threat: the current push of mangrove forest carbon projects, supposedly to restore mangrove forest already lost or heavily degraded.

Mangrove Forests in Indonesia

In 2020, according to Global Mangrove Watch (GMW), Indonesia had 3,092,376 hectares of mangrove forests, which represents 21 percent of the total area of mangroves worldwide. Southeast Asia is the region with most mangrove forest (33,6 percent) globally, followed by West and Central Africa (15,5 percent), North and Central America and the Carribean (14,4 percent), and South America (13,2 percent).

In many ways, life and livelihoods of coastal communities in Indonesia are interwoven with mangrove forests, ensuring food, medicine, building materials and other benefits. This is particularly the case for women. Their burden disproportionally increases when mangrove gets destroyed, one important reason that women are most often at the forefront of both resistance struggles against the grabbing of coastal areas, as well as efforts to restore mangrove forests. (1)

Mangroves play a very important role in protecting coastal areas against the effects of climate change. One example is the 2004 tsunami that hit Southeast Asia. In the location of Simeulue, Aceh

in Indonesia and in Southern Thailand, residents were spared thanks to the presence of mangrove forests, proven to be a natural barrier effectively reducing tsunami waves. (2). The role of mangroves in protecting fishing communities also became evident in September 2018 when a tsunami hit Palu Bay, Central Sulawesi. (3)

Nevertheless, mangrove forests are still not fully recognized, let alone the rights of the communities that live with mangroves. While the Indonesian National Mangrove Map states that mangrove is present in all 38 provinces, from the 28 provincial governments that have adopted regulations about zonation of coastal areas, only 12 recognize the existence of mangrove forests, a total of 60,670 hectares. Meanwhile, the remaining 16 provinces do not even mention mangroves, putting these even more at risk. (4)

The threats of extractive industries: nickel mining

In Indonesia, destruction of mangrove forests is mainly due to expanding large-scale aquaculture and agriculture, such as industrial oil palm (5); infrastructure development; and mineral and metal mining and extraction, all with the full support of the government. What stands out is the extreme fast increase in nickel mining in the past few years.

Extractive industries have a long history of degrading and destroying mangrove forests. For instance, Indonesia´s off-shore oil extraction. During the oil spill in Balikpapan Bay in 2018 in East Kalimantan, oil, carried by the ebb and flow of the tide, accumulated on mangrove roots causing death of countless mangrove trees. Mangrove roots are extremely sensitive to oil deposits, and it is a hardly impossible task for communities to rehabilitate such contaminated mangrove areas.

Nowadays, nickel mining, concentrated in the Eastern part of Indonesia, has become a threat for fisher communities. Indonesia has become the world's leading nickel producer, in only a few years' time. While in 2020, the country contributed with 30,72 percent of the global production, in 2024, it already supplied more than half of it: 62,26 percent. (6) The devastating impacts such as clearing of mangrove forests and the contamination of water with toxic materials, are not limited to mining activities only, but are even more severe due the related infrastructure development and facilities such as the construction of smelters for processing and refining raw mineral, that produce similar impacts. (7)

The government itself is further pushing the large-scale destruction due to its so-called ´hilirisasi´ policy. This policy intends to stimulate domestic processing of raw materials extracted in the country with the argument to add value inside the country, such as the building of smelters in the case of nickel mining. (8)

The threat of mangrove forest carbon projects.

The fact Indonesia accounts for 21 percent of the world's total mangrove area gives its government a special responsibility to lead the struggle to conserve mangroves and also to restore what has been destroyed, the latter a direct result of its own policies. But as aforementioned, the current trend is a continuation and intensification of massive land and ocean grabbing in the benefit of business interests.

But nevertheless, in recent years, an increased push by public and private actors for mangrove conservation is happening, in particular in Sumatra, Kalimantan and Sulawesi. These actors claim that their ´mangrove carbon´ projects and programmes will help to restore destroyed and degraded

mangrove. But rather than a genuine concern about that and about mangrove-dependent communities, what seems to drive these actors is the business opportunity of carbon trading based on mangrove forests. In fact, they emphasize in their documents and statements the extraordinary carbon storage capacity of mangrove forests, according to studies several times bigger compared with land-based forests.

This growing trend of carbon initiatives in mangrove forest ignores the complete failure of almost 20 years of experience with forest carbon offsetting through so-called REDD programs and projects (9), in terms of mitigating climate change. Companies buying carbon credits from REDD projects continue burning fossil fuels further accelerating climate change. Besides, REDD projects have never tackled the underlying causes of deforestation and plagued by scandals of fraudulent carbon calculations and overestimating the so-called carbon benefits.

But forest carbon projects have not been a failure for all. They provide a cheap way for polluting companies to claim ´carbon neutrality´, and big NGOs, governments, consultancy and carbon companies are making money from the carbon business. The Indonesian government, for instance, had a USD 419 million-dollar loan from the World Bank approved in 2022 in support of its plan to restore 600 thousand hectares of mangrove forest in Indonesia, focusing on four provinces: Riau, North Sumatra, East and North Kalimantan. (10) A significant part of the project documents is dedicated to carbon calculations. The Indonesian Ministry of Environment itself states that rehabilitating mangroves is an opportunity for carbon offset initiatives and trading. (11)

In East Kalimantan, the World Bank program wants to restore 15,000 hectares of mangrove. In 2025, WRM talked with one fishpond farmer (12) in Kutai Kartanegara district who worked for the project. In 2023, he and other villagers accepted to collaborate, hoping their declining fish production would improve. The main activity was planting one type of tree – rizophora – to create a so-called silvofishery system in the fish ponds. He received some financial support to plant and maintain the trees during 3 years.

The fishpond farmer made critical remarks about the World Bank project. First, he complains it is a top-down project. For instance, villagers were not consulted about the project activities. He stated he would have proposed another method to restore the mangrove forest, based on his concern about the need to restore the buffer function of the mangrove because of the water contamination by extractive industries, in particular from oil extraction and coal transported on the near-by river and sea. He would also plant more types of trees, not just one, and, mentioned that many trees died due to a disease.

The dying of mangrove trees planted is also what apparently happened in one of the first voluntary private carbon projects in mangrove forest in Indonesia: the Livelihoods Fund Project, located on the east coast of Aceh and North Sumatra provinces. This project claims it has rebuilt a natural mangrove barrier of 5,000 hectares by planting 18 million mangrove tree seedlings in the period 2011-2014. (13) Developed by the Yagasu Foundation, what calls attention in the project´s propaganda beyond catchphrases, such as '20,000 people impacted', is the probable overestimation of carbon credits that the project has generated. A comparison of satellite images from 2009 and 2024 from more than 450 'planting plots' of the project, showed that less than 30 percent of the project area had mangrove trees in 2024. (14)

While facing the impacts of fossil oil extraction and the current wave of mangrove forest carbon projects, Indonesian coastal communities are also among those bearing the heaviest burden of climate change. Examples are reduced fishing periods and the increasing trend of natural disasters.

(15) What´s worse, mangrove forest carbon projects do little to help mitigating climate change, when companies supporting the project, use that in their claims to become ´carbon neutral´ while they continue burning fossil oil, emitting more carbon dioxide to the atmosphere. Even worse when the trees planted to store carbon die. (16)

The experience of the Tiwoho community: growing mangroves without planting.

The village of Tiwoho is located in Bunaken National Marine Park, North Sulawesi Province. Mangrove in this area was destroyed in 1991 for commercial shrimp ponds. The Land Reclamation Agency (BRLKT) – an entity under the authority of the Ministry of Forestry at that time – facilitated the clearing of about 20 hectares of mangrove, despite the fact the area was supposed to be conserved due to its high level of biodiversity. (17)

But the company only operated the aquaculture facility for six months when it went bankrupt. It abandoned the shrimp farm infrastructure, leaving a degraded waterscape behind of dike walls built that had interrupted the natural connection between land and sea, allowing for tidal flushing.

Between 1995 and 2004, the Ministry of Forestry tried to reforest the 20-hectare abandoned pond area. Its approach was a classic example of conventional silviculture with 6 to 7 separate planting efforts during a 9-year period. The root cause of the failure was neglecting the importance of the tidal flushing, with no effort whatsoever to solve this by breaking the dikes or repair the clogged drainage system.

A turning point happened in October 2003. when villagers collectively descended upon the mudflats of the post-shrimp farm ecosystem. (18) First, they destroyed the dikes that blocked seawater circulation in the area. As a result, ocean waves periodically washed over the land, bringing in mangrove seeds and seedlings, dissolved nutrients, and suspended sediment material essential for land accretion. Second, they rehabilitated the drainage canals built before to drain the pond, to restore the natural water retention time in the area to prevent the ecological system from experiencing extreme drought during the lowest tidal cycle (neap tide).

Then, a network of small, winding waterways that simulate a natural estuary was excavated. This network of channels distributes the water flow to the landward zone. After that, the pond itself was refilled with water to facilitate mangrove colonisation by, while preventing saplings from sinking below a certain water level at high tide. (19). Besides, the community people agreed to periodically replant coastal mangrove propagules they happen to collect when scattering across the mangrove forest ‘floor’.

As a result, hundreds of families in Tiwoho Village can harvest now shallow marine fisheries such as crabs, obtain materials for herbal medicines. They also turned the recovered mangrove area into a centre for eco-tourism (KGK).

The Kinamang community experience: restoring sovereignty through restoring coral reef and mangrove

For the fisher people of Kinamang Village, Manado, in North Sulawesi, planting mangroves is much more than a matter of conservation, it is their means for survival. Amidst the onslaught of development that gradually grabbed and destroyed coral reefs and their fishing grounds, the community resisted, restoring their living space.

Their experience of community restoration starts in 2019, when the government planned to build a coastal protection infrastructure to ‘break’ fierce waves before they reach the coastline. But the community protested because the infrastructure threatened to displace their boat moorings. The residents put pressure to the government to move the infrastructure further away into the sea.

Their strategy worked and the government built the ´breakwater´ further into the sea. As a result, a 'calm' water area got created between the ´breakwater´ and the coast. Besides ensuring a safe zone for mooring their boats, the Kinamang community through the Kinamang Coastal Fisher people forum discussed and organized a two-fold strategy (20). First, they ‘engaged with the sea’ by restoring coral reefs creating a ´front line´, realizing that coral is the ´home´ for fish, the backbone of their economy. By restoring the reefs, the fish species, many of which had been lost, ‘returned home’, and people also realized they were also indireclty reclaiming their traditional fishing grounds. Then secondly, the Kinamang community ‘engaged with the sea shore’, the land just behind the coral reefs. They restored mangrove forest by planting deep-rooted mangrove species as a shield against erosion.

Although more than once storms destroyed the reef structures and tidal waves swept away the young mangrove seedlings, giving up was not an option for the people of Kinamang. They invented and built additional protective structures to give the mangroves and corals time to grow and take root on the seabed. After six years, the efforts finally paid off. The initially fragile mangroves transformed into a lush, sturdy green belt. The intertwining roots were securing and reinforcing Kinamang’s sovereignty against the threats of erosion and encroachment. And beneath the sea, coral reefs thrive, weaving again together in a once destroyed living space but now inviting various marine species to return home.

Pari Island: women at the forefront in a struggle for climate justice and mangrove conservation

The villagers of Pari Island, North of Indonesian´s capital Jakarta, are among the four million people in Indonesia increasingly facing flooding, in particular resulting from rising sea levels due to climate change. That is why in 2022, four villagers took legal action against one of the major emitters of carbon dioxide in the world and hence a major responsible for the increasing floods the community is facing: the Swiss-based Holcim cement corporation. (21) In December, 2025, in an unprecedent decision, a Swiss court declared the case admissible, clearing the way for an assessment of the merits. (22)

Along with the flooding, the villagers of Pari have been facing over the years many other threats including sand mining and ´reklamasi´ projects, heavily affecting the island and its mangrove forests. The last in 2015, when most of their island was privatized for corporate-led tourism by a company called PT Bumi Pari Asri, a subsidiary of the Bumi Raya Utama group. As a result, the community has been facing violence, criminalization and imprisonment.

What calls attention, in Pari and many communities in Indonesia is that women have been at the forefront of resistance. Part of that resistance is replanting mangrove and seaweed according to their traditional conservation practices transforming the area into a new ‘eco-tourism’ site on Pari Island called ‘Pantai Rengge’ as a tribute to their friend Rengge. (23). Every Friday afternoon, the women of Pari Island collectively go to the plots where they cultivate vegetables, then they will clean the beach, and plant new mangrove seedlings. The revenue from the vegetable harvest and ecotourism activities are equally distributed among every member of the Women of Pari Island group. One of the women expressed what they want like this: “We fisher women do not expect anything fancy, or

anything branded. We just want to live here as coastal people, as Island people, in harmony with the sea and entire eco-system". (24)

National Secretariat of the People's Coalition for Fisheries Justice (KIARA) and WRM International Secretariat

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(13) Livelihoods. INDONESIA: mangroves revitalizing coastal villages with fishery & new businesses

(14) This analysis was made by WRM

(15) WRM, 2019. Indonesia: Fate of Fishing Villages in the Climate Crisis and the Failure of 'Blue Carbon'

(16) With also mangrove forest carbon projects in Senegal and India, the following companies have used the project for their ´carbon-neutral´ claims: agribusiness Danone; French multinational Schneider Electric; French bank group Credit Agricole; French luxury goods manufacturer Hermès International; French travel group Voyageurs du Monde; French postal service company La Poste Group; tire manufacturer Michelin; fragrance and flavors company Firmenich; French public financial institution Caisse des dépôts et consignations and German software and technology company SAP. WRM, 2019. Indonesia: Fate of Fishing Villages in the Climate Crisis and the Failure of 'Blue Carbon'

(17) The dynamics of mangrove forests in relation to die-back and human use in Bunaken National Park, North Sulawesi, Indonesia - UQ eSpace - The University of Queensland

(18) It was when the methodology was changed. The local community´s knowledge of mangroves and coastal management, based on local wisdom, was combined with the knowledge of scientists committed with the community, using the principles of Ecological Mangrove Rehabilitation (EMR), including Sam Ratulangi University (UNSRAT), non-governmental organisations including the Kelola Foundation, Mangrove Action Project (MAP) - Indonesia, and Blue Forests; and ecologists such as Ben Brown and Rignolda Djamaluddin, and restoration specialist R.R. Lewis.

(19) Blue Restoration – Building Confidence and Overcoming Barriers Frontiers.

(20) The community received support from the KELOLA foundation and others, emphasizing

Rignolda Djamaluddin´s contribution, strongly defending that sea is not something separated from people but part of peoples ´home´, their ´front yard´, and restoring nature is synonymous with upholding people's sovereignty.

(21) Struggling to Stay Afloat: The People of Pari Island, Indonesia, against Injustice

(22) Swiss court accepts climate lawsuit against Holcim

(23) Who encouraged and supported them to start the experience

(24) Land Right Now. Save Pulau Pari!