September 2025

MANGROVE BREAKTHROUGH

GLOBAL MANGROVE ALLIANCE

Mobilizing the Mangrove Breakthrough in Indonesia

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This Country Summary forms part of the Mobilizing the Mangrove Breakthrough in Asia Regional Report. It highlights country-specific enabling conditions, policies, finance mechanisms, and opportunities for mangrove action in Indonesia.

For regional priorities, shared challenges, and the wider context of Mangrove Breakthrough goals, see the corresponding **Regional Report for Asia.**

Authors
Rita Lindayati (Lestari), Mark Beeston (Conservation International), Apri Susanto (Wetlands International Indonesia), Joni trio Wibowo (WI Indonesia), Susan Lusiana (Konservasi Indonesia), Aji Anggoro (YKAN), Irene Kingma, editor (Wetlands International), Virni Budi Arifanti (National Research and Innovation Agency).

Design
Maps created and provided by Lammert Hilarides. Report designed and produced by Lauren Bloom.

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Woman with brushwood from mangroves
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Table of Contents

Key Messages

- **20% of the worlds remaining mangroves** are found in Indonesia with 12 of the 40 global locations most critical for mangroves also located there.
- Government ambition to **protect, restore and rehabilitate mangroves** is high, with multiple policy instruments developed over the last five years. This includes a pragmatic step by step approach to **develop a nationally regulated blue carbon market.**
- To finance the governments ambitious plan a large influx of capital is needed as **less than 20% of the funds needed are secured at this time.**
- The Indonesian Government has not individually endorsed the Mangrove Breakthrough, but **has a leadership role in Mangrove Breakthrough partner** the Mangrove Alliance for Climate.
- Global recognition of the **importance of Indonesia's mangroves** has created a crowded conservation and carbon space which is difficult to disentangle and navigate. Many actors present conflicting goals, narratives or solutions. **Coordination is required for action at speed and scale.**
- Organizations aiming to support mangrove conservation and restoration in Indonesia should consider that **supporting training, communications, and capacity building in mangrove-friendly alternative incomes** may have more impact than sponsoring a restoration site.
- The **physical geography, remote locations of mangrove areas and variable socioeconomic contexts of Indonesia** are a significant challenge to communicating and implementing mangrove related policies.
- The need to shift aquaculture and palm oil production to **nature positive approaches,** combined with mangrove restoration for coastal protection presents multiple opportunities for investment in more resilient and climate friendly production models.
- With the **largest mangrove area of any country in the world,** realizing the Mangrove Breakthrough goals in Indonesia would have a huge impact both regionally and globally.

1. Introduction

The Mahakam Delta in East Kalimantan
© MsLightBox / iStock

An archipelago of over 17,500 islands with a coastline extending approximately 108,000 kilometres, Indonesia is home to the largest and most diverse mangrove ecosystem on the planet.

Spanning 29,500km^2 or 2.95 million hectares[1], they constitute more than 20% of the world's remaining mangroves[2] with the largest concentrations found in Papua (49%), Kalimantan (20%), and Sumatra (18%), where they are relatively intact compared to the severely degraded mangroves in densely populated regions such as Java and Bali[3].

For a nation of islands, mangroves provide essential services, including coastal protection, carbon sequestration, livelihoods, and support for fisheries and other coastal and marine life, all of which directly contribute to social, economic, and environmental well-being.

20%
of the world's mangroves exist within the Indonesian archipelago

They are a key part of Indonesia's sustainable development, climate change adaptation and mitigation, and biodiversity conservation goals.

Indonesia's economic development has long been intertwined with the utilization of its extensive marine and coastal resources, including mangroves. These ecosystems have historically supported key industries such as capture fisheries, aquaculture, and tourism, generating significant export revenues and community livelihoods. However, conversion of mangrove areas for agriculture, forestry plantations, industrial activities, and urban expansion has come at a considerable ecological cost. Widespread mangrove deforestation and degradation have severely undermined these ecosystems' ability to provide services, threatening not only their ecological integrity but also the substantial economic and social benefits they offer to local communities, the nation, and the global environment. Resolving the joint need for economic growth and the sustainable management of these carbon-rich ecosystems is a key challenge.

18,000 hectares
of Indonesia's mangroves are degraded, with 52,000 hectares lost annually

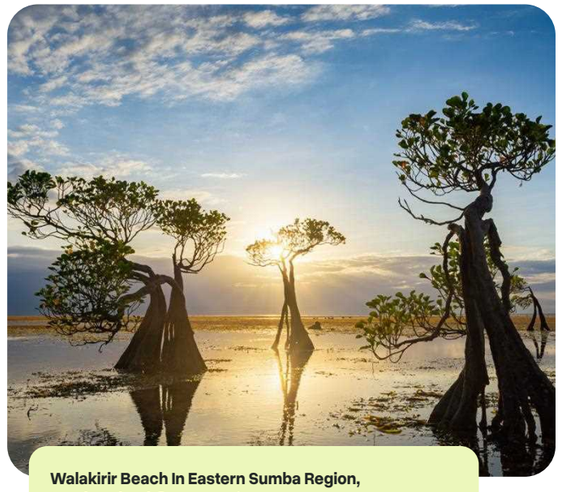
More than half of Indonesia's mangrove forests—approximately 1.8 million hectares—are already degraded, with 52,000 hectares lost annually from 1980-2005[2]. This deforestation leads to the release of approximately 190 million metric tons of carbon dioxide (CO_2) annually, representing about 20% of Indonesia's land-use emissions[4]. Recent estimate of mangrove deforestation rate in Indonesia from 2009-2019 indicate a lower number of 18,209 ha yr-1 with estimated annual CO_2 emissions of 1,434,874 CO_2e[5].

Drivers of mangrove deforestation and degradation vary across regions. In Java, Sulawesi, and parts of Kalimantan, mangroves are predominantly cleared for fisheries and aquaculture. In western regions like Sumatra and other areas of Kalimantan, they are mainly converted for oil palm and pulpwood plantations[2]. Aquaculture and plantations account for nearly 50% and 15% of mangrove deforestation, respectively[6].

Industrial and domestic pollution exacerbate mangrove degradation, while infrastructure projects disrupt hydrological systems essential for their survival. Climate change further amplifies these challenges, with rising sea levels, increasingly frequent and severe storms, and temperature fluctuations placing additional stress on already vulnerable ecosystems. These combined threats jeopardize the critical roles mangroves play in providing ecosystem services, highlighting the urgent need for sustainable management, conservation, and restoration efforts. Over the past 30 years, more than 800,000 hectares have been lost to aquaculture, oil palm plantations, and other land uses[7].

MANGROVE ALLIANCE FOR CLIMATE

At UNFCC CoP27 the United Arab Emirates and Indonesia launched the **Mangrove Alliance for Climate (MAC)** to support, enhance, and expand mangrove forests globally as a nature-based solution against climate change. MAC follows a voluntary approach, with the members determining their own commitments towards restoring mangrove forests, promoting multilateral cooperation, and sharing knowledge. In 2024 the MAC signed a formal partnership with the Mangrove Breakthrough.



Walakirir Beach In Eastern Sumba Region, Sumba Island © Wirestock

Challenges for effective mangrove conservation and restoration

17,500
islands
make Indonesia a uniquely complex setting for implementing effective mangrove sustainability efforts

Knowledge, awareness, and capacity-building on mangrove sustainability are critical to policymaker and stakeholder decision-making, the success of conservation and rehabilitation efforts, and the uptake of sustainable practices. This is especially true in Indonesia, with more than 17,500 islands, 38 provinces and 700 languages. Government awareness is increasing, and ministries have been including mangroves in national policy.

However, at local and provincial levels, this awareness may be lacking, which can lead to conflicts between development priorities and mangrove protection. It also leads to difficulty in implementing national plans, including how restoration goals are implemented and reported.

There are also challenges to effectively disseminating information on updated best practices in multiple languages or providing specialized training for local staff.

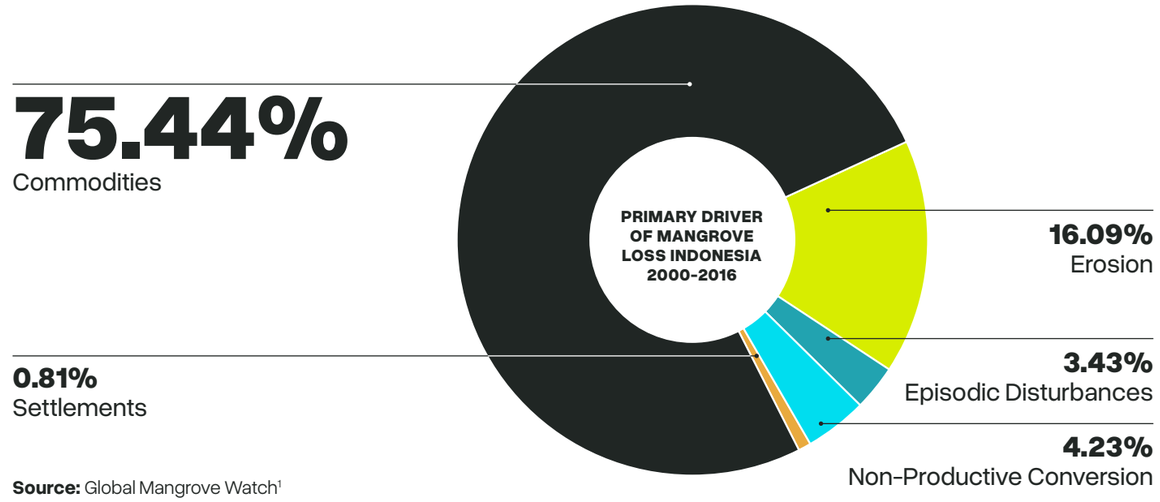
The persistence of profit-making pay-per-tree-planted schemes marketed at well-intentioned businesses and individuals also contributes to general misunderstanding of what successful **mangrove restoration** looks like in practice. Organizations looking to support mangrove conservation and restoration in Indonesia should consider that supporting training, communications, and capacity building may have more impact than sponsoring a restoration site, should actively avoid funding single-species planting activities, and should insist on multi-year reporting on survival and recruitment.

While the financial and governance landscape is complex, the Indonesian government has demonstrated clear ambition to resolve legislative and practical hurdles and set national targets for improved management and restoration of mangroves.

With prominent government leadership and a growing interest from corporate, philanthropic and bilateral investors and funders there is great potential for securing sustainable long-term finance for mangroves, however the complexity makes it impossible for one single sustainable finance model to be applied nationwide, nor is there a single quick and easy solution to replace the income offered by aquaculture, palm oil or wood products.

The primary driver of mangrove loss **Indonesia** between 2000 and 2016 was conversion for the production of **commodities:**

75.44% Commodities
16.09% Erosion
3.43% Episodic Disturbances
4.23% Non-Productive Conversion
0.81% Settlements



Source: Global Mangrove Watch[1]

Map 1: Spatial data for Breakthrough goals

Key

- Mangroves
- National borders

Cambodia
Vietnam
Philippines
Thailand
Palau
Malaysia
Brunei
Malaysia
Singapore
Indonesia
East Timor

2.

Potential for achieving the Mangrove Breakthrough

Achieving the Mangrove Breakthrough targets in Indonesia

Halt Loss

Although expansion of aquaculture and agriculture continues to pose significant threats, annual mangrove deforestation rates have declined from 52,000 hectares per year (1980–2005)[11] to 18,209 hectares per year (2009–2019)[12, 6]. This decline may reflect increased awareness and prioritization of mangrove conservation, coupled with increased legal protection, though it is also possible that the most accessible mangroves have already been deforested[5]. While logging or conversion of mangroves is regulated nationally, capacity to enforce restrictions across thousands of islands is limited, and this is reflected in the continuing gross loss of mangrove area, (Table 1) primarily driven by human causes and masked by increases in the net mangrove extent elsewhere.

Split-level view of a mangrove forest © Conservation International

Table 1: Comparison of net change and gross loss of Indonesia's mangrove area and proportion of loss attributable to human causes[1]

NET CHANGE 1996-2020 (KM²)	NET CHANGE 2010-2020 (KM²)	GROSS LOSS 2010-2020 (KM²)	PROPORTION OF LOSS FROM DIRECT HUMAN DRIVERS (%)	TOTAL HUMAN DRIVEN LOSS 2010 – 2020 (KM²)
-1,739.04	-214.66	1,052.05	82	858.34

Most drivers of mangrove forest loss could be effectively managed by policy interventions; however mangrove degradation still occurs with little or no compliance with existing laws and regulations. Some NGOs have taken the approach of purchasing logging concessions to reduce loss – but are left with the financial challenges of managing large areas while effectively compensating local communities' changes in livelihoods.

Although halting mangrove destruction will be slow, trends for reduced human caused loss when combined with sufficient financial support for improved management targets and investment in mangrove positive aquaculture could quickly enable a long-term shift to an annual net gain in mangrove area.

Restore Half

Restoring half of the available restorable area identified by Global Mangrove Watch would total around 1,016km² of mangroves – just over half of the regional Breakthrough goal for Asia and 25% of the global restoration goal. The 2024 Indonesian government target for mangrove restoration, rehabilitation and improved management far exceeded this at 600,000ha or 6,000km², greater than the entire global Mangrove Breakthrough goal (Table 2).

Table 2: Comparison of Breakthrough restoration goals based on Global Mangrove Watch data, and Indonesian government targets based on the National Mangrove Map. Differences in available area will arise from differences in how restorable area is defined by each group.

DATA SOURCE	TOTAL MANGROVE AREA 2020 (KM²)	TOTAL RESTORABLE AREA (KM²)	RESTORATION GOAL (KM²)
GMW[1]	29,534	2,032.04	1,016.02
National Mangrove Map[8]	34,426.14	7,776.36	6,000

When the revised national mangrove targets are released, increased financial support for government efforts combined with local capacity building & alternative incomes could really enable significant change. Mangrove rehabilitation efforts have gained traction, particularly after the 2004 tsunami in West Sumatra, which underscored the critical role of mangroves in coastal protection. Post-tsunami rehabilitation initiatives increasingly embraced community participation as a core strategy, with collaborative approaches to conservation and restoration and substantial involvement from NGOs[9, 10].

Building the capacity of aquaculture farmers with innovative sustainable practices through Coastal Field Schools © Boskalis

Double protection

Currently 7,343.2km² of Indonesian mangroves are classified as formally protected[1] (Table 3).

Table 3: Mangrove area under formal protection, according to Global Mangrove Watch. Expansions in protected area in the last year may not be included in this measurement.

PROTECTED AREA (KM²)	UNPROTECTED AREA (KM²)	PORTION OF MANGROVE AREA WITH PROTECTED STATUS (%)	ADDITIONAL PROTECTED AREA BY ACHIEVING NATIONAL GOALS (KM²)	PORTION OF MANGROVE AREA WITH PROTECTED STATUS BY ACHIEVING NATIONAL GOALS (%)
7,343.20	22,190.78	25	7,343.20	50

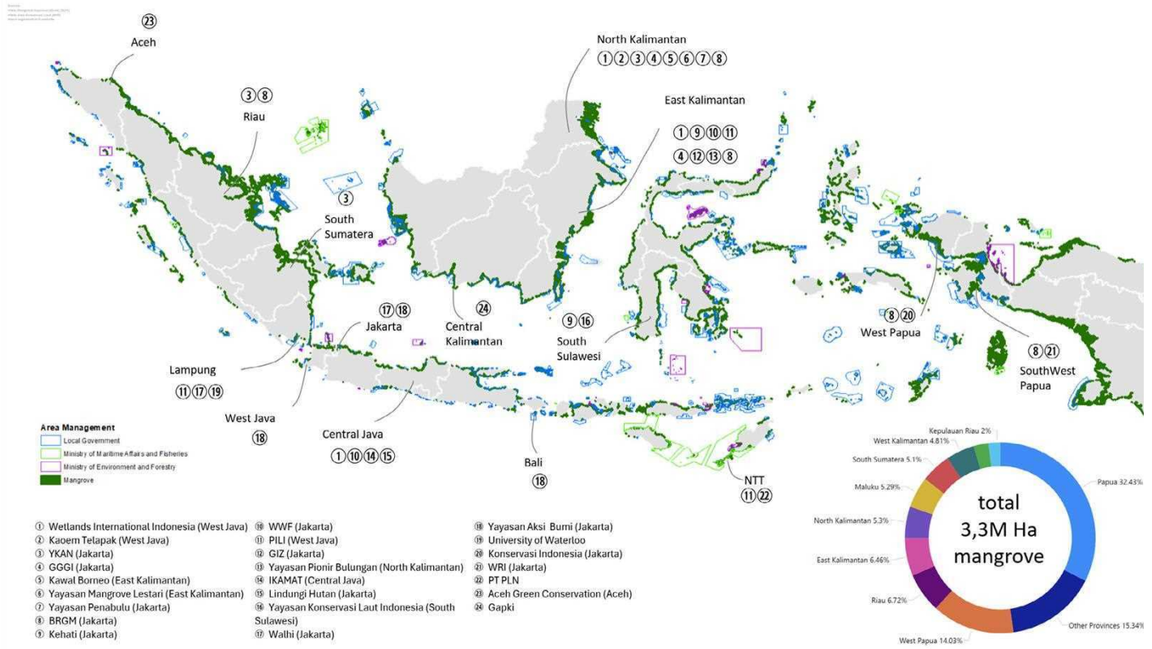
Marine Protected Areas (MPAs) account for less than 9% of Indonesia's waters at around 29 million hectares, including only 171,000 ha of mangroves – around 5%. However, the government aims to increase MPA coverage to 10% - or 325,000 km² - by 2030, and then expand to a further 30% - or 975,000km² – by 2045[13], as part of their contribution to the Global Biodiversity Framework's (GBF) "30 x 30" goal.

The Ministry of Marine Affairs and Fisheries (MMAF) is actively working toward this target, designating 11 new MPAs in 2024. With such a large scope to increase MPA coverage, there is a clear opportunity to include an increased amount of mangrove area, which could achieve Mangrove Breakthrough goals of doubling the area of mangroves protected nationally, or to align with a global goal of 80% protection, by the inclusion of an additional 7,344km² or 16,245km² of mangrove within new MPAs.

Sustainable financing

In the past decade many initiatives for sustainable financing have been piloted, particularly through nature-based solutions (NBS) and bilateral funding for mangroves through partnerships with Norway, the UK, and the World Bank. Scaling up available funding will be essential to reach national goals. The government is actively seeking private sector engagement and blended finance solutions to accelerate efforts as they lack budget needed to finance their ambitious restoration and conservation objectives. For carbon markets to play a meaningful role, a clear legal framework for international carbon trading needs to be established, ensuring that high value mangrove-based blue carbon can be effectively integrated into Indonesia's financial landscape.

Common Sandpiper on mangrove roots
© Yus Rusila Noor / Wetlands International



Source: National Mangrove Map of Indonesia

Effective mangrove protection requires accurate and up-to-date spatial data to prioritize actions and monitor progress. The Indonesian government Mangrove One Map provides a comprehensive mapping of mangrove extent and quality across the country and serves as a reference for all stakeholders[14].

There are some differences between the spatial data presented in the National Mangrove Map and the Global Mangrove Watch, which is normal as mangrove areas would be identified by their color signature, and imagery used would be at different resolutions.

The National Mangrove Map 2024 shows that the existing mangrove area in Indonesia is 3,442,614 ha, and the potential mangrove habitat for rehabilitation or restoration is 777,636 ha[15,16].

3,442,614
hectares
of existing mangrove area and 777,636 ha of potential mangrove habitat for rehabilitation or restoration are shown in the National Mangrove Map 2024

Using the same map across different government agencies and stakeholders ensures consistency in data interpretation, enhances coordination, reduces conflicts over jurisdiction, and facilitates unified planning and implementation.

3.

Mangrove policy & governance

Mangroves are a clear conservation priority for Indonesia and are well represented in both international and national policy, both explicitly and in references to coastal zones.

For example, ecosystem conservation and restoration is a key program for adaptation in Indonesia's NDC, including restoration of degraded mangroves, expansion of MPAs, conservation education, and engaging customary law communities for indigenous knowledge (masyarakat hukum adat).

Scientists scouting for a sampling site
© Miguel Cifuentes-Jara

Mangrove management in Indonesia operates across four levels of governance: **national, provincial, district, and village.**

National
Level

The central government establishes laws, sets national targets, and develops strategies and action plans in line with the mandates and responsibilities of various sectors[17].

Sub-national
Level

Ministries coordinate with the sectoral services of provincial and district governments, which are responsible for implementing these mandates within their respective jurisdictions.

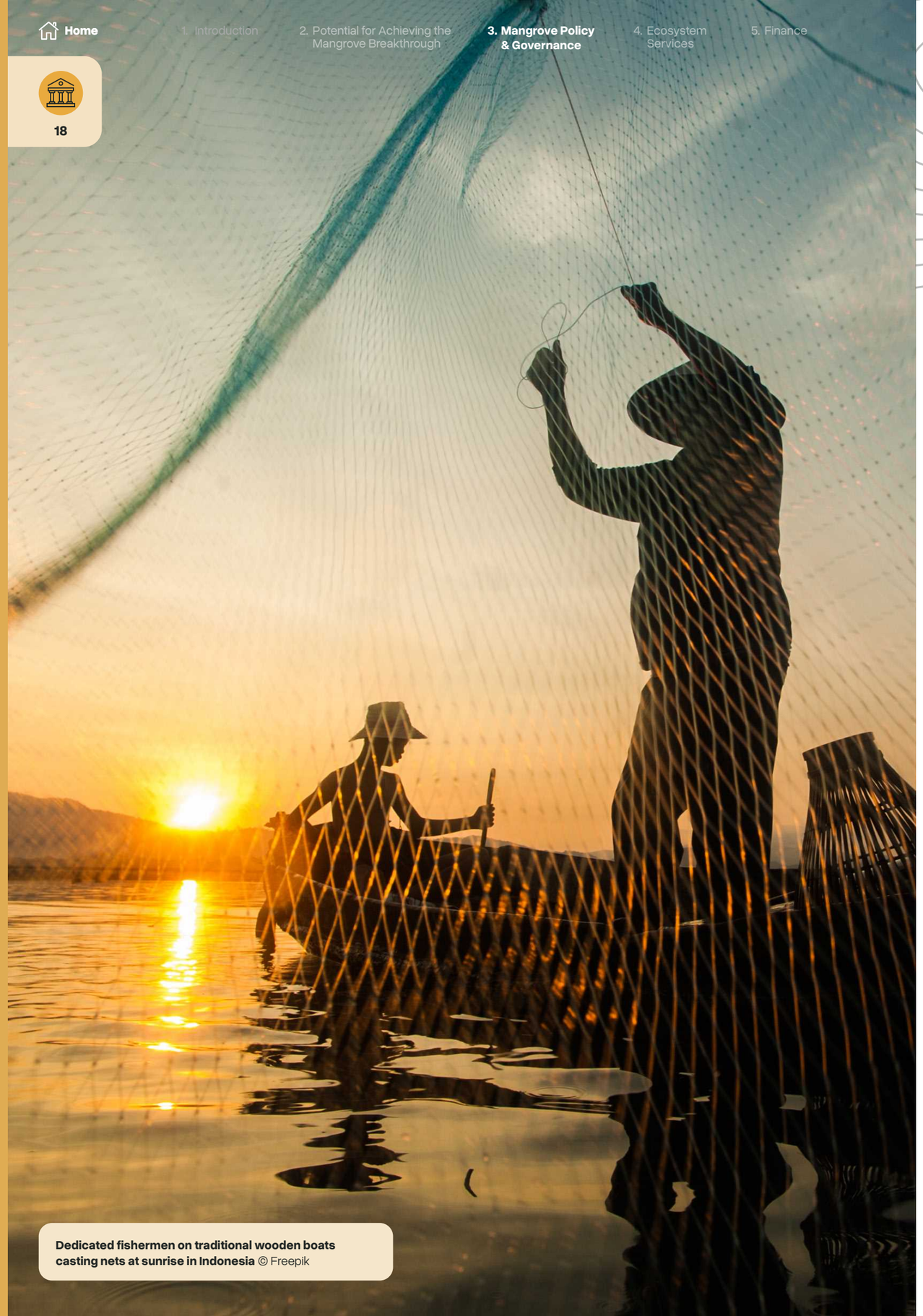
Local
Level

Village governments play a vital role by facilitating and mobilizing community participation in mangrove management, working under the guidance and direction of higher-level governments.

This multi-tiered governance structure reflects the complexity of managing Indonesia's vast and diverse mangrove ecosystems while emphasizing the importance of collaboration and community involvement.
Mangroves fall under the jurisdiction of multiple ministries and local governments, often resulting in overlapping tenurial and usage systems. At a national level, the trees themselves are managed by the Ministry of Environment and Forestry (MoEF), while the fish and aquatic resources fall under the authority of the Ministry of Marine Affairs and Fisheries (MoMAF)[18], which also has the authority to establish and manage marine protected areas including mangroves. Local governments are mandated to oversee the management and utilization of natural resources within 12 nautical miles of the coastline and implement spatial planning of coastal areas, subject to review by the national government (MoASP).

Mangrove areas are divided into two main zones based on territorial mandates:

- **21%** are designated non-forest zones, also known as Areas for Other Uses (Areal Penggunaan Lain, APL) managed by the MoSAP, MoMAF, and provincial governments.
- **79%** - over two and a half million hectares, are forest zones under the jurisdiction of the MoEF, made up of 22% conservation forests (hutan konservasi), 27% protection forests (hutan lindung) with limited use, and 30% production forests (hutan produksi) where timber harvesting is permitted[19].



Dedicated fishermen on traditional wooden boats casting nets at sunrise in Indonesia © Freepik

Resolving the regulatory overlaps and inconsistencies in mangrove management is a key challenge to the effective implementation of Indonesia's national mangrove initiatives[20].

Recognizing that coordination is crucial for effective mangrove ecosystem management, recent policy developments have focused on the development of multi-stakeholder processes, such as the National Blue Carbon Action Partnership (see carbon finance section) and the Forest and Land Use (FOLU) coalition. There is growing recognition of the benefits of devolving tenure rights to local communities, including indigenous peoples, who actively use and manage these resources. Such devolution can enhance the effectiveness of mangrove conservation and management and can provide space to acknowledge and accommodate the unique roles women play in the utilization, conservation, and rehabilitation of mangroves.

Circumference measuring of mangrove trees
© Conservation International Indonesia

There is growing recognition of the **benefits of devolving tenure rights to local communities,** including indigenous peoples, who actively use and manage mangroves

Some local communities have established village-level regulations to specifically address mangrove protection and conservation within their areas[21]. These village regulations define the tenure and usage rights of village mangrove forests and are typically developed through a bottom-up, participatory process anchored within the broader legal framework of village autonomy laws. As such, there is opportunity for NGOs and CSOs to scale up locally led mangrove management by supporting the associated financing and capacity building needs.

National Policies & International Commitments

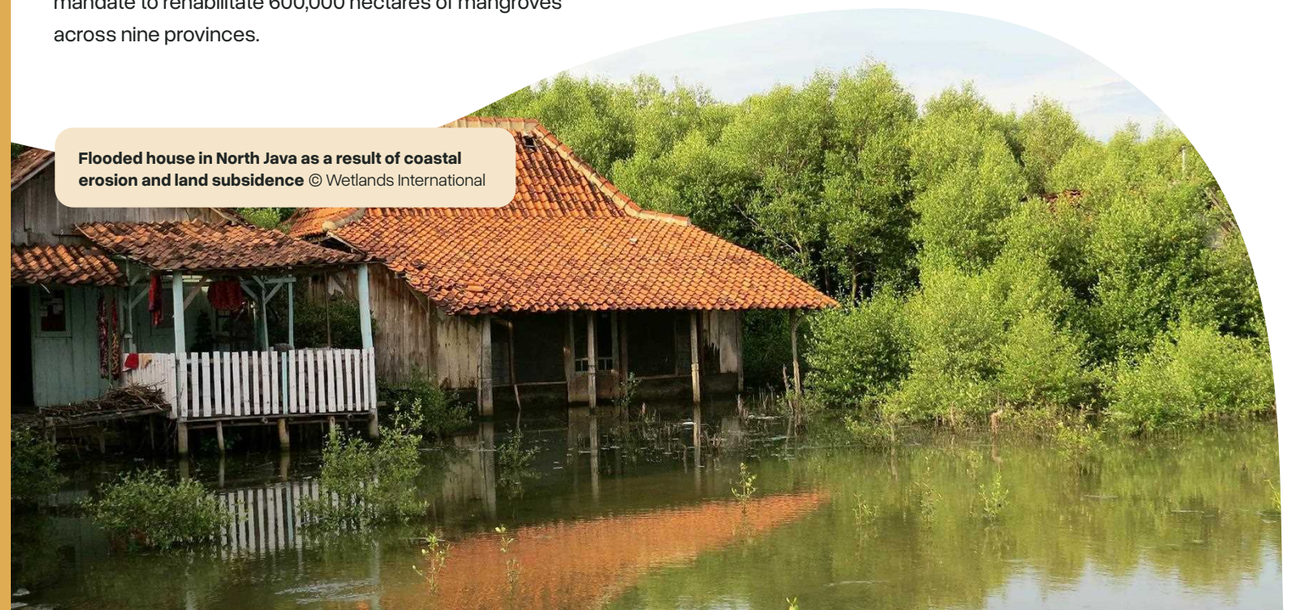
National policies and initiatives for mangroves

The Government of Indonesia has implemented various programs to conserve and restore mangrove ecosystems:

In 2020, the Peatland and Mangrove Restoration Agency (BRGM) (Indonesian: Badan Restorasi Gambut dan Mangrove Republik Indonesia) was established with a mandate to rehabilitate 600,000 hectares of mangroves across nine provinces.

In December 2024 this agency concluded its mission and is dissolving, having rehabilitated about 84,396 ha of mangroves since 2020. In 2025 this target is expected to be revised, with some suggesting a shift to 200.000 ha rehabilitated and 400.000 ha under improved management, however this is not yet confirmed.

BAPPENAS, the Ministry of National Development Planning, is the Indonesian central government institution responsible for formulating national development planning and budgeting. BAPPENAS has also a responsibility to coordinate international development (bilateral, unilateral and multilateral) cooperation.



Flooded house in North Java as a result of coastal erosion and land subsidence © Wetlands International

NATIONAL STRATEGY FOR WETLAND ECOSYSTEM MANAGEMENT: PEAT AND MANGROVE ECOSYSTEMS 2022-2045

In 2020 BAPPENAS established the National Strategy Coordination Team for Wetland Ecosystem Management[22] to develop the **National Strategy for Wetland Ecosystem Management: Peat and Mangrove Ecosystems 2022-2045.** It serves as a reference point for the preparation of national and regional development plans and is highly relevant as an umbrella for future mangrove management interventions and advocacy.

84,000
hectares
of mangroves have been rehabilitated in Indonesia since 2020 through the BRGM initiative.

REGULATION ON THE PROTECTION AND MANAGEMENT OF MANGROVE ECOSYSTEMS (RPP-PPEM)

2022 saw the first time the Indonesian Government specifically drafted regulations related to mangroves at the Government Regulation level and the new government is committed to finalizing and issuing the RPP PPEM under the responsibility of the MoE. The RPP PPEM will regulate 3.36 million hectares of mangroves and is a major step toward delivering Indonesia's commitments in global agreements. Mangroves are integral to Indonesia's Low Carbon Development (LCD) framework, a cornerstone of the country's long-term development plan, and are pivotal in achieving its Nationally Determined Contributions (NDCs) for climate adaptation and mitigation. In the current cabinet structure, the process of finalizing the RPP PPEM is under the responsibility of the Ministry of Environment and coordinated by the Coordinating Ministry for Food Affairs. The government is currently committed to completing the process until the RPP PPEM is issued.

NATIONAL MANGROVE REHABILITATION ROADMAP 2021-2030

Jointly developed by ministries/agencies led by the Ministry of Environment and Forestry and released in 2022, the **mangrove rehabilitation roadmap** is based on the 2021 National Mangrove Map. Designed as foundational framework for coordination between agencies in the implementation of mangrove rehabilitation, the roadmap is based on the current condition of the mangrove ecosystem, legal aspects and management, as well as strategic issues: community welfare, climate change, disasters, degradation, and mangrove deforestation.

NATIONAL MEDIUM-TERM DEVELOPMENT PLAN

BPHN and BAPPENAS has recently published the **2025-2029 National Medium-Term Development Plan (RPJMN).** This plan sets out the priority actions for the next 5 years for the ministry. Mangrove Rehabilitation is a national priority to support activity on Increasing Carbon Reserves in Blue Carbon Ecosystems, and as part of the Low Carbon Development priority program.

The total funding needed for the PRJMN is estimated at 47.587 trillion rupiah (US$ 2.85 billion). At this time, less than 20% is secured through the government's own financing, while the remaining funds will need to be leveraged from alternative sources.

Mangrove rehabilitation is a national priority to increase carbon reserves in blue carbon ecosystems

International commitments

NATIONALLY DETERMINED CONTRIBUTIONS (NDCS)

As part of the United Nations Framework Convention on Climate Change (UNFCCC) Paris Agreement goal of limiting warming to <2°C, Indonesia has committed to reducing national emissions by 29% and 41% under unconditional and conditional mitigation scenarios by 2030[23] in their first **Nationally Determined Contribution (NDC).** The forestry sector is expected to contribute up to 60% to the total emission reduction target from all sectors[5]. This was further elaborated in the 2022 Forest and Other Land-Use (FOLU) Net Sink 2030 plan and Enhanced NDC which increases unconditional emission reductions target to 31.89%, compared to 29% in the first NDC.

Photo of woman Bedang, North Java
© Boskalis

Mangroves are defined as part of forests for the purpose of NDC mitigation targets and are also specifically mentioned several times in Adaptation plans related to ecosystem restoration, reducing vulnerability to climate change, coastal zone protection and social and economic resilience[24]. Overall, mangrove emission reduction initiatives are projected to contribute around 8% to the NDC target for the forestry sector by 2030[5].

60%
of Indonesia's total emission reductions are expected to come from the forestry sector

THE NATIONAL GREENHOUSE GAS INVENTORY (NGHGI)

In Indonesia 55 to 59% of national emission reduction targets by 2030 depend on mitigation in Forestry and Other Land Use[25].

Mangroves are effectively included in Indonesia's GHG inventory[26]. Emissions factors including CO_2, CH4 and N20 effluxes plus soil carbon burial have been calculated for Indonesian mangroves, and the GHGi also differentiates between primary or secondary mangroves on mineral or peat soil types when estimating emissions and removals[25]. Soil organic carbon is included based on national data, and the emissions from conversion of mangroves to aquaculture is also accounted for.

While mangroves comprise only ≈2.6% of Indonesia's total forest area, their degradation and deforestation accounted for ≈10% of total greenhouse gas emissions arising from the forestry sector[5].

The government is preparing a short-term national blue carbon action plan until 2030, along with a blue carbon roadmap extending to 2045.

NATIONAL BIODIVERSITY STRATEGIES AND ACTION PLAN (NBSAP)

The Indonesian Biodiversity Strategy and Action Plan (IBSAP) 2025-2045 was released late 2024, responding to all 23 GBF targets and including clear references to mangrove restoration under national target 2. It also includes a high-level analysis of the main threats and drivers of biodiversity loss.

Within the IBSAP mangroves are recognized as crucial strategies for achieving Indonesia's commitment to the FOLU (Forest and Other Land Uses) Net Sink 2030 initiative aimed at reaching net zero emissions by 2030. The IBSAP aligns with the restoration targets in the Wetland Management National Strategy (see above) and with national climate resilience policies.

The expected cost of implementation of the objectives in the IBSAP is around US$ 4.5 billion annually, with a portion allocated for mangrove conservation and restoration, of which the Indonesian government is currently able to provide around USD 0.64 billion. To bridge this funding gap the Indonesian government is transitioning from funding-based to financing-based restoration efforts, integrating blended finance models and encouraging private sector investment.

Integration of available private sector contributions are planned to be tracked through a sustainable investment indicator, the IPK (Kehati Management Index) which is included in the 2025-2045 national development indicators.

It's worth noting that National target 17 seeks to increase the participation of Indigenous Peoples and local communities, women, youth and people with disabilities, including through strengthened policy and regulatory frameworks.

National Target 17 emphasizes **increased participation of Indigenous Peoples, local communities, women, youth, and persons with disabilities,** supported by stronger policy frameworks

RAMSAR

Indonesia has completed a National Wetland Inventory as part of its commitment to implementing the RAMSAR convention, including information on mangroves, coral reefs and seagrass. Mangrove coverage in the wetland inventory was last updated in 2019.

There are eight designated Ramsar sites in Indonesia covering 1,375,426 ha. Six sites total just over a million hectares, contain intertidal forested wetlands. Menipo Nature Recreational Park is the most recent addition, including 2,450ha of mangroves, coastal mudflats, saltmarshes and other wetlands.

Areal picture of permeable structures to trap sediment to enable mangrove regrowth along the eroded coastline of North Java © Boskalis

4. Ecosystem Services

Adaptation and Resilience Benefits

Across Indonesia, mangroves provide protection from annual storms for around 835km² of coastal lands and upwards of 245,000 people[1]. For more intense 25-year extreme weather events, this increases to over 2,000km² of land and around 685,000 people – a huge contribution to coastal resilience as storms increase in both frequency and severity due to climate change[1].

Recognition of the critical coastal protection services provided by mangroves – and government level interest in their restoration as a priority, was influenced by the tragic 2004 tsunami. A 500m wide strip of 10 year old mangroves has the potential to reduce hydrological force of 3m extreme waves by up to 70%[27], with effectiveness – and the survivability of the forest itself – increasing with age, although of course this will vary based on local hydrological conditions.

Siamese Crocodile, proboscis monkeys and a Javan Kingfisher spotted in Yogyakarta © Envato

Biodiversity Benefits

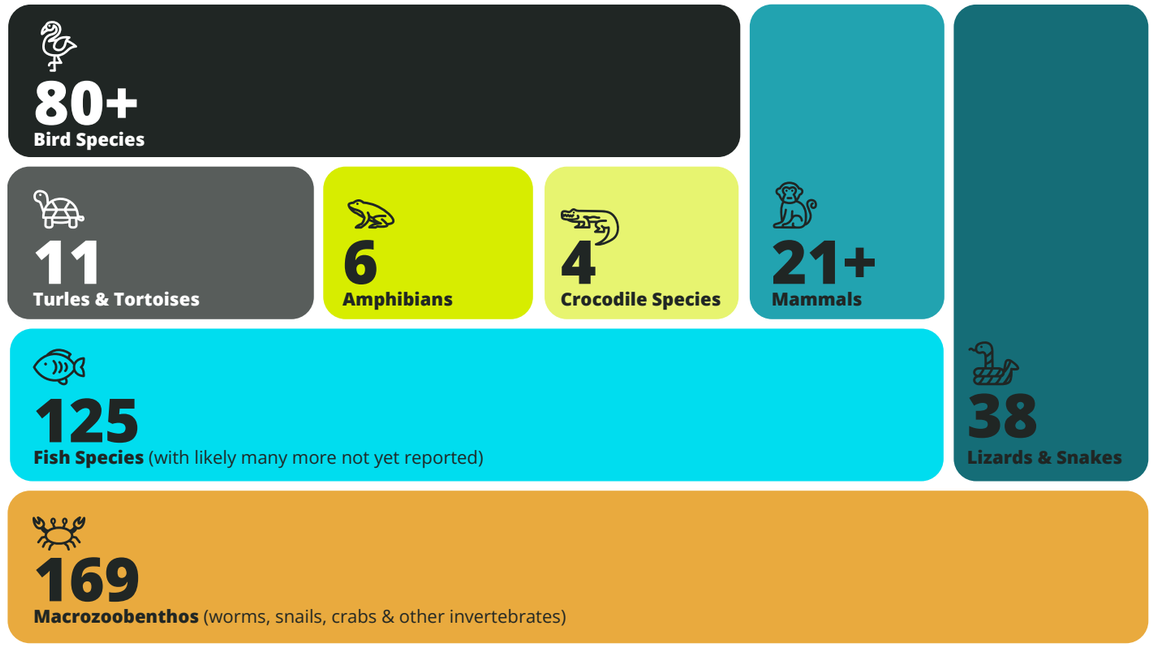


Figure 1: Infographic showcasing the biodiversity within an Indonesian mangrove ecosystem

Indonesia's mangroves are globally significant biodiversity hotspots, supporting 48 true mangrove species, which represent approximately 80% of the world's mangrove species (IUCN, 2019) plus a further 192 mangrove associated flora[28]. Two true mangrove species are critically endangered, 2 more are endangered, and another 5 are threatened[1]. The dominant species belong to five main genera: Avicennia, Rhizophora, Sonneratia, Bruguiera, and Nypa[18].

48
true mangrove species
are found in Indonesia's mangroves

Mangroves provide essential habitats for a wide range of fauna, including fish, crustaceans, birds, and reptiles, as well as endangered species such as the proboscis monkey *(Nasalis larvatus)* and the dugong *(Dugong dugon)*. Two of Indonesia's four crocodilians, the Siamese crocodile *(Crocodylus siamensis)* and the False gharial *(Tomistoma schlegeli)* are critically endangered.

While several biodiversity surveys have been carried out, given the complexity of the Indonesian land- and sea-scape, including overlapping the Wallace line, further surveys are likely to drastically increase records of species within Indonesia's mangroves, especially of fish and invertebrates, including corals occurring within the mangrove fringe.

Several unique faunas are protected in conservation areas and have become icons in ecotourism activities, including the Siamese crocodile, kingfishers of the Halcyon genus, and the charismatic and endangered proboscis monkey[28].

Economic Values

A 2020 World Bank report estimates that mangroves contribute at least USD 1.5 billion annually to the Indonesian economy[29]. Peer-reviewed estimates are also available for some key services which demonstrate the economic value of intact mangroves to be greater than the value of conversion to other uses.

The potential economic value of mangrove conservation, estimated in terms of fishery production is 12,364–22,861 US$/hectare/year, which is substantially higher than the revenues from possible alternative land uses of 7,610 US$/ha/yr from aquaculture and 9,630 US$/ha/yr from oil palm plantations in Indonesia. This makes conservation substantially more cost-effective than alternative land uses, such as aquaculture and oil palm plantations, which are the leading causes of mangrove loss[30]. In one study, fishery households experienced a decline in annual household income ranging from 5.3% to 9.8% in response to a 1% increase in local mangrove loss. Around 2.5 million typically low-income small scale fisher households[31] make up 83% to 90% of Indonesia's local fleets[30, 31].

In addition to supporting fisheries, during an average annual storm in Indonesia mangroves provide protection from loss or damage to around US$320m of property assets. As the frequency and intensity of storms increases due to climate change, this protection value increases accordingly: in the event of a 100yr storm, mangroves in their current depleted state provide protection to just over a billion dollars of property[1]. The World Bank estimated a coastal protection value of about $50,000 a hectare for mangroves near developed coastal areas[29].

Mangrove plants have been incorporated in traditional medicine for centuries. Different parts, including leaves, bark, and roots, are employed to create remedies for ailments ranging from skin disorders to respiratory conditions[32].

Testing of mangrove ingredients used in traditional medicines has revealed a multitude of potential pharmaceutical applications, mostly anti-inflammatory, anti-bacterial and antioxidant, but trials have included applications as diverse as treatments for HIV-1, cancer, and diabetes[32]. The potential economic and public health value of continued medicinal research into mangrove products

$1.5 billion
is the minimum annual contribution of mangroves to the Indonesian economy

Mitigation Benefits

Based on the mangrove emission reduction baseline estimated by Arifanti et al[5], realizing the mangrove breakthrough goal of halting human-driven mangrove loss by conserving and restoring mangrove in Indonesia would result in reduced emissions equivalent to 41 Tg (41 million tonnes) of carbon dioxide every year.

The mean total ecosystem carbon stock for Indonesian mangroves is 1063 ± 91 tonnes C ha^{-1}, of which 83% is in the soils, which means that emissions from mangrove loss are exceptionally high. Despite mangroves only making up around 2.6% of Indonesia's forest cover, degradation and deforestation of mangroves comprises around 10% of emissions from the entire forest sector and halting loss could achieve about 8% of Indonesia's current total GHG emissions reductions target in 2030[5].

The mangrove breakthrough goal of restoring half the restorable area (as defined by the Global Mangrove Watch) by 2030 would result in an additional 1,022km^2 of mangrove area, sequestering an estimated 1,250,000 t CO_2 per year.

28 million tonnes of CO_2 emissions
could be reduced annually by halting human-driven mangrove loss in Indonesia

Fisherman mothers cleaning sea shells in Belitung Island, Indonesia © Raditya / Shutterstock

A 500m wide strip of 10-year-old mangroves can reduce a 3-meter extreme wave's force by up to 70%

Coral reef grows along the edge of a blue water mangrove forest Raja Ampat, Indonesia © Shutterstock

5. Finance

National Finance Mechanisms

Funding for mangrove conservation and rehabilitation in Indonesia has traditionally come from the state budget, with international development organizations and donors providing additional financial support on a project-by-project basis. Indonesia has actively sought to diversify its sources of sustainable financing, deploying mechanisms such as debt-for-nature swaps, ecological fiscal transfers and carbon pricing, blue bonds, and green sukuk bonds, a type of long-term securities that adhere to Sharia principles and are offered by the Ministry of Finance. The government of Indonesia have consolidated coordination of significant financial mechanisms under a dedicated Environmental Fund Management Agency.

Since 2019 the government has partially adopted performance-based fiscal instruments to incentivize local governments in protecting the environment. These Ecological Fiscal Transfers (EFTs) link intergovernmental fiscal transfers from higher to lower levels of government to their performance in environmental and forest protection efforts[33].

Despite government efforts to diversify funding sources, financing to achieve restoration targets remains insufficient. This highlights the need for additional contributions from other sources, including from the private sector, which so far remains limited. A few national companies have initiated mangrove restoration projects, often in collaboration with NGOs and local communities. These initiatives are typically funded through the companies' Corporate Social Responsibility (CSR) programs. Except for a handful of carbon crediting and NGO led projects, most funding will likely be short term and not include sufficient monitoring of the effectiveness of project activities. This is especially true of simple planting activity days marketed at well-intentioned corporates.

$60.2 billion
estimated annual value of Indonesia's blue carbon market

Private companies are also encouraged to support management of Ramsar sites, either providing funding through Corporate Social Responsibility (CSR) mechanisms, or through Restoration (of) Ecosystem concessions on wetlands, where companies might engage in mangrove planting activities.

ENVIRONMENTAL FUND MANAGEMENT AGENCY (BPDLH)

BPDLH serves as a centralized "funding hub" for various mechanisms currently being implemented to address environmental degradation and the climate crisis, including mangrove ecosystems. BPDLH coordinates a total fund of 1.65 billion USD, spread across grants, loans, and endowment funds:

A. Grants – 50%

Funding sources include GCF, GEF, World Bank, UNDP, and bilateral cooperation with Norway. The grants also include catalytic funding for startups in aquaculture and mangrove protection, as well as financing based on REDD+, Terra Fund, and mangrove rehabilitation initiatives.

- GCF (2014–2016): 103.8 million USD for enabling conditions and incentives for local governments.
- FCPF Kaltim (2019–2024): 110 million USD for ecosystem protection and rehabilitation, including mangroves.
- BioCarbon Fund Jambi (2020–2025): 70 million USD for forest protection and rehabilitation, including mangroves.
- FOLU Norway (2016–2019): 156 million USD for forest protection and rehabilitation, including mangroves.
- M4CR Grant: 19 million USD for mangrove rehabilitation policy and governance.
- Terra Fund (2022–2024): 1 million USD for research on livelihood-related topics.

B. Loans – 20%

Funding from the World Bank amounting to 400 million USD for mangrove rehabilitation and improving community livelihoods in four provinces.

C. Endowment Fund – 30%

Used for disaster prevention and post-disaster rehabilitation, this is a revolving fund from reforestation funds for financing (re-financing) the on-farm sector (agroforestry, deferred logging, environmental services, forestry and non-forestry commodities) and the off-farm sector (forestry industry). Involves 31,000 debtors with a total fund of 1.5 trillion IDR across 29 provinces.

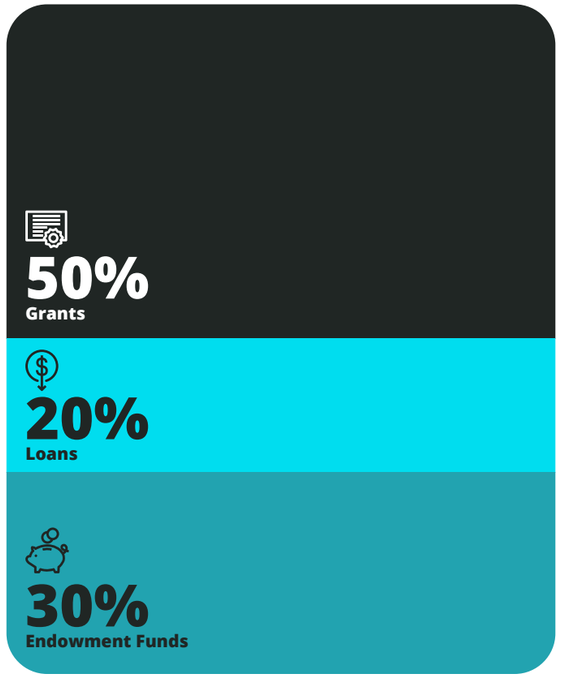


Figure 2: Funding sources within the BPDLH

EXAMPLES OF BLENDED FINANCE PROGRAMS IN INDONESIA

The Indonesian government has established dedicated public funds such as the Indonesia Climate Change Trust Fund (ICCTF) which are accessible to government and non-government institutions[34]. The ICCTF focuses on linking international financing with national climate change mitigation and adaptation programs, primarily supported by non-refundable contributions from bilateral and multilateral donors, and international finance institutions[35].

Indonesia launched the first publicly offered Sovereign Blue Bond in 2023, raising US$ 150 million to support coastal protection, sustainable fisheries and aquaculture, marine biodiversity conservation, and mangrove restoration[36]. The bond is a part of a larger government initiative to support the growth of sovereign thematic bonds under its SDG Government Securities Framework, allowing for the future issuance of other blue bonds.

In July 2024, Indonesia and the United States signed a US$ 35 million debt-for-nature swap agreement, redirecting canceled debt to fund coral reef conservation projects and strengthening marine protected areas.

M4CR is a World Bank funded project implemented by the Indonesia Ministry of Environment and Forestry and Mangrove and Peatland Restoration Agency Republic of Indonesia. The project focuses on strengthening coastal management through mangrove rehabilitation, conservation, and sustainable use while improving the livelihoods of coastal communities. The overall project cost is US$ 419 million and will be financed through Investment Project Financing (IPF) in loan and grant resources, of which US$ 100 million will be disbursed against the achievement of the Performance-based Conditions. The remaining US$ 300 million will be disbursed as expenditure-based financing and some grant funding.

$150 million
was raised in 2023 via Indonesia's first Blue Bond for coastal and marine ecosystem restoration

Nature Positive Business

Sustainable aquaculture and silviculture practices which reduce or partially restore mangroves have been successfully piloted in Indonesia. For example, Wetlands International Indonesia's Associated Mangrove Aquaculture approach allows mangroves to regenerate naturally with increased yield for shrimp producers. The Climate Smart Shrimp initiative renovates existing shrimp ponds to increase overall farm production, achieving Aquaculture Stewardship Council certification while reducing the area required by half and enabling restoration of mangroves on the remaining half. Mapping of suitable shrimp ponds has identified a further 200,000ha of former mangrove where these models could be applied.

Some mangrove areas in Indonesia have a high potential to develop ecotourism as a sustainable business model, such as the one operating in the Raja Ampat MPA where nature fees paid by visitors to this area pay for a multitude of community driver conservation programs and sustainable business initiatives.

Other examples of sustainable business endeavours include beekeeping for mangrove honey, low impact fisheries and harvesting natural resources that can be used in medicine or other small-scale business such as making dyes for batik fabric.

Carbon Finance

Indonesia is an active participant in REDD+ mechanisms which generate results-based payments for forest restoration and improved management. Mangroves are included in Indonesia's definition of forests and out of 57 active REDD+ projects active in January 2025, at least two specifically focus on mangrove conservation and rehabilitation[37]. REDD+ carbon projects also account for around 66% of Indonesia's total credit issuances since 2009 – around 100 million tons CO_2e[38].

Indonesian Government Regulation No. 98/2021 initiates a legal framework for carbon trading, carbon taxes, and results-based payment mechanisms to align with NDC targets and Indonesia launched its Domestic Carbon Exchange (IDXCarbon) in September 2023[39]. Roadmaps and regulations for power plants and the forestry sector were issued in 2024, including a carbon tax on coal-fired power plants set at US$4.50 per ton of CO_2. This initial rate is too low to create meaningful demand for carbon credits in the short term[40], however the first international trading of Indonesian Carbon Units took place in January 2025. The value of Indonesia's nascent blue carbon market is estimated at around $60.2 billion annually – based on a top credit price of $30 – and has potential to enable significant investment into mangrove crediting projects.

Clam shell collection, Indonesia © Wetlands International

Voluntary carbon credits exported from Indonesia will require corresponding adjustments under Article 6 of the Paris Agreement, This process is now being developed under the Ministry of the Environment and no authorizations have taken place, while quotas on the number of forestry sector credits that can be internationally traded have yet to be detailed, effectively pausing international credit trade from the forestry sector and existing mangrove carbon credit projects. International standards and methodologies such as those administered by Verra and Plan Vivo are being assessed and are expected to be approved for use in Indonesia during 2025. The Gold Standard was approved in May 2025. While this will be resolved, and interest in blue carbon crediting projects remains high, successful delivery of finance for project initiation is reduced by the regulatory uncertainty. Recently, less ethical operators are taking advantage of this slowdown in carbon credit project investment to target communities with low value carbon credit offtake agreements, speculating on renewed demand and market value once the regulatory framework is complete.

Mangroves and needlefish off Mansuar Island © Burt Jones & Maurine Shimlock / Conservation International

66% of Indonesia's carbon credits since 2009 come from REDD+ projects (~100 Mt CO_2e)

Existing Blue Carbon initiatives

Indonesia's vast blue carbon reserves have attracted financial and policy support from several major programs:

BLUE CARBON ACTION PARTNERSHIP (BCAP)

The **Blue Carbon Action Partnership** (BCAP) was launched in March 2023 to support national governments in achieving their blue carbon ambitions and coordinating, communicating and connecting stakeholders at a global and national scale. The first National BCAP (NBCAP) is in Indonesia, following the establishment of a partnership with Indonesia at the World Economic Forum's Annual Meeting in Davos in January 2023, reinforced at UNFCCC COP 28 in Dubai in December 2023. The Indonesian NBCAP is led by a secretariat, which provides the necessary operational, management and coordination capacity to support the development and delivery of the NBCAP.

Eco-tourism mangroves trail on Java
© Wetlands International

GLOBAL AFFAIRS CANADA

Project on Enabling Blue Carbon in Indonesia with **Global Green Growth Institute.**

Support the Government of Indonesia in establishing healthier blue carbon ecosystems through (1) promoting the full integration of blue carbon ecosystems into national development and climate change strategies; (2) positioning blue carbon as the sixth component in Indonesia's Nationally Determined Contribution plan; and (3) incorporating blue carbon within the national monitoring, reporting and verification (MRV) system.

Canada supports Indonesia in **integrating blue carbon into national climate strategies,** including its NDC and MRV systems, through a project with the Global Green Growth Institute.

BLUE PLANET FUND (UK GOVERNMENT)

Blue Planet Fund (BPF) Country Plan for Indonesia: This plan will support the delivery of the Government of Indonesia's Ocean and Blue Economy priorities and objectives. As part of the plan, the UK also launched the Climate and Ocean Adaptation and Sustainable Transition (COAST) Program in Indonesia. In November 2024 they announced up to £18 million of new funding over the next 5 years. Among COAST's objectives is developing blue finance streams to support the conservation and restoration of Indonesia's blue carbon ecosystems.

2,000
hectares
of shrimp farms will be restored under RePLANET, with 60% of credit revenue to locals

BLUE CARBON ACCELERATOR FUND (BCAF)

The BCAF was established by the government of Australia and IUCN as a dedicated funding scheme to help increase coastal blue carbon ecosystems conservation and restoration in developing countries.

BCAF contributes funding to several ongoing projects in Indonesia:

- **Forest Carbon:** aimed at support large-scale mangrove and seagrass funding using environmental markets. BCAF funding will support a biodiversity assessment and monitoring pro
- **RePLANET:** restoring up to 2000 hectares of existing, abandoned or underutilised shrimp farms. 60% of the revenue from carbon and biodiversity credit sales will go to local stakeholders.
- **Rekam Nusantara Foundation:** restore mangrove forests and seagrass around three islands of the Indonesian archipelagic region through setting up a blue carbon credit system, as well as developing synergies with local governments and the tourism sector.
- **Konservasi Indonesia:** mixed management combining fisheries management, protected areas management and sustainable financing of marine protected areas.
- **Blue You:** investible regenerative aquaculture farms, combining no-input shrimp production and blue carbon credits.

Van Yong Chong / iStock

Civil Society Working Towards Mangrove Conservation

With Indonesia having the greatest global area and diversity of mangroves, Indonesia is home to some world-leading capacity in science and restoration.

There are also hundreds of national or local conservation groups working in diverse local contexts among thousands of islands, and multiple regional or national working groups and partnerships leading restoration, research, outreach, and advocacy programs. Examples include the Indonesian Mangrove Society (IMS), the CIFOR/ICRAF “Blue Carbon Deck” and the Indonesia chapter of the Global Mangrove Alliance. Understanding and navigating this space can be challenging, especially as definitions of best practice in restoration or management will also be variable across different networks.

The NGO and civil society space is correspondingly crowded. Indonesia has strict safeguarding laws around foreign actors, and so major international conservation NGOs such as Fauna and Flora, Rare, WRI, and WWF are often represented through Indonesian-led partner orgs or local expert organizations such as Yayasan Hutan Biru, who provide training in ecological mangrove restoration.

Mobilizing the Mangrove Breakthrough workshop in April 2025, Jakarta © Global Mangrove Alliance

GLOBAL MANGROVE ALLIANCE

GLOBAL MANGROVE ALLIANCE

The Global Mangrove Alliance (GMA) Indonesia Chapter was established in 2022. As a national representative of the GMA, this chapter plays a crucial role in achieving the Mangrove Breakthrough and GMA goals of stopping mangrove deforestation, restoring 50% of mangrove ecosystems, and doubling their protection. By engaging national and local stakeholders, the chapter plays a vital role in aligning Indonesia with the broader goals of the GMA. The chapter has three core members:

- **Wetlands International Indonesia (Yayasan Lahan Basah or YLBA)** as the coordinator.
- **Yayasan Konservasi Alam Nusantara (YKAN),** also known as The Nature Conservancy Indonesia.
- **Konservasi Indonesia (KI),** representing Conservation International Indonesia. KI also lead the NBCAP secretariat.

In 2025 the chapter is planning to expand its membership and formalize its operation procedures to ensure all organizations in Indonesia who support the GMA goals can be represented.

THE BLUE CARBON DECK

THE BLUE CARBON DECK

The Blue Carbon Deck is a Transformative Partnership Platform (TPP) designed to bring together the multiple initiatives around blue carbon to become the go-to source on blue carbon for researchers, civil society and practitioners working in coastal communities. It is hosted by the Center for International Forestry Research and World Agroforestry (CIFOR-ICRAF).

INDONESIA MANGROVE SOCIETY

Indonesia Mangrove Society (IMS), or Masyarakat Mangrove Indonesia, a stakeholder forum which aims to facilitate and bridge the relationship between government and non-government parties.

The IMS supports several key initiatives, including:

1. Discussing the Government Regulation Draft (RPP) for the Protection and Management of Mangrove Ecosystems.
2. Aligning mangrove maps with those developed and maintained by the Government.
3. Monitoring mangrove rehabilitation activities
4. Sharing best practices, such as:
   a. Mangrove rehabilitation Guides.
   b. Design and implementation of protected area.
   c. Guide for the rehabilitation of related ecosystems.

September 2025

MANGROVE BREAKTHROUGH

GLOBAL MANGROVE ALLIANCE

Mobilizing the Mangrove Breakthrough in Indonesia