

# Mangrove Law and Policy

November 2023

Legal and policy frameworks that enable mangrove conservation, restoration and sustainable use, in support of global goals for climate, biodiversity and sustainable development



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# 1. Introduction

## 1.1 Mangroves as a valuable ecosystem

Mangroves have a high value, both economic and non-economic. They provide habitat for 341 threatened species, ranging from crustaceans to tigers, and support 600 billion young shrimp and fish and 100 billion crabs and bivalves.<sup>1</sup> They provide billions of dollars worth of ecosystem services, including an estimated \$65 billion in coastal protection,<sup>2</sup> sequester 21 billion tons of CO<sub>2</sub>,<sup>3</sup> and support over 4 million small-scale fishers as well as high-value commercial fisheries.<sup>4</sup> Mangrove ecosystems can sequester four times as much carbon per hectare as terrestrial forests.<sup>5</sup> Beyond the quantifiable values that mangroves provide, they are also critical to the culture and identity of coastal communities and their health is often intrinsically linked to the health of people and adjacent ecosystems.

## 1.2 Global goals and frameworks related to mangroves

Mangroves and other coastal ecosystems are gaining attention in the international agenda, including as part of the upcoming UNFCCC COP28 presidency priorities, where a coalition of parties and non-state actors are building momentum to direct increased action for mangroves in support of the [Mangrove Breakthrough](#). The decade between 2021 and 2030 is the UN Decade on Ecosystem Restoration and the UN Decade on Ocean Science. In 2019, the United Nations Environment Assembly (UNEA) adopted a resolution on sustainable management for the global health of mangroves, encouraging Member States to support mangrove conservation, restoration and sustainable management through the use of ecosystem-based approaches, policies to address pollution and waste disposal, research and capacity building, education and awareness raising, mobilization of resources, and development of multipurpose mangrove management plans.<sup>6</sup> In 2020, the IUCN World Conservation Congress adopted a resolution urging Members “to take all necessary measures to protect, sustainably manage and, where relevant, restore mangroves and associated ecosystems.”<sup>7</sup>

<sup>1</sup> Maricé Leal and Mark Spalding, eds., *The State of the World's Mangroves 2022* (Global Mangrove Alliance, 2022).

<sup>2</sup> Menéndez, P. et al. (2020) 'The Global Flood Protection Benefits of Mangroves', *Scientific Reports*, 10(1), p. 4404.

<sup>3</sup> Maricé Leal and Mark Spalding, eds., *The State of the World's Mangroves 2022* (Global Mangrove Alliance, 2022).

<sup>4</sup> Ermgassen, P.S. e Z. et al. (2020), Fishers who rely on mangroves: Modelling and mapping the global intensity of mangrove-associated fisheries, *Estuarine, Coastal and Shelf Science*, 247.

<sup>5</sup> Spalding, Mark D and Leal, Maricé, eds., *The State of the World's Mangroves 2021* (Global Mangrove Alliance 2021).

<sup>6</sup> UNEP/EA.4/Res.12 (2019).

<sup>7</sup> WCC-2020-Res-078.

The Global Mangrove Alliance (GMA) has set the most ambitious global goals to date on mangroves to be achieved by 2030. These goals include halting loss of mangrove ecosystems by reducing net anthropogenic mangrove loss to zero (saving approximately 16,800 ha relative to business as usual), restoring half of recently lost mangrove area (over 400,000 ha at a rate of approximately 50,000 ha per year until 2030), and doubling the area-based protection of mangroves from 40% to 80% (an additional 6,100,000 km<sup>2</sup> under protected areas and other effective area-based conservation measures).<sup>8</sup>

In 2022, the Global Mangrove Alliance and UN High-Level Climate Champions led a community of governments, businesses, civil society, public and private funds and research organizations to launch the Mangrove Breakthrough.<sup>9</sup>

Conservation and restoration of mangrove ecosystems are important for achieving the Sustainable Development Goals (SDGs), including, among others, SDG 13, to limit and adapt to climate change, SDG 14 on life below water, and SDG 6 on freshwater, particularly Target 6.6 on protecting and restoring water-related ecosystems.<sup>10</sup> Given their importance to livelihoods, mangroves are relevant to SDG 2 (zero hunger), SDG 8 (economic growth) and SDG 12 (responsible consumption and production). At the 2017 United Nations Conference to Support the Implementation of SDG 14, participants submitted 116 voluntary commitments that specifically mentioned “the restoration, rehabilitation, protection and management of mangroves and associated ecosystems.”<sup>11</sup> At the 2022 Conference, participants submitted over 200 additional voluntary commitments on mangroves.<sup>12</sup>

As of 2023, 97 countries have included coastal and marine ecosystems, including mangroves, in their Nationally Determined Contributions (NDCs) to the Paris Agreement, and 61 countries have included conservation or restoration of blue carbon ecosystems as a mitigation and/or adaptation measure.<sup>13</sup> Many of these specifically call out mangroves.<sup>14</sup> For example, Seychelles has committed in the adaptation section of their NDC to protect at least 50% of the nation’s mangrove and seagrass ecosystems by 2025 and 100% by 2030 (see [Seychelles case study](#)).<sup>15</sup> Costa Rica has committed to protect the 22,000 hectares (ha) of mangroves recorded in its National Wetland Inventory and to explore innovative conservation finance mechanisms (see [Costa Rica case studies](#)).<sup>16</sup>

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<sup>8</sup> About Us, The Global Mangrove Alliance. Available at: <https://www.mangrovealliance.org/about-us/>.

<sup>9</sup> Global Mangrove Alliance (2023), *The Mangrove Breakthrough: Guiding Principles*; Owen-Burge, C. (2023) *Launch of the Ocean Breakthroughs: 5 pathways to catalyze action to achieve a healthy and productive ocean*, Climate Champions.

<sup>10</sup> GA Res. 70/1 *Transforming Our World: the 2030 Agenda for Sustainable Development*, (21 October 2015).

<sup>11</sup> *Communities of Ocean Action, The Community of Ocean Action for Mangroves –Towards the Implementation of SDG14: Interim Report to UN-DESA*, p. 5.

<sup>12</sup> IISD Earth Negotiations Bulletin, 2022 UN Ocean Conference. <http://enb.iisd.org/2022-un-ocean-conference>.

<sup>13</sup> Leckerf, M., Herr D., Elverum, C., Delrieu, E. and Picourt, L., (2023), *Coastal and marine ecosystems as Nature-based Solutions in new or updated Nationally Determined Contributions*, Ocean & Climate Platform, Conservation International, IUCN, Rare, The Nature Conservancy, Wetlands International and WWF.

<sup>14</sup> Haseeb Bakhtary, Franziska Haupt, and Jana Elbrecht, *NDCs – A Force for Nature? 4th Edition* (WWF, 2021).

<sup>15</sup> Republic of Seychelles (2021), *Seychelles’ Updated Nationally Determined Contribution*, UNFCCC.

<sup>16</sup> Costa Rica (2020), *Contribución Nacionalmente Determinada de Costa Rica 2020*, UNFCCC.

Belize has pledged in the adaptation section of their NDC to expand the area of mangroves under protection by 12,000 ha and restore 4,000 ha of mangrove forest by 2030 (see [Belize case study](#)).<sup>17</sup> Mozambique's updated NDC set a restoration target of 5,000 ha of mangroves by 2025 and identified mangroves as key breeding and feeding areas for fish.<sup>18</sup> Kenya and Tanzania's NDCs also specifically mention mangroves,<sup>19</sup> while Madagascar is in the process of updating its 2016 NDC, which already included mangroves. There are a range of resources and tools for strengthening the inclusion of mangroves in NDCs.<sup>20</sup>

Mangroves are highly relevant to the implementation of multiple goals and targets across the Kunming-Montreal Global Biodiversity Framework (GBF) adopted by Parties to the Convention on Biological Diversity (CBD). The GBF sets targets to conserve, manage, and restore 30% of terrestrial, marine and coastal ecosystems by 2030 and emphasizes that conservation should especially focus on areas of importance to biodiversity and ecosystem functions and services.<sup>21</sup> The GBF Complementary indicators specifically refer to mangroves, including Complementary Indicator a.9 on Continuous Global Mangrove Forest Cover, Complementary Indicator a.12 on Trends in mangrove extent, and Complementary Indicator a.10 on Trends in mangrove forest fragmentation.<sup>22</sup> Parties are expected to update their National Biodiversity Strategy and Adaptation Plans<sup>23</sup> (NBSAPs) to align with the GBF goals by COP16 in 2024, which provides an opportunity for governments to incorporate mangroves action into their new plans. Kenya (2000-2005 with an updated draft 2019-2030), Mozambique (2015-2035), Madagascar (2015-2025) and Tanzania (2015-2020) have included mangroves in their NBSAPs.<sup>24</sup>

Globally, 305 Ramsar sites contain mangrove ecosystems.<sup>25</sup> Parties to the Convention have long recognized the importance of wetlands. Resolution VIII.32 adopted in 2002 requests Parties to implement measures to protect and restore mangroves and exhorts them to update and exchange information on mangrove conservation, management and sustainable use.<sup>26</sup> Resolution XIII.14 encourages Parties to pursue policies to conserve and restore coastal wetlands, including mangroves.<sup>27</sup>

Countries can use synergies across international policy frameworks by aligning national commitments and plans, such as NDCs, NBSAPs and National Wetlands Inventories. This can accelerate the conservation and restoration of mangroves and other blue carbon ecosystems.<sup>28</sup>

<sup>17</sup> Belize (2021), Belize's Updated Nationally Determined Contribution, UNFCCC.

<sup>18</sup> The Mangrove Alliance (2022), Saving our mangroves in Kenya, Tanzania, Mozambique and Madagascar, WWF, IUCN, Wetlands International.

<sup>19</sup> The Mangrove Alliance (2022), Saving our mangroves in Kenya, Tanzania, Mozambique and Madagascar, WWF, IUCN, Wetlands International.

<sup>20</sup> Hamilton, J. et al. (2023), Blue Carbon and Nationally Determined Contributions: Second Edition, The Blue Carbon Initiative; Luz Gil et al. (2023) Integrating Mangrove Ecosystems into NBSAPs through the Global Mangrove Watch

<sup>21</sup> Convention on Biological Diversity, COP Dec. 15/4 Kunming-Montreal Global Biodiversity Framework, (19 December 2022).

<sup>22</sup> Global Mangrove Alliance, Global Mangrove Watch and Mangrove Specialist Group (2021), Guidance on Mangrove Indicators in the Post-2020 Global Biodiversity Framework.

<sup>23</sup> Luz Gil, et al., Integrating Mangrove Ecosystems into NBSAPs through the Global Mangrove Watch, p. 3, (Global Mangrove Alliance, 2023).

<sup>24</sup> The Mangrove Alliance (2022), Saving our mangroves in Kenya, Tanzania, Mozambique and Madagascar, WWF, IUCN, Wetlands International.

<sup>25</sup> Ramsar Sites Information Service (2023), RSIS Search Report: Mangrove, <https://perma.cc/YA2J-YB2J>

<sup>26</sup> Res. VIII.32 (2002).

<sup>27</sup> Res. XIII.14 (2018).

<sup>28</sup> IUCN & Conservation International (2023), International Policy Framework for Blue Carbon Ecosystems.

### 1.3 Principles for mangrove conservation, restoration and sustainable management

The international community has adopted multiple sets of principles and expansive guidance for implementing mangrove conservation, restoration and sustainable use. In 2021, the Save Our Mangroves Now (SOMN) initiative prepared the Guiding Principles on Sustainable Mangrove Ecosystem Management (Mangrove Principles), which provide guidance for national policy decision-makers responsible for sustainable mangrove ecosystem management.<sup>29</sup> The principles, launched at the IUCN World Conservation Congress, have been endorsed by several actors in the international conservation community. The Mangrove Principles include three on legal and policy frameworks: 1) Adopt national policies that prioritise the reservation of mangroves; 2) Recognise that mangrove ecosystems transcend political, municipal and state boundaries; and 3) Put mangrove conservation and restoration at the top of national agendas, and ensure mangrove communities are represented at international conventions. Additional principles address the need to ensure an engaged and equitable society, the importance of sound science and knowledge, the achievement of a sustainable economy through a local approach and consideration of communities and future generations, and sustainable conservation financing.

The High-Quality Blue Carbon Principles and Guidance, developed in 2022 by a Mangrove Expert Group convened by the World Economic Forum, aim to “guide the development and procurement of high-quality blue carbon projects and credits”.<sup>30</sup> The five principles are to safeguard nature, empower people, operate locally and contextually, mobilize high-integrity capital, and employ the best information, interventions and carbon accounting practices.

These principles informed the development of the Mangrove Breakthrough’s six Principles: 1) Safeguard nature and maximize biodiversity; 2) Employ the best information and practices; 3) Empower people; 4) Align to the broader context – operate locally and contextually; 5) Design for sustainability; and 6) Mobilise high-integrity capital.<sup>31</sup>

The Global Mangrove Alliance and the Blue Carbon Initiative, along with dozens of mangrove scientists and user groups across the world, developed The Best Practice Guidelines for Mangrove Restoration in 2023.<sup>32</sup> The Guidelines include step-by-step guidance for setting goals and assessing feasibility, project design, engagement and implementation and monitoring and evaluation, as well as a special module on blue carbon. The Guidelines also incorporate the Mangrove Breakthrough Guiding Principles in the form of six guiding principles for successful mangrove restoration.

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<sup>29</sup> Save Our Mangroves Now (2021), Mangrove Principles: Guiding Principles on Sustainable Mangrove Ecosystem Management SOMN is an initiative of the Federal German Ministry for Economic Cooperation and Development (BMZ), IUCN, Wetlands International and WWF.

<sup>30</sup> World Economic Forum (WEF) et al. (2022) High-Quality Blue Carbon Principles and Guidance.

<sup>31</sup> Global Mangrove Alliance (2023), The Mangrove Breakthrough: Guiding Principles.

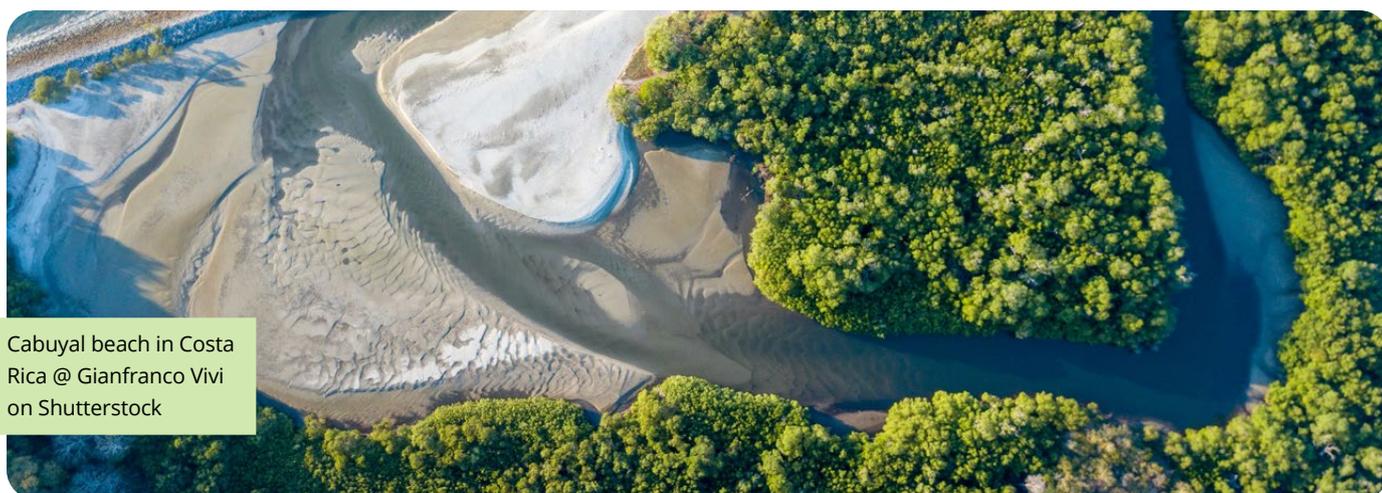
<sup>32</sup> Beeston, M., Cameron, C., Hagger, V., Howard, J., Lovelock, C., Sippo, J., Tonneijk, F., van Bijsterveldt, C. and van Eijk, P. (Editors) 2023, Best Practice Guidelines for Mangrove Restoration, Global Mangrove Alliance.

## 1.4 Using national legal and policy frameworks to achieve global mangrove goals

A growing number of countries are adopting laws and policies specifically aimed at the conservation or restoration of mangroves. As of 2023, at least 75 jurisdictions explicitly consider mangroves in their national laws.<sup>33</sup> Among these, 64 have explicit mangrove cutting or clearing regulations, including at least 19 that ban all uses (with potential exceptions for traditional or subsistence use).

A broad range of legal and policy tools and mangrove management approaches are available across sectors and levels of government. Policymakers can use a range of different legal tools and approaches to promote mangrove conservation, restoration, and sustainable use. These can include systems of protected areas, direct prohibitions on cutting or clearing of mangroves, regulation of activities like aquaculture or coastal development or permitting and environmental impact assessment requirements, among many others.<sup>34</sup> The most effective combination of tools and approaches for a given country depends on its national legal, social and ecological circumstances.

This brief will explore selected national-level legal and policy options for mangrove conservation, restoration and sustainable use: 1) incentives and financial mechanisms such as blue carbon measures, Payments for Ecosystem Services (PES) programs, fiscal incentives and subsidies, and product certification; 2) community management of mangrove areas, including tools for community management (such as conservation agreements and concessions) and the legal context for community management, particularly issues around rights, tenure and legal pluralism; 3) specific national mangrove policies such as national mangrove management plans and strategies; and 4) integrated planning laws and regulations which can incorporate consideration of mangroves. The brief ends with key considerations and recommendations for developing and implementing mangrove laws and policies. Several case studies and examples from national policies are presented throughout the brief as well as in the Annex.



Cabuyal beach in Costa Rica @ Gianfranco Vivi on Shutterstock

<sup>33</sup> Mangrove Law and Policy Database developed through a partnership between WWF-US, Georgetown Law and Griffith University (unpublished).

<sup>34</sup> Lydia Slobodian and Léa Badoz, eds., *Tangled Roots and Changing Tides: Mangrove Governance for Conservation and Sustainable Use* (WWF and IUCN, 2019).

## 2. Incentives and financial mechanisms for mangrove conservation, restoration and sustainable use

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The high value of mangrove ecosystems makes a strong business case for investment in mangrove conservation. It opens the door for private as well as public investment. This can take the form of the sale of blue carbon credits, taxes on users of mangrove services, direct payments for conservation or restoration, biodiversity offsets, or other payments for ecosystem services (PES).

The carbon sequestered by ocean and coastal ecosystems, or blue carbon, is increasingly recognized as a key nature-based solution to global climate change.<sup>35</sup> Blue carbon ecosystems like mangroves are among the most effective carbon sinks on the planet,<sup>36</sup> and their degradation contributes to 19% of carbon emissions from global deforestation.<sup>37</sup> This potential has created growing interest in blue carbon credits.<sup>38</sup> As of 2022, only eight fully validated mangrove blue carbon projects are in operation, but there is growing interest from the private sector.<sup>39</sup>

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<sup>35</sup> Christian Nellemann et al., *Blue Carbon: The Role of Healthy Oceans in Binding Carbon*, Center for Coastal and Ocean Mapping, January 1, 2010, <https://scholars.unh.edu/ccom/132>; “High-Quality Blue Carbon Principles and Guidance’ Seeks to Drive Sustainability and Equity in the Blue Carbon Market,” The Nature Conservancy, accessed October 11, 2023, <https://www.nature.org/en-us/newsroom/blue-carbon-principles-guidance/>; Dorothée Herr et al., “Pathways for Implementation of Blue Carbon Initiatives,” *Aquatic Conservation: Marine and Freshwater Ecosystems* 27, no. S1 (2017): 116–29, <https://doi.org/10.1002/aqc.2793>.NeN

<sup>36</sup> Nellemann et al., “Blue Carbon.”

<sup>37</sup> Herr et al., “Pathways for Implementation of Blue Carbon Initiatives.” Three types of ecosystems - mangrove, seagrass, and salt marsh - are recognized by the Intergovernmental Panel on Climate Change (IPCC) as being blue carbon ecosystems for their ability to sequester and store carbon in their biomass and underlying soils for long periods of time.

<sup>38</sup> “High-Quality Blue Carbon Principles and Guidance’ Seeks to Drive Sustainability and Equity in the Blue Carbon Market.”

<sup>39</sup> Daniel A. Friess et al., “Capitalizing on the Global Financial Interest in Blue Carbon,” *PLOS Climate* 1, no. 8 (August 15, 2022): e0000061, <https://doi.org/10.1371/journal.pclm.0000061>.

Table 1: Types of payments for ecosystem services

	Private payer	Public payer
Private provider	<p>Private resource user pays community or individual for conservation of resource.</p> <p>Examples: blue carbon market, biodiversity offsetting, private payments by downstream water users</p> <p>Legal tools: private contract; cap-and-trade; offsetting requirement; market regulation.</p>	<p>Government pays community or individual for conservation of resource.</p> <p>Example: subsidies for conservation/restoration</p> <p>Legal tools: public-private contract; public fund; subsidy; tax break; easement.</p>
Public provider	<p>Private resource user pays government agency or body for the use of the resource.</p> <p>Example: Tax on water users to fund conservation</p> <p>Legal tools: tax, concession, offsetting requirement.</p>	<p>Government entity pays another government entity for ecosystem services.</p> <p>Example: municipality pays government water management agency for water</p> <p>Legal tools: contract/MOU/coordination measure among agencies</p>

The sale of blue carbon credits is a version of PES. PES systems involve payment from a beneficiary to a provider of an ecosystem service, such as carbon sequestration, clean water or biodiversity habitat. Tens of billions of dollars each year are spent on PES around the world.<sup>40</sup> PES can involve public or private payers and providers (Table 1).

In addition to offset markets, privately-funded PES can take the form of private agreements or contracts, such as where a downstream user pays an upstream user (either private or public) for water purification. Government-funded PES compensates local communities, landholders and in some cases other government agencies for conserving and restoring mangrove resources.

<sup>40</sup> James Salzman et al., "The Global Status and Trends of Payments for Ecosystem Services," *Nature Sustainability* 1, no. 3 (March 2018): 136-44, <https://doi.org/10.1038/s41893-018-0033-0>.

## 2.1 Taxes and direct payments

Subsidies, tax credits, and other fiscal incentives are potentially powerful tools for mangrove conservation and restoration. For such approaches to be effective, it is important to balance the bureaucratic requirements of the program, which can serve as a barrier to entry, with the need for monitoring and regulation over a sufficient time scale to ensure that the program is effective.

One form of PES is a tax on the use of resources which is used to fund conservation of the resource. For example, Quito's Water Conservation Fund is financed through a 1% tax on water utility bills.<sup>41</sup> In 2023, Bali adopted a tourism tax, a fraction of which will be used to fund mangrove conservation.<sup>42</sup> Revenue from ecotourism operations managed by local communities is already being used to maintain and manage mangrove ecosystems, e.g. through seed planting and waste clearing.<sup>43</sup>

PES can be coordinated by the government but still take advantage of private funding. For example, under Costa Rica's PES program, the government-operated Fondo Nacional de Financiamiento Forestal (FONAFIFO) provides direct payments to landowners for sustainable forest management, through which it generates carbon credits that it sells on the international carbon market. In Costa Rica's National Blue Carbon Strategy, the country communicates its intent to expand the terrestrial PES program to recognize marine ecosystem services, which would include mangroves (see Costa Rica case studies).

All PES programs require clear identification of the ecosystem service provider as well as payments sufficient to cover the costs, including opportunity costs from not using the resource. They should also guard against incentives that could lead to planting inappropriate species or monocultures optimized to qualify for specific programs or subsidies.

## 2.2 Creating and regulating markets

Sustainably and fairly monetizing mangrove ecosystem services, including blue carbon, through sale of credits first requires a market. Such markets can be either compliance markets, created by government rules limiting emissions or other environmental degradation, or voluntary markets where companies voluntarily purchase credits to demonstrate their commitment to addressing climate change or biodiversity loss.

Compliance carbon markets typically take the form of "cap and trade" systems, where a government or other regime sets emissions limits and regulated entities can buy or trade credits to ensure they achieve these limits. Where these systems allow purchase of credits from other sectors, there is potential for blue carbon credits to enter the market. For example, the European Union Emissions Trading System, which allows actors to meet their compliance obligations partly through offsetting credits, can potentially include credits from blue carbon projects.<sup>44</sup>

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<sup>41</sup> Salzman et al., "The Global Status and Trends of Payments for Ecosystem Services."

<sup>42</sup> Bali governor's Decree No. 36/2023

<sup>43</sup> Ginantra, 2022. Mangrove Conservation: An Ecotourism Approach. Environmental Sciences. IntechOpen. doi:10.5772/intechopen.109253

<sup>44</sup> Adam Orford, "Blue Carbon Law", Sea Grant Law & Policy Journal, Forthcoming, available at SSRN: <https://ssrn.com/abstract=4501437>

Setting up this kind of carbon market requires a legally-binding, defined emissions target, strong and well-implemented regulations defining how carbon credits can be generated and traded, and a system for monitoring and enforcing regulations on carbon credits. If emissions targets are set too high, regulated entities will not need to buy as many credits to offset their emissions, and the price of carbon credits on the market may be too low to effectively compensate projects and stakeholders.

Compliance markets for biodiversity offsets operate in a similar way, through requirements that private developers offset their environmental impacts through purchase of mitigation credits. For example, through the Clean Water Act's Compensatory Mitigation requirement, the United States requires developers to offset impacts on wetlands by purchasing certified mitigation credits from a bank of restored ecosystems. This can include mangrove projects, such as the Mangrove Point Mitigation Bank in Florida.<sup>45</sup>

Voluntary markets can be easier to access because they do not involve the same legal requirements and structures as compliance markets. However, if the carbon market is not sufficiently regulated and monitored, it can be flooded with low quality credits that do not actually represent avoided or sequestered emissions, essentially granting emitters a license to pollute. In this case, the market loses its power to effectively mitigate climate change as well as to finance mangrove ecosystem restoration.

Blue carbon credits can be eligible for transactions under the International Carbon Market under Article 6 of the Paris Agreement, as long as they meet minimum requirements from Article 6 guidance. They are also eligible for use under the International Civil Aviation Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA).

National laws and policies can support the development of both voluntary and compliance markets by creating platforms for registering and trading credits, setting standards and providing resources for measuring and verification, and encouraging and facilitating participation by national and international actors. For example, Panama has laid the groundwork for a carbon market to support low-carbon development in the country (see Box 1: Panama). National laws and policies can also create the framework international markets require (Article 6 and CORSIA) and take advantage of these growing markets.

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<sup>45</sup> 'Mangrove Point Mitigation Bank,' The Mitigation Banking Group. <https://mitigationbankinginc.com/mangrove-point-mitigation-bank/>

**Box 1: National Carbon Market and “Reduce Your Footprint” Program in Panama**

Panama’s Environment Ministry (MiAmbiente), together with national and international partners, are in the process of structuring a national carbon market. It is grounded in two pieces of essential legislation. Executive Decree No. 100 of October 20, 2020, established the national Reduce Your Footprint program, which oversees the management of low-carbon economic and social development in Panama. Executive Decree No. 142 of December 9, 2021, lays the foundation for a national carbon market. It outlines the market’s function as a national compensation system, catering to the demand for GHG emission reduction units from domestic actors in the Reduce Your Footprint program as well as international actors. The Climate Change department of MiAmbiente plays a central role in ensuring the effective operation and adaptation of the market, striving to harmonize it with national and international objectives.

The Reduce Your Footprint program applies to government agencies and private companies in, inter alia, the logistics, construction, forestry, financial, agricultural, and hospitality sectors, as well as the Panama Canal. While the program is voluntary, it can be used as a requirement to unlock government incentives, such as COVID relief funds. Moreover, the framework adopts standards and a registry for monitoring, verifying, and reporting emissions.

The Blue Natural Heritage initiative—a partnership involving Audubon Americas, the Inter-American Development Bank, the UK Blue Carbon Fund, and the Panama Audubon Society—fosters coordination among stakeholders and supports the inclusion of blue carbon projects in the national carbon market.

*Excerpt from [Panama case study](#) by Inês Côte-Real de Portugal Fernandes and Adriana Moreno from the National Audubon Society, and Anelise Zimmer from The Pew Charitable Trusts; with additional information from <https://unfccc.int/news/panama-launches-new-programme-towards-implementing-its-ndc>*



Mangrove forest, Caravelas, Brazil  
© Conservation International

## 2.3 Monitoring and verification

Monitoring and verification are essential for all financial mechanisms and are particularly vital in the case of carbon markets and other offset markets. Regulation and independent verification of traded credits are essential to ensure social and environmental integrity, quality, and accountability.

Independent bodies have developed guidelines and standards for the verification of carbon credits. These include the Integrity Council for Voluntary Carbon Markets and the Voluntary Carbon Markets Initiative. New methodologies can verify results from efforts that meet Paris Agreement Article 6 and CORSIA criteria (e.g., Verra REDD+ JNR) towards higher integrity. The Voluntary Carbon Standard Association has published methodologies for two project types relevant to blue carbon: VM0024 (Methodology for Coastal Wetland Creation) and VM0033 (Methodology for Tidal Wetland and Seagrass Restoration).

## 2.4 Defining rights and sharing benefits

Effective financial mechanisms, including carbon markets, require clarity on carbon rights, land tenure, and benefit sharing to avoid conflict and ensure legitimacy. In many jurisdictions, coastal areas within a certain distance from the high tide mark are not subject to private ownership. Land and resource tenure can be complicated by inconsistent or conflicting regimes governing, e.g., forest rights, fishing rights, water rights and land rights, and recently rights to benefit from sequestered carbon.<sup>46</sup> This can make it more complicated to implement payments to resource owners/users or set up an agreement or operation involving private investment. Clarification of carbon and other resource rights in mangrove areas can facilitate financial mechanisms and ensure benefits flow to local communities as custodians.



Gazi Bay, Kenya © Julia Jung

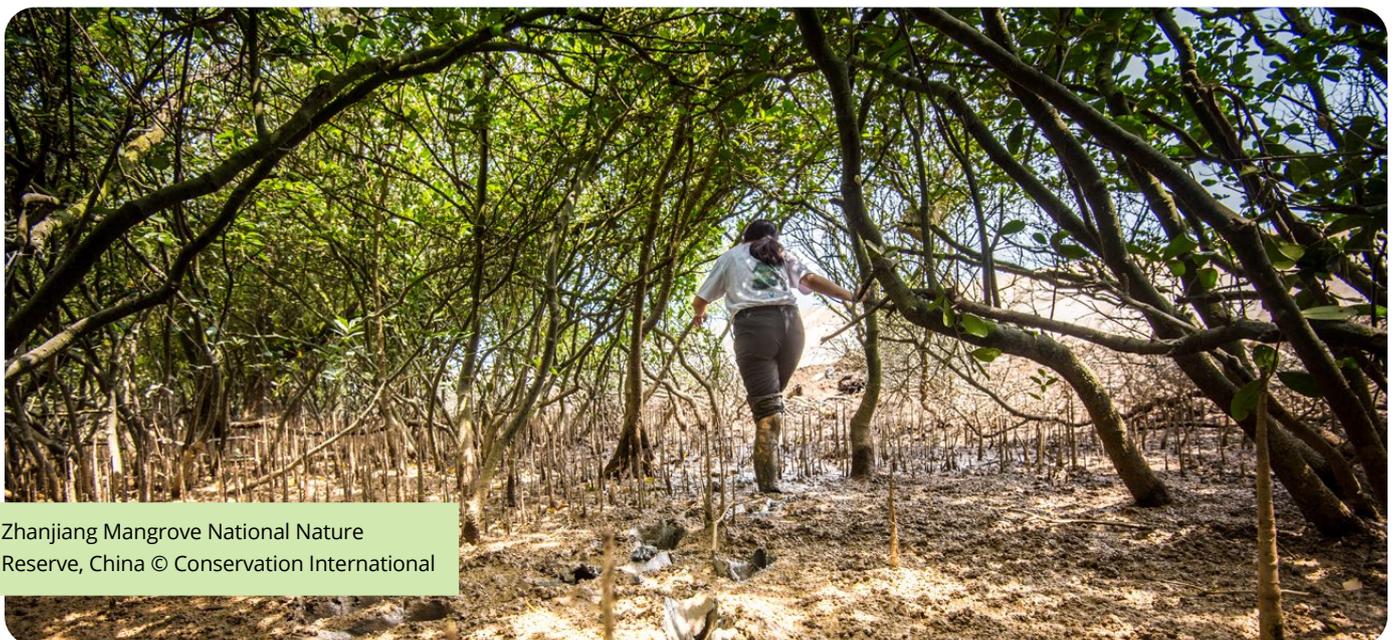
<sup>46</sup> Christine Merk et al., "The Need for Local Governance of Global Commons: The Example of Blue Carbon Ecosystems," *Ecological Economics* 201 (November 1, 2022): 107581, <https://doi.org/10.1016/j.ecolecon.2022.107581>.

## 3. Community management of mangrove resources

Over 50 countries have legal frameworks that allow community management of mangrove resources. These take the form of direct recognition of community rights and authority over mangrove areas, provisions for conservation agreements or partnerships, or Indigenous and community conserved areas (ICCAs) or co-managed protected areas.<sup>47</sup> Communities also play an important role in blue carbon projects and other PES systems. Successful community management of mangrove areas requires both supportive legal frameworks and consideration of the broader legal context, particularly issues related to community rights, tenure and legal pluralism. Linking community mangrove management to broader landscape, seascape and watershed level planning can strengthen sustainability.

### 3.1 Legal frameworks for community management of mangrove areas

Conservation agreements typically recognize community or private ownership or access rights over natural resources and in exchange impose responsibilities. For example, in Ecuador, traditional mangrove users can apply for a concession to use mangrove areas under a sustainable use and stewardship agreement (see [Box 2: Ecuador](#)).



Zhanjiang Mangrove National Nature Reserve, China © Conservation International

<sup>47</sup> Mangrove Law and Policy Database developed through a partnership between WWF-US, Georgetown Law and Griffith University (unpublished).

**Box 2: Agreements for sustainable use and custodianship of mangrove ecosystems in Ecuador**

Mangroves have several regulatory instruments for their conservation and management. The Constitution of the Republic of Ecuador includes mangroves as fragile and threatened ecosystems over which the State may establish norms for their conservation, management, sustainable use, recovery and ownership. The Ministry of Environment, Water and Ecological Transition (MAATE) is the authority in charge of their administration. In 1990, the Forestry, Natural Areas and Wildlife Law was reformed to declare all mangrove areas (including those owned by the private sector) state property that can only be exploited through concessions. In 1999, the regulatory framework for traditional mangrove users was put in place, allowing for the application for concession of mangrove areas, through a sustainable use and stewardship agreement issued by MAATE.

The sustainable use and custody agreements of the mangrove ecosystem (AUSCEM) are legal tools promoted by the Ecuadorian government since 2019, the main purpose of which is the protection of the mangrove forest through a territory concession given by the government to ancestral users, to ensure that such territories are guarded to avoid illegal logging, and that in return, the group of concessionaires can make preferential use of mangrove resources, especially linked to the capture of red crab (*Ucides occidentalis*) and concha prieta (*Anadara tuberculosa*) for a period of 10 years with the possibility of renewal. As of October 2023, there are 53 AUSCEMs in force covering 50,252.39 ha of mangroves distributed among the provinces of Esmeraldas, Manabí, Guayas and El Oro provinces.

*Excerpt from Ecuador case study by Chalén, X., Echeverría, H., Suárez, L. & Zambrano, N., Conservation International Ecuador.*

In other countries, laws directly grant Indigenous communities responsibility over mangrove areas. For example, the Philippines Indigenous Peoples' Rights Act provides that "Ancestral domains or portions thereof, which are found to be necessary for critical watersheds, mangroves, wildlife sanctuaries...shall be maintained, managed and developed for such purposes. The [Indigenous Cultural Communities and Indigenous Peoples] concerned shall be given the responsibility to maintain, develop, protect and conserve such areas with the full and effective assistance of government agencies." (1997 Section 58). In Indonesia, communities can seek recognition of management rights through the social forestry program, which allows for co-management agreements or full recognition of community ownership rights.<sup>48</sup>

<sup>48</sup> Santoso, H. and Purwanto, E. (2020), Improving social forestry in Indonesia - Recommendations for CSOs, Tropenbos International; Moeliono, M. et al. (2023), Social Forestry in Indonesia: Fragmented Values, Progress, Contradictions, and Opportunities, Springer.

### 3.2 Legal context for community management of mangrove areas

In developing and promoting community management of mangroves, it is important to consider the legal context, particularly ownership, tenure and legal pluralism.

Ownership, rights and tenure issues in mangrove areas can be complex and unclear. A land tenure analysis can be a helpful tool (see Box 3: Belize). Unclear tenure is a common barrier to community management of mangrove ecosystems.

#### **Box 3: Land tenure analysis and National Mangrove Action Plan in Belize**

To inform future management decisions for Belize's mangroves and to enable the protection, restoration, and carbon sink goals in Belize's NDC, a land tenure analysis of Belize's mangroves is underway. The land tenure analysis will aim to produce an updated land tenure inventory for Belize's mangrove areas to contribute to the engagement of coastal-marine land stakeholders (public and private) on practices and actions to foster sustainable and climate-smart development around and within mangroves. This study will provide the baseline data and enabling conditions for which Belize may implement their ambitious, inclusive, and science-based mangrove-related NDC goals.

In coordination with these efforts, the Belize National Chapter of the Global Mangrove Alliance (also known as the Belize Mangrove Alliance) is supporting the development and implementation of a National Mangrove Action Plan for Belize, which will be completed in 2024. The Plan development is being carried out synergistically with the land tenure analysis, a process that will help to identify and verify mangrove areas that could be targeted for restoration within the Plan in an integrated way. The Plan will also highlight the important role of Belize's mangroves as a carbon sink and provide justification for restoration and protection.

*Excerpt from Belize case study by Anelise Zimmer, Kim Jenson, and Tom Hickey from The Pew Charitable Trusts and Nadia Bood from WWF Belize*

Mangrove conservation and management implicates customary law as well as statutory law. In some countries, customary norms and authorities are explicitly recognized in the national legal system, which can facilitate community management of mangroves (Box 4: Fiji). In Fakfak, West Papua in Indonesia, the “adat”, traditional authority, established a Kerakera (local wisdom) mechanism to protect mangroves by setting a closed and open season for access, with a community representative assigned to undertake regular patrolling and monitoring. While not recognized in the statutory system, the area protected under Kerakera can be included as a protection zone under the coastal zonation plan.<sup>49</sup> It is important to carefully consider customary law when developing national laws and policies, as conflicts between custom and statute can undermine and delegitimize legal frameworks.

#### **Box 4: Customary law and mangrove management in Fiji**

In Fiji, legal pluralism is recognized by law. The Fisheries Act gives iTaukei Fijians, indigenous Fijians, the right to practice traditional management in qoliqoli, with fishing rights held in common by the community as a whole (Fisheries Act §§ 13-20). Qoliqoli may include tabu areas where community fishing is prohibited. Communities can manage resources through Locally Managed Marine Areas (LMMAs), which are established within qoliqoli and often feature tabus. Within an LMMA, communities can decide between establishing permanent closures for resource extraction or closures with periodic harvesting, which is based upon traditional resource management utilizing tabus. The Fiji LMMA network grew rapidly and by 2014, the network had established 466 tabus in 135 qoliqoli, which covered an area of 79% Fiji’s inshore fishery area. (FLMMA Strategic Plan 2014-2019: pg 4)

For the 2023 International Day for the Conservation of Mangrove Ecosystem & World Mangroves Day, WWF with the support of the Govt of Fiji and especially the traditional owners of two islands of Nukuvadra & Katawaqa Islands declared the islands as designated Community Marine Protected areas, based on the existence of turtle nesting sites as well as the vast area of mangroves which covers almost the entirety of the two islands.

In addition, Fiji is currently drafting the Mangrove Conservation and Management Regulation under the Environment Management Act. This regulation will set out the functions of the National Mangrove Management Committee, provide for the establishment and management of mangroves protected areas, guide development processes in mangroves areas, address appointment of mangrove wardens and outline offenses and penalties for public noncompliance. It will also help to ensure enhanced collaboration and cooperation among ministries and synergies in decision making processes.

*Based on Fiji case study by Megan Algya, Georgetown Law, and Alfred Ralifo, Francis Areki, Unaisi Malani and Margaret Vakalalabure, WWF Pacific.*

<sup>49</sup> Dahlan Iha, Hanggar Prasetio, Sefrianto Saieda and Susan Lusiana, Local Mangrove Ecosystem Protection Knowledge, Unpublished report; Barat, W.N.P. (2023) Pengelolaan Ekosistem Magrove di Teluk Berau, Wakil Bupati Fakfak: Lestarian Budaya Kerakera Mangrove, Wahana News Papua Barat. <https://papua-barat.wahananews.co/utama/pengelolaan-ekosistem-magrove-di-teluk-berau-wakil-bupati-fakfak-lestarian-budaya-kerakera-mangrove-v14bczPnQt>

### 3.3 Engagement of communities in mangrove conservation and restoration

Mangrove conservation and restoration projects are often most successful when directly engaging with local communities. Community members are often best placed to undertake restoration work. Their leadership in conservation and restoration can also provide communities with an alternative income to replace revenue from unsustainable activities that degrade mangrove ecosystems. Involving communities directly in restoration and giving them a financial stake in its success fosters local ownership, making for more effective and sustainable projects. Including marginalized genders and groups in the decision-making process and the distribution of benefits is particularly important. Supportive laws and policies are important to scale up such projects and ensure their permanence.

First, the terms of community involvement should be clearly outlined in contracts or agreements which stipulate the responsibilities and obligations of the community and the amount and timing of payment. In some cases, as in the Bio-rights programme in Indonesia, payment can be conditional on performance or achievement of specified environmental targets (see [Indonesia case study](#)).

Second, the projects should be conducted following conservation plans or targets developed with broad stakeholder participation and ideally adopted at the community or regional level. While not legally binding, the Parita Bay Conservation Plan developed by the Panama Audubon Society is a good example of a collaborative process. Development of the conservation plan followed Open Standards methodology and involved the Environment Ministry, Aquatic Resources Authority, Ministry of Agriculture, Ministry of Education, Ministry of Tourism, local authorities, NGOs, academia, local authorities, community groups and leaders, conservation actors, fishermen, etc. (see [Panama case study](#)).

Third, community engagement in mangrove restoration requires a secure source of funding to be sustainable beyond the often short-term project funding cycle. Failure to secure permanent funding can not only mean the end of progress on the project, it can also damage community trust and willingness to engage in future conservation work. In Indonesia, the establishment of a national Environmental Fund Management Agency provides a potential mechanism for sustainable funding and scaling up of community mangrove restoration projects (see [Box 5: Indonesia](#)).



Cabo Rojo wetlands, Dominican Republic © Christopher Esquea

**Box 5: Financing community engagement in Indonesia**

In the Building with Nature Indonesia project in Demak, Northern Java, managed by Wetlands International, 268 people from ten community groups participated in the Bio-rights programme, in support of mangrove restoration and conservation along a 20-kilometer eroded coastline where mangroves used to thrive. Participants in the Bio-rights programme were paid in advance in the form of small loans, in return for tasks such as constructing, maintaining, guarding, and inspecting permeable structures that trap mud and sediments so that mangroves can naturally regrow into a resilient mangrove greenbelt. Others worked on converting unproductive and degraded aquaculture ponds into sediment catching basins, where mangroves then regenerated naturally. Villagers were also involved in the revision of village development plans. Under the terms of the Bio-rights agreements, if the groups achieve the environmental targets, the loans are turned into grants that do not have to be repaid.

The participants of the Bio-rights programme spent the funds they received on integrating riverine mangrove restoration in part of their aquaculture ponds, or creating alternative livelihoods and other projects of benefit to communities. Through coastal field schools that lasted a full cropping season, small-scale aquaculture pond farmers learned about the ecology of coastal waters, the functions of mangroves, and best practices in pond ecology and management to advance their livelihoods and sustain coastal ecosystems. The project also supported farmers with equipment to harvest wild fish from in and around the resurgent mangroves. More than 80 per cent of fishers report better near-shore catches, with incomes now as good as those from aquaculture. Aquaculture profit margins from ponds where sustainable practices were applied were typically three times higher than before. Most groups have reached their targets, and continue to meet with Wetlands International every month.

During the implementation of the programme, the government from the national, provincial, district, and village levels, provided support in the form of program allocations and/or funding to the community groups.

Recent legal developments may facilitate further scaling up. There has been an opportunity through the Environmental Fund Management Agency (BPDH), as a funding mechanism that has a clearer policy framework. In 2019, the Indonesian government established the BPDH, supported by two new regulations, PP No. 46/2017 on Environmental Economic Instruments and Perpres No. 77/2018 on Environmental Fund Management. BPDH collects funds from public and private sources including state and regional budgets, philanthropy, NGOs, private companies and international funds. It has flexibility in distributing benefits to communities and businesses across a range of sectors, including mangroves.

*Excerpt from Indonesia case study by Apri Susanto Astra, Ragil Satriyo, and Susanna Tol, Wetlands International.*

## 4. National mangrove plans, policies and strategies

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At least 20 countries have adopted national policies specifically and explicitly targeted at mangroves, including Brazil, Thailand and Senegal.<sup>50</sup> These can be legally binding national regulations on mangroves or non-binding national mangrove plans and strategies. While binding regulations can establish enforceable restrictions on the cutting, conversion or use of mangroves, non-binding policies can also serve an important coordinating and planning role. They can also be developed at the regional level, such as the Regional Mangrove Action Plan for the Western Indian Ocean, which is currently in preparation (see [Box 6: Western Indian Ocean](#)).

Sailfin Lizard  
© Dominador Asis Jr



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<sup>50</sup> Mangrove Law and Policy Database developed through a partnership between WWF-US, Georgetown Law and Griffith University (unpublished).

**Box 6: Towards a Regional Mangrove Action Plan for the Western Indian Ocean**

In 2021, Member States of the Nairobi Convention adopted Decision CP.10/12/2(d) to develop a WIO Regional Mangrove Vision and Regional Mangrove Action Plan (RMAP). A Regional Policy Advisory Group of the Western Indian Ocean Mangrove Network confirmed the vision: “A healthy and resilient mangrove ecosystem in the WIO region by 2050 for the benefit of people and nature”. They drafted seven strategic objectives for the RMAP: (i) promoting the translation of science into policy and ensuring the implementation of national and international legislation for the protection, rehabilitation, expansion, sustainable use and management of Mangroves in the WIO Region; (ii) identifying and sustainably managing natural, human, and climatic induced impacts on mangrove ecosystem within the WIO Region in a way that actively involves the local community, raises awareness around these impacts; (iii) ensuring sound restoration/rehabilitation of degraded mangroves ecosystems to improve climate change resilience, community livelihoods and ecosystem services; (iv) establishing standardised and innovative monitoring and reporting of mangrove ecosystems and reporting; (v) identifying the needs and roles of stakeholders/actors in implementing sound management strategies; (vi) enhancing the capacity and capability of local communities to improve and establish alternative livelihood activities to promote good mangrove health; and (vii) effective communication, reporting and sharing of best practice across the region. The RMAP is scheduled to be completed, endorsed and adopted by Member States in 2024. It is expected to create a framework for regional policy dialogues around mangroves to enhance mangrove-related policies and sustainable management in the Western Indian Ocean.

*Excerpt from WIO case study by Mwita M. Mangora, Anusha Rajkaran, Rashid O. Ismail, Western Indian Ocean Mangrove Network.*

**4.1 Purpose of national mangrove policies**

In most countries, mangroves are governed through a patchwork of national and subnational policies, legislation and regulation across sectors, involving multiple agencies and actors with different interests and priorities. A specific national mangrove policy can help coordinate and harmonize these instruments and institutions.

Laws and authorities governing forests, coasts, freshwater and other sectors may apply to mangroves but often do not prioritize them. A national mangrove policy can help bring mangroves to the front of the minds of policymakers and officials. It can bring them together on an agreed set of goals and objectives. Specific targets can help affirm commitments and facilitate measuring progress. More concretely, a national mangrove policy can establish processes or mechanisms for coordination among agencies. It can also lay out an agreed-upon strategy for mangrove conservation, restoration and sustainable use.

**4.2 Outline and content of national mangrove policies**

The structure and content of national mangrove policies depends on the context and goals of the jurisdiction. Many jurisdictions have adopted national mangrove plans and/or strategies that contain certain common elements. Table 2 describes the function of these elements with examples.

Table 2: Elements of National Mangrove Plans and Strategies

Element	Description	Function	Example
<b>Background and assessment</b>	Information on legal framework, ecosystem extent and health, ecosystem services	Establish context, set baseline, identify problems to solve, highlight value/importance, clarify institutional responsibility	Kenya's <a href="#">National Mangrove Ecosystem Management Plan 2017-2027</a> includes the biophysical, socio-economic, legal and institutional status, an assessment of ecosystem services and threats, and a county-by-county situation analysis
<b>Principles and values</b>	Adoption of fundamental principles and values to guide implementation	Highlight agreement among stakeholders; set parameters and safeguards	<a href="#">Mozambique Mangrove Management Strategy 2020-2024</a> adopts the fundamental values of sustainability, equity, transparency and participation as well as the polluter pays principle and the principle of rational use and management, among others.
<b>Goals and objectives and strategy for achieving them</b>	General goals and specific objectives for mangrove conservation and restoration and activities for achieving the goals	Agree on commitments, enable measuring progress, estimate magnitude, define actions and clarify how they will be achieved	Ecuador's <a href="#">National Plan for Conservation of Mangroves</a> includes a Strategy for conservation of mangroves 2019 with defined general and specific objectives and components such as institutional coordination, scientific research, and sustainable financing. For each component, the strategic planning matrix sets out targets, priority actions, indicators, verification sources, responsible institutions and a timetable.
<b>Monitoring and evaluation</b>	Mechanism for monitoring and evaluating achievement of goals and objectives	Measure effectiveness of interventions and evaluate achievement of strategy	Brazil's <a href="#">National Plan of Action for Mangroves (2015-2020)</a> includes a matrix for monitoring progress on activities and a matrix for evaluating achievement of specific objectives with clear indicators.

Some countries have developed or are developing national plans and policies that address a specific topic closely related to mangroves, such as Costa Rica's National Blue Carbon Strategy (Box 7: Costa Rica).

### **Box 7: Costa Rica National Blue Carbon Strategy**

During its 2023 World Wetlands' Day celebration, Costa Rica launched its National Blue Carbon Strategy (NBCS), the first such policy instrument in the world. The strategy, strongly based on science and supported by a broad regulatory and policy framework on conservation and sustainable use of wetland ecosystems, is a key milestone for the country in achieving its nationally determined contributions (NDCs) and its National Decarbonization Plan. The strategy's main objective is "to establish a framework that integrates actions related to the management, conservation, restoration and rehabilitation of blue carbon ecosystems and wetlands with carbon sequestration potential to promote a model that benefits communities who depend directly on the ecosystem services they provide".

The strategy's eight guiding principles establish a clear participatory and inclusive route to promote the persistence and expansion of blue carbon ecosystems by developing and implementing stable long-term financial mechanisms that directly benefit the communities that are the primary stewards of these ecosystems. Its five strategic objectives respond to the needs of institutional organization, maintenance of blue carbon ecosystems health, finance mechanisms, fair and equitable distribution of benefits and awareness about the importance of those ecosystems. Its goals for 2025 include the development of a mechanism for promoting carbon credits, criteria for registration of carbon projects and management plans covering 100% of blue carbon ecosystems, and ensuring that local communities are stewards and beneficiaries of the actions. Its goals for 2030 include reversing the loss and degradation of blue carbon ecosystems, adoption by national institutions and scientists of a standard economic valuation guide, and accounting of the contribution of blue carbon ecosystems to the country's economy.

Under the leadership of Costa Rica's National Wetlands Programme, within the Ministry of Environment and Energy, and with technical support of partner Conservation International Costa Rica and in collaboration with The Pew Charitable Trusts, Costa Rica is currently working on developing the strategy's action plan.

*Excerpt from Costa Rica case study by Ana Gloria Guzmán-Mora, Sofía Cortés and Miguel Cifuentes-Jara, Conservation International; and Jacklyn Rivera, Wetlands Program Coordinator, Conservation Areas System Costa Rica.*

### 4.3 Developing a national mangrove policy

Development of national mangrove plans and policies is best done through a participatory process based on science and data. In Mexico, the National Mangrove Monitoring System has contributed to the development of national laws and norms for the protection of mangroves (see [Mexico Case Study](#)).

Belize is in the process of developing a national mangrove restoration action plan, coordinated by members of Belize's Global Mangrove Alliance national chapter. The process, which began in 2023, is centered on an inclusive process of stakeholder engagement, supported by desktop studies, field verification and spatial analysis of mangrove ecosystems aligned with the land tenure analysis. The process is inherently cross-sectoral with an advisory committee consisting of representatives from the Forest Department, Ministry of Blue Economy, Coastal Zone Management Authority and Institute, Fisheries Department, National Climate Change Office, National Biodiversity Office, and Department of Environment as well as WWF and the University of Belize (see [Belize Case Study](#)).



## 5. Coastal and integrated planning and management frameworks

Spatial planning is an important and ubiquitous tool for natural resource management. Often planning is sectoral – the same geographic area can be subject to land use plans, conservation plans, water plans, agricultural plans, etc. In recent years, the need for integrated planning has been widely recognized.<sup>51</sup> Integrated planning brings together interests and stakeholders from across sectors to develop comprehensive plans at the national, local or landscape level. Integrated Water Resource Management, Integrated Landscape Management and Integrated Coastal Zone Management are all forms of integrated planning and management.<sup>52</sup>

This section focuses on 1) coastal planning and marine spatial planning laws and 2) cross-sectoral integrated planning frameworks.



Proboscis monkeys combing a creek for food in North Kalimantan, Indonesia  
© Ryan Hidayat, TNC Photo Contest 2022

<sup>51</sup> Barbara Lausche, *Integrated Planning: Policy and Law Tools for Biodiversity Conservation and Climate Change* (IUCN, International Union for Conservation of Nature, 2019), <https://doi.org/10.2305/IUCN.CH.2019.EPLP.88.en>.

<sup>52</sup> *The State of the World's Land and Water Resources for Food and Agriculture – Systems at Breaking Point (SOLAW 2021)* (FAO, 2021), <https://doi.org/10.4060/cb7654en>.

## 5.1 Coastal planning and marine spatial planning

Over 30 countries explicitly refer to mangroves in coastal planning laws.<sup>53</sup> In some cases, existence of mangroves triggers a requirement for development of a plan. Saudi Arabia's Regulation for Sustainable Management of Marine and Coastal Environment includes mangroves as areas of high environmental importance in the marine environment for which the competent national center must develop and implement a management plan in coordination with relevant authorities (Executive Regulation for the Environmental Law m/165, 19/11/1441 Hijri).

Others provide for special zoning for mangrove areas. For example, the Brazil National Planning for Coastal Zone Management Law (1988) provides for coastal zoning that prioritizes the conservation of mangroves. South Africa designates mangrove areas as part of the "coastal protection zone," which warrants special treatment in national, provincial and municipal land planning and development regulatory processes (Integrated Coastal Management Act no. 24 of 2008).

Mozambique's Marine Spatial Management Plan (POEM), adopted in 2021, includes mangroves as critical ecosystems and recommends their conservation, restoration and inclusion in protected areas, including but not limited to Locally Managed Marine Areas. Most aspects of the Marine Spatial Management Plan were integrated into Mozambique's National Territorial Development Plan later that year.<sup>54</sup> To create a systematic dialogue space, involving government, civil society and development partners on pertinent issues linked to biodiversity, climate resilience and Nature-based Solutions (including mangroves), the Mozambique Government, in collaboration with IUCN, established a National Policy and Partnership Dialogue platform that was first convened in 2022 and will continue for the coming years.



Mangroves and needlefish off Mansuar Island, Indonesia  
© Conservation International

<sup>53</sup> Mangrove Law and Policy Database developed through a partnership between WWF-US, Georgetown Law and Griffith University (unpublished).

<sup>54</sup> Independent Evaluation Group (2022), ICR Review Mozambique Forest Investment Project, World Bank, p. 9. <https://documents1.worldbank.org/curated/en/099062323171510635/pdf/P1600330b4e000a10bbea0838ad258c337.pdf>.

## 5.2 Cross-sectoral integrated planning

Integrated planning requires supportive legal frameworks, which can include land use planning laws, zoning laws, Environmental Impact Assessment (EIA) requirements and coordination provisions in sectoral planning legislation. It can be facilitated by cross-sectoral planning legislation, such as the Kenyan Environmental Management and Coordination Act which provides for development of “an overall environmental management plan for a lake, river, wetland or coastal area, taking into account the relevant sectoral interest” (EMCA art. 42(3)). The National Biodiversity Act of India (2002) requires the national government to “integrate the conservation, promotion and sustainable use of biological diversity into relevant sectoral or cross-sectoral plans, programmes and policies” (Section 36(3)) and the 2017 Wetlands Rules direct wetland authorities to “coordinate implementation of integrated management plans based on wise use principles through various line departments and other concerned agencies (Section 5(4)).”

## 5.3 Environmental impact assessment

Environmental impact assessment (EIA) is an important tool for planning. EIA is a means to regulate potentially harmful activities and support permitting requirements. It can also provide an important source of environmental information supporting planning, particularly if EIA reports and underlying data can be made public. EIA requirements can be incorporated into integrated planning and management legislation or adopted in stand-alone environmental impact assessment statutes. For example, the Coastal Zone Management Act of Barbados states that the national coastal zone management plan may include standards for environmental impact assessment for development that affects the conservation and management of coastal resources, including coastal wetlands (1 L.R.O. 1998, art. 4).

About 30 countries have special EIA requirements for mangroves. For example, in Vanuatu, any clearance of mangroves or disturbance of coastal ecosystems triggers an EIA (Vanuatu Environmental Impact Assessment Regulations 2011). In Myanmar, an EIA is required for all projects located in or with “foreseeable adverse effects on” legally protected mangrove areas (Notification 616/2015, 25). These EIA requirements can reinforce integrated planning measures for mangrove areas.

## 6. Key considerations in developing and implementing mangrove policy and law

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**The development and implementation of law and policy governing mangrove areas warrants special considerations given the unique situation of mangrove ecosystems.**

**1. Coordination and participation.** The involvement of multiple interests, actors and stakeholders in the use and management of mangrove resources means that coordination and broad engagement are essential for the effective design and implementation of mangrove laws and policies. When developing new laws, the needs of different actors and sectors should be taken into account through opportunities for participation and consultation with different agencies and stakeholders, including community groups, industry and the public.

Civil society can play an important role in facilitating this participation. Effective implementation requires continued coordination across institutions and agencies, which can be facilitated through a national mangrove policy or integrated management plan. Capacity building and knowledge sharing are important across stakeholders.

**2. Legal clarity and coherence.** The location of mangroves at the juxtaposition of ecosystems, sectors and jurisdictions means there is a particular need for legal clarity and coherence. A national mangrove policy can facilitate this by mapping existing legal frameworks and tools, setting out agreed principles, goals, objectives and activities, and identifying responsible institutional actors for different strategy components. Legal clarity is also important for land and resource tenure—uncertain and insecure tenure can undermine community engagement in mangrove conservation and restoration, blue carbon projects and other financing mechanisms.

**3. Scientific and expert information and data.** Consistent, reliable, and updated data on mangrove ecosystems is needed to monitor progress towards achieving national and international mangrove conservation and restoration goals. Setting new commitments requires strong data for establishing baselines and understanding trends. Accurate mangrove data can stir public concern and motivate policymakers to take action. Evidence is important to demonstrate the feasibility and viability of inclusive and ecological mangrove restoration and conservation approaches. While civil society and academia are important partners in generating data, embedding data collection and monitoring in government institutions can ensure that it will be available in the long term, not subject to the project-funding cycle.

Relevant data includes information on ecology, hydrology, engineering, land uses such as aquaculture, socio-economic factors and livelihoods. Measuring success must go beyond the number of trees planted, and instead should consider the achievement and maintenance of the desired benefits for nature and people. Traditional and local knowledge and expertise is as important as scientific data.

**4. Valuation and alignment of incentives.** The high ecological and economic value of mangrove ecosystems creates a need for appropriate valuation and alignment of incentives. At the same time, mangroves may not fit easily into existing PES or blue carbon frameworks. Overvaluing the financial potential of mangrove projects can be as dangerous as undervaluing, as it risks overstating potential benefits and undermining future trust. It is important to consider a range of values, including biodiversity and coastal protection as well as non-market values like cultural ecosystem services.

**5. Efficiency and effectiveness.** The ecological, climate and economic importance of mangroves in the context of limited political and enforcement resources means there is a need for efficiency in development and adoption of laws and policies for mangrove conservation and sustainable use. Financial incentives and community engagement can be both efficient and effective when appropriately designed. Sharing of best practices among stakeholders and jurisdictions and engagement with organizations experienced in best practices for conservation and restoration can support effective design and implementation of mangrove law and policies. To be effective, laws and policies may need to be flexible and adaptive, particularly in the context of climate change.



Depleted mangroves, Yucatan, Mexico  
© Miguel Diaz, TNC Photo Contest 2022

# Case studies from the Global Mangrove Alliance

## Case study

# Belize Nationally Determined Contribution to the UNFCCC Paris Agreement

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**Contributors:** Anelise Zimmer, Kim Jenson, and Tom Hickey from The Pew Charitable Trusts and Nadia Bood from WWF Belize

Belize submitted its updated Nationally Determined Contribution (NDC) to the UNFCCC Paris Agreement in September 2021. It contained a number of ambitious climate commitments, including protection and restoration targets for its mangroves and other coastal wetland ecosystems. By committing to protect and restore both mangrove and seagrass ecosystems, the country recognized the benefits that these ecosystems offer: buffering coastal communities against the full impact of storms and flooding; providing wildlife with critical nursery and foraging grounds; and drawing down carbon dioxide from the atmosphere and storing this carbon in their soils. If undisturbed, this carbon can remain in place—and out of the atmosphere—for millennia.

In their 2021 NDC Update, Belize pledged to protect and restore coastal wetlands within the country by expanding the area of mangroves under protection by an additional 12,000 hectares while also restoring 4,000 hectares of mangrove forest. Key mangrove-related commitments in Belize's updated NDC include to enhance the capacity of the country's mangrove ecosystems to act as a carbon sink by 2030 by:

- Protecting a minimum of 6,000 hectares of mangroves by 2025 and 6,000 additional hectares by 2030, which will double the current levels of protection.
- Restoring at least 2,000 hectares of mangroves by 2025 and 2,000 more hectares by 2030.
- Halting and reversing net loss of coastal wetland habitat by 2025.
- Completing an in-situ assessment of the below ground carbon stock of mangroves by 2022, using IPCC compliant methodologies, alongside a comprehensive assessment of mangrove-based carbon stock in the National Greenhouse Gas Inventory and relevant reports by 2025.
- Exploring new financing options to support mangrove protection and restoration.
- Promoting the stewardship of local community and indigenous people's coastal lands as sustainably managed landscapes to serve as carbon sinks.

## The NDC in Practice

To ensure these mangrove and other coastal wetland commitments were backed by robust science, the country undertook its first ever comprehensive above and below-ground carbon assessment in September 2022. Led by the Smithsonian Institution in partnership with the University of Belize, World Wildlife Fund (WWF), and supported by The Pew Charitable Trusts, the project brought together government departments, local NGOs, and international researchers to take soil cores and tree measurements to estimate the amount of carbon stored in Belize's mangroves.

In March 2023, the Belizean government, WWF, and The Pew Charitable Trusts held a workshop to share the findings of this national mangrove carbon assessment, and it included a special session with the Forest Department to begin the process of incorporating the data into its national inventory.

Key findings from the Smithsonian-led study, Belize Blue Carbon: Establishing a national carbon stock estimate for mangrove ecosystems, which was published in the journal *Science of the Total Environment* in April 2023 include:

- Estimation that the almost 58,000 hectares of mangroves of Belize currently store 25.7 million metric tons of carbon.
- Higher total carbon stock is found in riverine, healthy, tall mangrove ecosystems.
- Collaboration, knowledge sharing, and local buy-in is key for mangrove conservation.

To inform future management decisions for Belize's mangroves and to enable the protection, restoration, and carbon sink goals in Belize's NDC, a land tenure analysis of Belize's mangroves is underway. The land tenure analysis will aim to produce an updated land tenure inventory for Belize's mangrove areas to contribute to the engagement of coastal-marine land stakeholders (public and private) on practices and actions to foster sustainable and climate-smart development approach around and within mangroves. This study will provide the baseline data and enabling conditions for which Belize may implement their ambitious, inclusive, and science-based mangrove-related NDC goals.

In coordination with these efforts, the Belize National Chapter of the Global Mangrove Alliance (also known as the Belize Mangrove Alliance), is supporting the development and implementation of a National Mangrove Restoration Action Plan for Belize. The plan development process began in 2023 and is expected to be completed by mid-2024.

The National Mangrove Restoration Action Plan will identify and create a coordinated guidance and mechanism for mangrove restoration activities on public and private lands in Belize. The Plan will also support wise stewardship and improved protection of mangrove ecosystems. The Plan is being developed through an inclusive process of stakeholder engagement, and an assessment will be completed, including desktop studies, field verification, and spatial data analysis on mangrove ecosystems. The spatial analysis will determine areas of degradation and areas requiring restoration. The assessment will incorporate mangrove extent, type of development risks (current and future), mangrove land tenure data, and location of degraded mangrove ecosystems nationally.

The findings from the assessment will inform the identification and prioritization of geographical areas where restoration would contribute most significantly to achieving national level targets, including Belize's NDC targets. The assessment findings will develop an understanding of the causes of mangrove degradation and will suggest specific actions for the development of the five-year National Mangrove Restoration Action Plan which will include recommendations for community engagement participation, as well as a monitoring and evaluation matrix to monitor success.

An advisory committee consisting of representation from the Belize Forest Department, Ministry of Blue Economy, Coastal Zone Management Authority and Institute, Belize Fisheries Department, National Climate Change Office, National Biodiversity Office, Department of Environment, World Wildlife Fund, and University of Belize, will undertake all activities related to the development of the Plan to systematically guide the restoration, protection and improved management of Belize's mangrove ecosystems. The Plan will also be subjected to review and inputs from the Belize Blue Carbon Working Group and the Belize National Chapter of the Global Mangrove Alliance. In addition, the development process will include community and stakeholder involvement through stakeholder workshops.

The Plan development is being carried out synergistically with the land tenure analysis; a process that will help to identify and verify mangrove areas that could be targeted for restoration within the Plan in an integrated way. The Plan will also highlight the important role of Belize's mangroves as a carbon sink and provide justification as to why they needed to be restored and protected where needed.

### **Lessons for Other Countries**

Mangrove-related NDC contributions are only as meaningful as the baseline data and policy arrangements that enable their success. Following in Belize's lead, countries are encouraged to fill scientific, land tenure, and other necessary data gaps to inform their mangrove NDC commitments. To do so, Belize took a stepwise approach when designing its mangrove related NDC targets. By leading with an overarching goal to "Enhance the capacity of the country's mangrove ecosystems to act as a carbon sink by 2030," Belize then outlined each specific action needed to achieve that goal, including by filling data gaps and exploring financing opportunities. Additionally, Belize developed an [NDC Implementation Plan](#) through the NDC Partnership to help guide their implementation efforts. The NDC Implementation Plan is an essential part of the NDC revision process, which facilitates the planning, coordination and progress tracking required to meet the targets set in Belize's updated NDC. The implementation plan has been validated by government partners and is a tool for the government through its National Climate Change Office (NCCO) to guide their leadership and effectively mobilize resources required for the implementation process. It enables the government to map out the way forward, while coordinating information for and from stakeholders as necessary. The implementation plan represents the collaborative process that will engage relevant sectors and sector leads, donors, implementing partners, private sector, civil society and other stakeholders to advance climate action nationally. Other countries can follow suit by setting specific and measurable goals, outlined in an implementation plan, that advance the protection and restoration of their coastal wetland ecosystems, including mangroves.

## Case Study

# First in kind: Costa Rica's National Blue Carbon Strategy

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**Contributors:** Ana Gloria Guzmán-Mora, Sofía Cortés and Miguel Cifuentes-Jara, Conservation International; and Jacklyn Rivera, Wetlands Program Coordinator, Conservation Areas System Costa Rica

Costa Rica is a conservation leader committed to an ambitious climate action framework that unifies international and national policies with science and local implementation. With the ultimate goal to link global commitments with local impact, the country's wetlands restoration and conservation, plus the concept of blue carbon, are fully integrated into Costa Rica's NDC and biodiversity targets as a clear statement in taking full advantage of natural climate solutions.

To make this a reality, during its 2023 World Wetlands' Day celebration, Costa Rica launched its National Blue Carbon Strategy (NBCS), the first such policy instrument in the world. The NBCS built through an extensive transparent, participatory and iterative process that integrated perspectives from representatives from government institutions, academia, NGOs and local organizations. The entire process was developed in support of the National Wetlands Program within Costa Rica's Ministry of the Environment and the final product adopted by the latter in direct response to an urgent national need to recognize and integrate blue carbon ecosystems into the country's policy and legal frameworks.

Recognizing it as a key service in the fight against climate change, the strategy places blue carbon restoration, conservation, and sustainable management at the center of the country's climate agenda. The strategy, strongly based on science and supported by a broad regulatory and policy framework on conservation and sustainable use of wetland ecosystems (i.e., 17 laws, policies, strategies and decrees)<sup>55</sup>, is a key milestone for the country in achieving its nationally determined contributions (NDCs) and its National Decarbonization Plan. The strategy's eight guiding principles establish a clear participatory and inclusive route to promote the persistence and expansion of blue carbon ecosystems by developing and implementing stable long-term financial mechanisms that directly benefit the communities who are the primary stewards of these ecosystems.

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<sup>55</sup> Costa Rica's National Blue Carbon Strategy (NBCS) integrates elements from 6 national scale policy instruments (e.g., National Climate Change Strategy, National Wetlands Policy, National Decarbonization Plan) and 11 national legal instruments (e.g., Water, Fisheries, Forestry and Maritime-Terrestrial Zone Laws and several Decrees).

The strategy’s main objective is “to establish a framework that integrates actions related to the management, conservation, restoration and rehabilitation of blue carbon ecosystems and wetlands with carbon sequestration potential to promote a model that benefits communities who depend directly on the ecosystem services they provide”. Its five strategic objectives respond to the needs of institutional organization, maintenance of blue carbon ecosystems health, finance mechanisms, fair and equitable distribution of benefits and awareness about the importance of those ecosystems, as follows:

- 1. Institutional coordination:** Develop the efficient governance model, institutional capacities and coordination mechanisms needed to implement the National Blue Carbon Strategy.
- 2. Management, conservation, restoration, and rehabilitation of blue carbon ecosystems:** Ensure the restoration, conservation, and sustainable management of blue carbon ecosystems through scientific research, on-site actions and ecological monitoring.
- 3. Economic valuation and financing mechanisms:** Implement an economic valuation process to support an efficient, transparent, and sustainable financial mechanism for blue carbon. Costa Rica may opt to include non-market approaches to its non-traditional blue carbon finance options.
- 4. Strengthening capacities and distribution of benefits:** Train relevant actors and enable solid relationships between government institutions and communities as stewards and fair beneficiaries of the blue carbon model.
- 5. Raising awareness about the importance of blue carbon ecosystems:** Empower and enable people across the country to act upon the conservation and restoration of blue carbon ecosystems by sharing local experiences, lessons learned and scientific information.

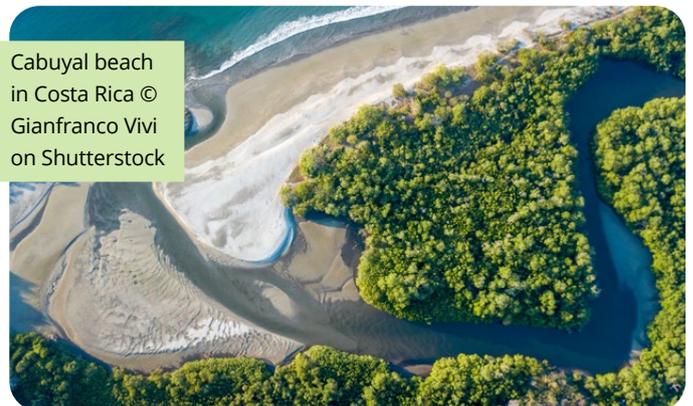
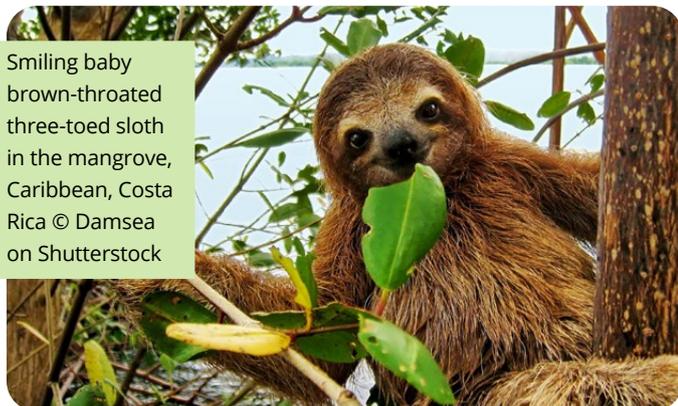
By 2025, Costa Rica has:	By 2030:
<ul style="list-style-type: none"> <li>• Criteria for the registration of blue carbon projects are in place.</li> <li>• A mechanism for promoting carbon credits.</li> <li>• A financial strategy to provide sustainability to the implementation of the NBCS.</li> <li>• Local communities are stewards and beneficiaries of the actions ensuring the stable provision of ecosystem services by blue carbon ecosystems.</li> <li>• 100% of blue carbon ecosystems have management plans to ensure their protection and conservation.</li> </ul>	<ul style="list-style-type: none"> <li>• The loss and degradation of blue carbon ecosystems and their ecosystem services have been halted and reversed.</li> <li>• National institutions and scientists use a standard economic valuation guide for these ecosystems.</li> <li>• An environmental account to record the contribution of blue carbon ecosystems to the country’s economy.</li> </ul>

## Next steps towards implementation

Under the leadership of Costa Rica's National Wetlands Programme, within the Ministry of Environment and Energy, and with technical support of partner Conservation International Costa Rica, the country is developing the strategy's action plan. This includes detailing tasks, responsible parties and priority intervention sites, and the consolidation of a technical body to oversee the national measurement, reporting and verification (MRV) system for blue carbon. All actors relevant in developing a national action plan are fully integrated in this process, which should be finalized by December 2024.

Also, through this partnership, a process to structure a new Payments for Marine Ecosystem Services (PMES) Program is ongoing. The PMES builds upon Costa Rica's globally recognized terrestrial Payment for Environmental Services (PES) system, its original legal framework and financial structure, expanding its impact to coastal communities as direct beneficiaries of the services provided by marine ecosystems and commitment to their protection and rehabilitation. Based on previous feasibility studies, the PMES core governance and financial structure is under design under the purview of the Ministry of Environment and Energy (MINA), with a planned kick-off in 2024 through a pilot on mangroves and blue carbon, which will also serve as the trial case for the NBCS action plan's MRV system. An interinstitutional cooperative approach will be key to ensuring the success and broad impact of the Program.

A key feature of Costa Rican blue carbon ecosystems such as mangroves is that they are considered "Natural State Heritage" and, as such, are Public Land. Thus, direct cash payments cannot be made to individuals who are precluded from owning Public Land, as is done in traditional PES systems, but whose livelihoods depend entirely or partly on the services marine and coastal ecosystems provide. This poses both a challenge and an opportunity to innovate and pioneer environmental management solutions because the PMES Program would deal with the collective of coastal communities. Consequently, fair, transparent, and equitable benefit sharing based on science-based monitoring of restoration and conservation success needs to be translated into equipment, capacity building, seed capital for community project proposals (alternative sustainable production practices), and community infrastructure improvement, among other in-kind options. These compensatory options are less prone to creating conflict among community members organized in local associations or cooperatives, as they would respond to specific local needs. They also allow for better monitoring of the investments disbursed and greater community stewardship of the local blue carbon ecosystems.



## Lessons for Other Countries

The Government of Costa Rica and its technical partners in developing the NBCS are leading globally in providing technical assistance to countries reaching out to replicate this process with their blue carbon ecosystems. Our ultimate goal, is to aid countries in reaching their commitments under the Paris Agreement and the Ramsar Convention. Some lessons learned from the NBCS process are as follows:

- The importance of identifying key people in the country who can serve as “champions” for blue carbon and lead in developing a clear pathway for integrating the concept into national science, conservation, policy, and climate action priorities cannot be understated. These champions must have a clear knowledge and understanding of blue carbon science, its applications, and country governance, policy and (market and non-market) carbon finance options.
- Solid scientific data will be necessary to demonstrate the importance and potential of blue carbon ecosystems as nature-based solutions for climate action and build the case for national adoption. This entails the high-quality and historical mapping of blue carbon ecosystems, carbon inventories, accounting, and robust capacity-building processes.
- Integration of blue carbon notions, data and applications across various restoration, conservation and climate action mechanisms will be critical for countries to streamline the adoption of these principles and realize the synergies from this process. Integrating mangrove ecosystem mapping into a country’s national forest inventory, biodiversity monitoring, REDD+ and its MRV system, and, ultimately, into national greenhouse gas emissions accounting was vital for Costa Rica to integrate, harmonize and scale blue carbon across these multiple monitoring platforms.
- Transparent, inclusive, and equitable information sharing with authorities and local communities can enhance interest, promote trust and strengthen support for such innovative mechanisms. Solid and long-term buy-in and support from the authorities and local communities depends on this starting early on.
- Policy processes can be lengthy, and government priorities are known to change; thus, adopting and integrating blue carbon as a nature-based solution for climate and human well-being into national policy instruments and international commitments will ultimately require a country to deliver on those commitments fully.

## Additional resources:

[Blue Carbon National Strategy](#)

[National Wetlands Policy](#)

Videos on blue carbon and mangrove restoration developed by Conservation International-Costa Rica in collaboration with SINAC authorities:

- <https://youtu.be/rebfGgG-y8Q?si=NBUkREeZ8bcRTYLu>
- <https://youtu.be/DL3Ycj5L5q4?si=aaPntagKZqwoH5LT>
- <https://youtu.be/iUfpqS2Gq6c?si=fvfjpHS3gx8iLtYq>

## Case Study

# Costa Rica Nationally Determined Contribution to the UNFCCC Paris Agreement

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**Contributors:** Anelise Zimmer and Tom Hickey from The Pew Charitable Trusts and Ana Gloria Guzmán Mora and Sofía Cortés Mesén from Conservation International Costa Rica

Costa Rica's updated Nationally Determined Contribution (NDC) to the Paris Agreement was submitted in December 2020 and includes language to protect, restore, and sustainably use its coastal wetlands, including mangroves. As stated in Costa Rica's NDC, "Costa Rica will continue to lead in conservation, responsible use and restoration of coastal wetlands through deepening scientific knowledge of the ecosystem services these habitats provide and will take steps to better protect and restore these spaces."

During the NDC updating process for coastal wetland ecosystems, the country received support from Conservation International Costa Rica and The Pew Charitable Trusts. These partners helped the country identify the best ways to include nature-based solutions, such as mangrove conservation and restoration, within its updated NDC.

Costa Rica's updated NDC outlines a suite of detailed commitments to protect and restore coastal wetlands, including:

- Protecting 100% of coastal wetlands recorded in the country's National Wetland Inventory, including 22,000 hectares of mangroves.
- Restoring priority coastal wetlands areas by 2025.
- Developing management and monitoring plans that will enable sustainable community stewardship of mangrove areas that are key to local livelihoods.
- Exploring innovative conservation financing mechanisms, including the potential of expanding the existing terrestrial Payment for Environmental Services program towards a Program for Marine Ecosystems Services (PMES) that includes different types of recognition to coastal communities.

## The NDC in Practice

Costa Rica is currently implementing its NDC mangrove-related commitments through science and policy.

In 2021, Costa Rica's National Wetlands Program, which sits within the National System of Conservation Areas (SINAC) and is in the Ministry of Environment and Energy (MINAE) published the nation's first ever comprehensive [mangrove ecosystem map](#). The map demonstrates the distribution and ecosystem classes of Costa Rica's 52,802 hectares of mangrove ecosystems. The map provides a consistent 2021 baseline to monitor future mangrove changes and can be used as a tool for monitoring and evaluation of mangrove activities, such as restoration and conservation. It allows the country to prioritize restoration areas, a key step towards achieving its NDC goal of restoring priority wetland areas by 2025. The mangrove map, at the national and local level, also provides the opportunity for long-term planning, management, and responsible use of mangrove ecosystems, ultimately improving coastal communities' quality of life.

In February 2022, [Costa Rica was announced as one of the first winners of the Earthshot Prize](#) – a prize awarded by The Royal Foundation of the Duke and Duchess of Cambridge. Some of these funds will be used to support the piloting of a Program for Marine Ecosystem Services (PMES), which will enable the country to restore and protect its coastline and mangroves. The PMES aligns with the country's NDC ambition to explore innovative conservation financing mechanisms. The PMES will be initially implemented through the "Blue Carbon Community Development Model" which will use mangroves as a pilot ecosystem. The model will support mangrove conservation and restoration by creating sustainable jobs related to environmental education and mangrove ecotourism in coastal communities.

In February 2023, Costa Rican officials launched the country's [National Blue Carbon Strategy](#), which provides a mechanism to implement the country's 2020 NDC commitments. Notably, the strategy bridges over 20 disaggregated policy instruments and provides a cohesive and coordinated structure for the various government entities responsible for ensuring that Costa Rica's NDC commitments are met. The strategy promotes traditional wetland protection measures and calls for Costa Rica to establish, by 2025, financial mechanisms for effective blue carbon ecosystems management. In addition, the strategy calls for Costa Rica's Central Bank, by 2030, to develop and standardize a methodology for the economic valuation of the benefits—including but not limited to carbon sequestration—that are provided by blue carbon ecosystems. **Read more about the development of Costa Rica's Blue Carbon Strategy in the [Conservation International case study](#).**

In collaboration with key stakeholder organizations, the country hosted a workshop in July 2023 to bring together key government representatives to plan the next steps for the national Program for Marine Ecosystem Services and other aspects of Costa Rica's National Blue Carbon strategy, all of which moves the country closer to achieving their 2020 NDC goals.

## Lessons for Other countries

Costa Rica's ambitious NDC goals related to mangrove protection and restoration are based on years of science and institutional coordination, through the leadership of the National Wetlands Program that functions as the implementation model of the Ramsar Convention. Costa Rica leads by example by mapping baseline mangrove ecosystem coverage which provides the country with a data-based decision-making tool for mangrove activities such as conservation, restoration, and policy. Other countries can follow suit by filling data gaps for mangrove ecosystem coverage, which helps create the enabling conditions for ambitious and science based NDC development and implementation. Furthermore, Costa Rica's pursuit to explore non-market conservation finance mechanisms, such as expanding the successful terrestrial payment for environmental services program to marine and coastal ecosystems including mangroves, demonstrates that finance mechanisms are diverse –there is no one size fits all approach– and can be tailored to fit the conditions of each country, all while aligned with the goals of the Paris Agreement. Finally, as illustrated by Costa Rica, national-level policies, such as the National Blue Carbon Strategy, provide detailed frameworks for countries to achieve their mangrove-related NDC goals by supporting institutional coordination, data sharing, and outlining specific activities that mark the path to success.



Bare-Throated Tiger Heron in the brush in Tortuguero National Park in Costa Rica © UlyssePixel on iStock

## Case Study

# The Constitutional Defense of Mangrove Ecosystems, Ecuador

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Xavier Chalén, Hugo Echeverría, Luis Suárez, and Nelson Zambrano,  
Conservación Internacional, Ecuador.

In Ecuador, mangroves have several regulatory instruments for their conservation and management. The Constitution of the Republic of Ecuador includes mangroves as fragile and threatened ecosystems for which the government can establish norms for conservation, management, sustainable use, recovery, and property limitations. The Ministry of Environment, Water and Ecological Transition (MAATE) is the authority in charge of their administration. In 1990, the Forestry, Natural Areas and Wildlife Law was amended to declare all mangrove areas (including those on private sector property) state property whose exploitation can only be carried out through concessions. In 1999, the regulatory framework for traditional users of mangroves was put in place, allowing the application for concession of mangrove areas through a sustainable use and stewardship agreement issued by MAATE.

The agreements for sustainable use and custody of the mangrove ecosystem (AUSCEM) are legal tools promoted by the Ecuadorian state since 2019, whose primary purpose is the protection of the mangrove forest through a concession of territory given by the state to ancestral users to ensure that said territories are guarded to prevent illegal logging and that in return, the group of concessionaires can make preferential use of mangrove resources, mainly linked to the capture of red crab (*Ucides occidentalis*) and brown conch (*Anadara tubercuosa*) for a period of 10 years and with the possibility of renewal. Until October 2023, 53 AUSCEM are in force, covering 50,252.39 hectares of mangroves distributed among the provinces of Esmeraldas, Manabí, Guayas, and El Oro.

## Privatization of the Beach and Bay Area

The Organic Law for the Development of the Aquaculture and Fishing Sector (LODAP) of 2020 mentions the beach and bay area as the intertidal zone, defined as alternately covered and uncovered by the ebb and flow of the waters of the sea.

Historically concessioned to the aquaculture sector from 1969 to 1978, the beach and bay areas have been linked to the conversion of mangrove ecosystem territories - including salt marshes - to shrimp ponds. This loss of the mangrove ecosystem has represented the destruction of 56,395 hectares of one of the most valuable ecosystems on the planet. Since 2021, the government has promoted the privatization of beach and bay areas.

A proposal to title the beach and bay area in favor of the shrimp sector was sent for the first time to the National Assembly in 2022 and subsequently archived. A second proposal was incorporated into the draft of the Law Decree on risk and disaster management through the following article: "That it is necessary to regularize the land on which shrimp concessions are located, so that the concessionaires can access capital that allows them to face the adverse effects of El Niño, as well as allowing income to the government that contributes addressing this emergency."

## Analysis by the Constitutional Court

Given the current exceptional regime facing the government due to the dissolution of the National Assembly, the draft Law Decree must be sent and analyzed by the Constitutional Court of Ecuador for constitutional control. In this context the Constitutional Court made a public call for third parties outside the process to speak out under the Amicus Curiae mechanism.

This was an opportunity for Conservation International to appear before the Constitutional Court in September 2023 and argue that the alleged aspiration of the aquaculture sector to privatize territories that are enshrined in the constitution as public goods is unconstitutional, that they are not susceptible to adjudication because they have been public assets since time immemorial and that, according to Ecuadorian civil, environmental and municipal legislation, they belong to the entire Nation and their use is for all its inhabitants, so the President cannot dispose of them. For this reason, the Organic Code of the Environment expressly provides that "the sea beach is a national asset of public access, consequently no person may claim ownership of it."

Furthermore, CI's amicus presentation highlighted the constitutional scope and legislation that prioritizes the comprehensive restoration of the mangrove ecosystem, which has suffered constant degradation due to the expansion and bad practices of the aquaculture sector.

The ruling resulting from this Constitutional Court case did not allow the privatization of the beach and bay territories, pointing out that the measure involves and violates the exercise of several constitutional rights, namely: the right to self-employment (fishing), the collective rights of communes and communities, and the right to property and the rights of nature.

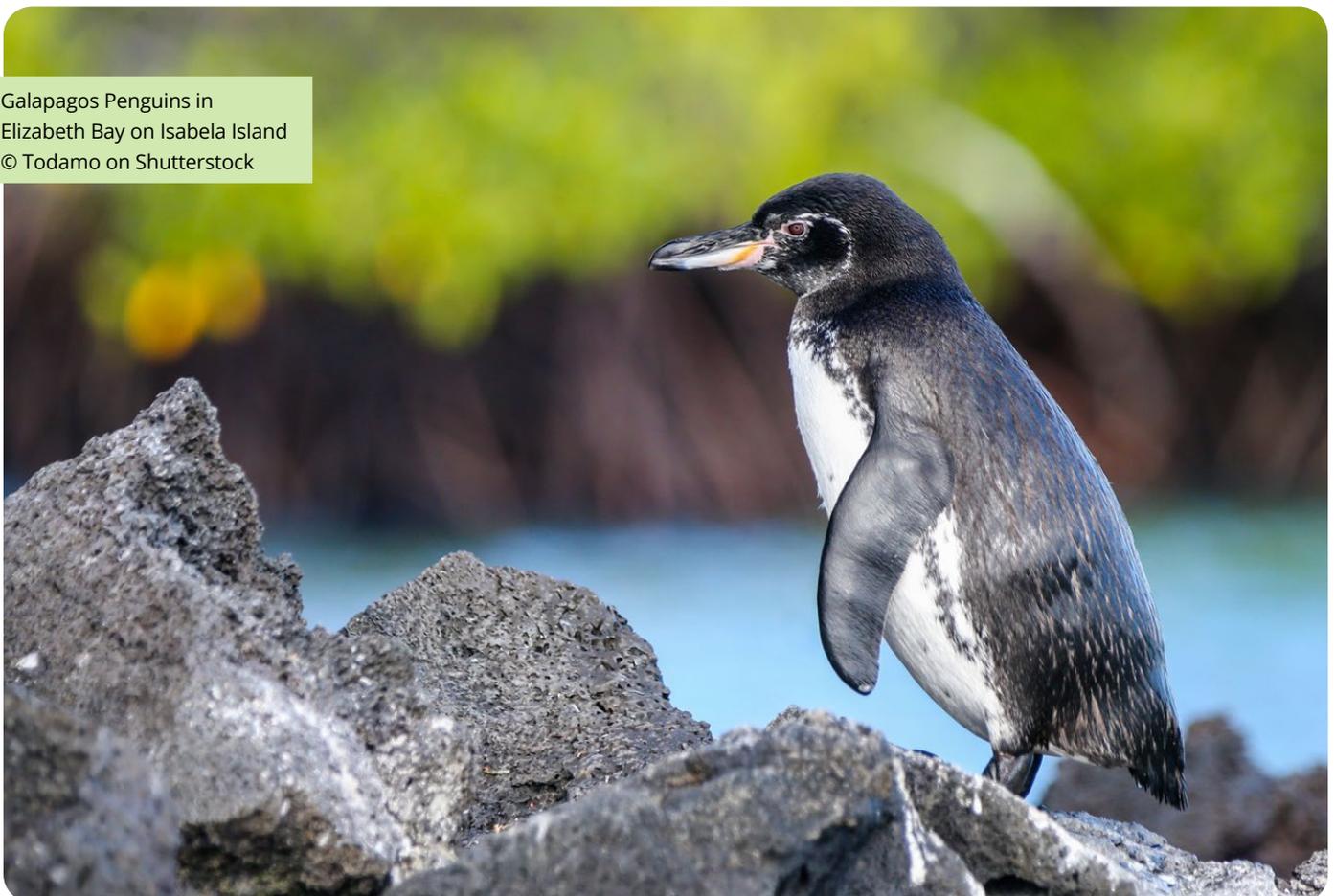
On the one hand, the protection of mangrove and marine-coastal ecosystems is recognized by the Constitution of Ecuador Article 406, which considers them fragile ecosystems that belong to the entire nation, not susceptible to alienation. Similarly, the Organic Code of the Environment defines marine-coastal ecosystems as those areas

with unique characteristics or resources that are susceptible to any intervention of an anthropogenic nature, which produces a profound alteration in their structure and composition. This legal definition has been accepted by the Constitutional Court of Ecuador, which has emphasized the effects of anthropic intervention due to the serious risks of violations of cycles, structure, functions, and evolutionary processes. For this reason, the Court has indicated that these ecosystems “are not naturally fragile,” but rather that the presence and unsustainable activity of human beings “has turned them into vulnerable ecosystems,” which is why they require and demand special protection.

The weak point of the current legal framework is the lack of an ecosystem definition of the beach and bay areas and a connotation that identifies the direct connection between the beach and bay area and the mangrove ecosystem. In other words, this legal weakness may be the reason that the mangrove territories that were degraded by the aquaculture sector are subsequently considered beach and bay territories susceptible to privatization.

In this context, it is essential to determine the competent authority for the management of the beach and bay area, beyond the productive approach. As explained before, these gaps found in the legal framework have been used by the draft Law Decree on risk and disaster management to propose the privatization of the beach and bay area’s concessioned to shrimp farmers.

Galapagos Penguins in  
Elizabeth Bay on Isabela Island  
© Todamo on Shutterstock



## Case Study:

# Bio-rights Program in Indonesia

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**Contributors:** Apri Susanto Astra, Ragil Satriyo, and Susanna Tol, Wetlands International

Bio-rights is an innovative system for giving communities financial and technical support to develop more sustainable livelihoods, in return for their active engagement in environmental conservation and restoration. By providing micro-credits for sustainable development, the approach enables local communities to refrain from unsustainable practices and be actively involved in environmental conservation and restoration. Besides incentivising sustainable livelihoods, the mechanism also builds awareness among local stakeholders with regards to sustainable resource management and safeguards nature's environmental goods and services for future generations. As such Bio-Rights unifies the priorities and needs of local communities, conservationists, development organisations, governments, and the corporate and finance sector.

In the Building with Nature Indonesia project in Demak, Northern Java, managed by Wetlands International, 268 people from ten community groups participated in the Bio-rights programme, in support of mangrove restoration and conservation along a 20-kilometer eroded coastline where mangroves used to thrive. The coastal communities of Demak have in recent decades generated considerable income through aquaculture in ponds created by sacrificing mangroves. But yields and financial returns have declined. By 2015, the western part of Demak had lost most of its aquaculture ponds to coastal erosion. Further east, ponds remained, but productivity was reduced by erosion, flooding, and pollution. Income from aquaculture in Demak had decreased by 60-80 per cent.

A typical pragmatic response was to maintain income by converting yet more mangroves to ponds, exacerbating the problems. But there is potential to do better, and restored mangroves can be a key part of this. For instance, restored mangroves can protect the ponds from waves, and filter seaborne toxins such as industrial waste. In addition, they can deliver firewood and fertiliser, and provide nursery and feeding grounds for wild fish. So, rather than being competing land uses, mangroves and aquaculture can be complementary. The key to breaking the damaging cycle of declining pond yields and further mangrove destruction has been to realise these potential gains. We did this by introducing coastal field schools to train villagers in better aquaculture techniques and appreciation of the value of mangroves, and by providing incentives through Bio-rights, a financial system that reconciles livelihoods with environmental conservation and restoration.

Participants of the Bio-rights programme were paid in advance in the form of small loans, in return for tasks such as constructing, maintaining, guarding, and inspecting permeable structures that trap mud and sediments so that mangroves can naturally regrow into a resilient mangrove greenbelt. Others are converting unproductive and degraded aquaculture ponds into sediment catching basins, where mangroves then regenerated naturally. Villagers were also involved in the revision of village development plans.

An important feature of Bio-rights agreements is that they are conditional. The payments are loans that are written off only when more sustainable livelihood approaches have been adopted and mangrove restoration efforts have been successfully demonstrated. If the groups achieve the environmental targets, then the loans are turned into grants that do not have to be repaid. If not, then they will have to be repaid.

The communities were supported by field facilitators who lived in the district throughout the landscape restoration process. When the work began in 2015, the facilitators spent almost a year living and working in the nine villages involved, learning about the problems and hopes of the villagers, and about their village development plans. They discussed with them the ideal of electing village groups to carry out activities. Only when the groups had been established did they begin negotiating the package of activities and the terms of the loans and setting up training programmes to help them achieve their aims.

The participants of the Bio-rights programme spent the funds they received on integrating riverine mangrove restoration in part of their aquaculture ponds or creating alternative livelihoods and other projects of benefit to communities. Examples include buying equipment to make fish food or natural fertiliser for their ponds, purchasing livestock, creating vegetable gardens, buying boats for rental, or harvesting non-timber forest products to make handicrafts and honey. Through coastal field schools, that lasted a full cropping season, small-scale aquaculture pond farmers learned about the ecology of coastal waters, the functions of mangroves, and best practices in pond ecology and management to advance their livelihoods and sustain coastal ecosystems. The project also supported farmers with equipment to harvest wild fish from in and around the resurgent mangroves. More than 80 per cent of fishers report better near-shore catches, with incomes now as good as those from aquaculture. Aquaculture profit margins from ponds where sustainable practices were applied were typically three times higher than before.

Wetlands International encouraged community groups to continue with the programme by themselves. Most have reached their targets, and so far the groups have continued, and we meet them every month. They have formed a forum of community groups, known as the BINTORO Forum, that speaks with one voice to local authorities such as district officials. Some groups are now receiving direct support from the district, such as funding for maintaining the permeable structures and boardwalks. Of course, there is a turnover of people in the groups, but we are encouraging them to hold elections for new members.

The Bio-rights programme requires a significant investment in preparation, planning, and capacity and trust building. This therefore needs to be built into the programme design. Government involvement will be necessary for upscaling of Bio-rights. This can be a challenge due to rigid sectoral planning and budgetary processes within governments, which do not match the holistic and adaptive approach of Building with Nature. Getting around this may require public-private partnerships, with each partner adopting the roles and responsibilities that best suit their planning and budgetary processes.

During the implementation of Building with Nature Indonesia project, the government from the national, provincial, district, and village levels, provided support in the form of program allocations and/or funding to the community groups, so that the groups received additional support to implement programs in the field. The project also encourages community groups, through Forum Bintoro, to continue and maintain communication not only with the government but also with the private sector, in the hope that they can continue to receive support for the sustainability of program implementation after the project ends.

The Indonesian government has established the Environmental Fund Management Agency (BPD LH) since 2019. At the technical level, regulatory strengthening is regulated in PP No. 46/2017 on Environmental Economic Instruments (IELH) and Perpres No. 77/2018 on Environmental Fund Management (PDLH). By many parties, the BPD LH institution is considered to be a new breakthrough in the management of public funds through the appointment and establishment of custodian banks as trustees.

Although labeled as an environmental fund, the sectors managed include several areas: forestry and peatlands and mangroves, agriculture, industry, transportation, and energy. The selection of these sectors represents the areas targeted by the government's commitment to achieving the Nationally Determined Contribution (NDC) in 2030.

In running its business, BPD LH has the function of collecting, developing, and distributing funds. The sources of funding that can be collected by BPD LH consist of public funds (APBN/APBD), private, philanthropy, NGOs, and international funds. BPD LH has flexibility in implementing sound business practices to improve services to the community as an exception to the general state financial management provisions. In distributing benefits, BPD LH is also more flexible down to the smallest business units at the community level.



Harvesting from the mangroves in Demak, Central Java, Building with Nature Indonesia initiative © Wetlands International, Nanang Sujana

## Case Study

# Mexico's Mangrove Monitoring System

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**Contributors:** María Teresa Rodríguez-Zúñiga, Carlos Troche-Souza, Samuel Velázquez-Salazar, Jose Alberto Alcántara-Maya, Edgar Villeda-Chávez, Luis Valderrama-Landeros, Berenice Vázquez-Balderas, María Isabel Cruz-López and Rainer Rainer from the National Commission for Knowledge and Use of Biodiversity (CONABIO), Coordination of Systems, Monitoring and Geospatial Information Team

Like many other countries in the world, especially megadiverse countries, Mexico faces the problem of protecting its natural resources on the one hand and sustainably using them on the other; mangroves are no exception. To face this challenge, over the last few decades, Mexico has developed and implemented many public policies, reflected in national regulatory instruments and frameworks, as well as signing international agreements and protocols.

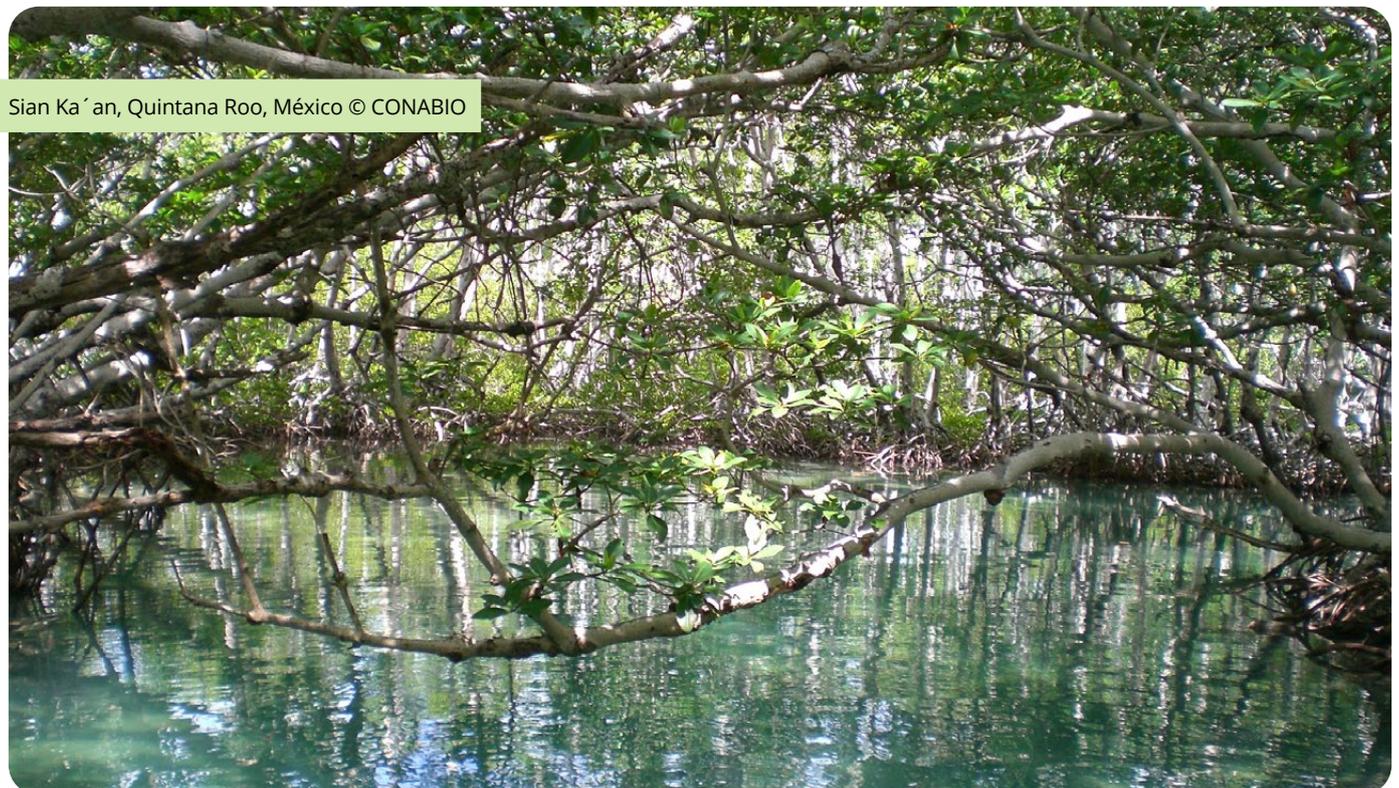
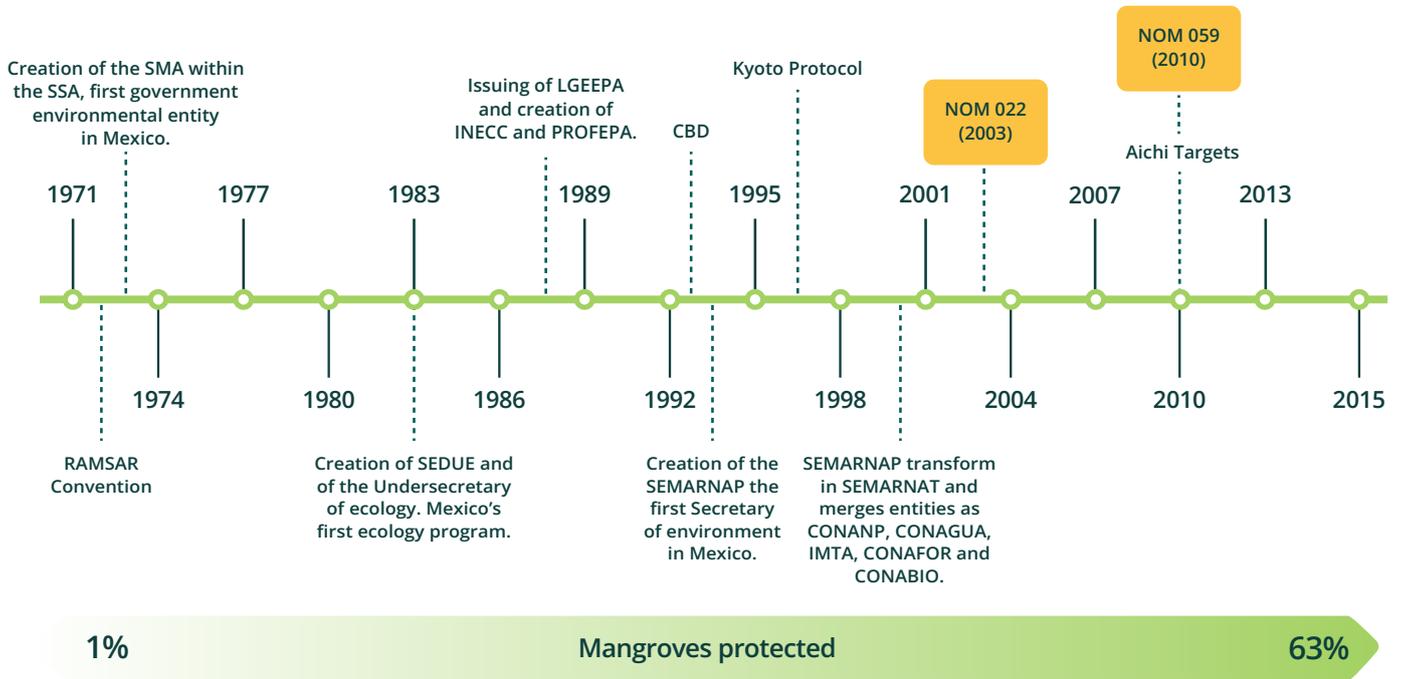


Figure 1



**Figure 1.** Chronography of the main policy events that have influenced mangrove conservation in Mexico. Source: <https://www.biodiversidad.gob.mx/monitoreo/smmm/efectos-politica-publica>. Note: The SMMM participated in updating those marked in yellow.

**List of acronyms:**

**CONABIO:** National Commission for the Knowledge and Use of Biodiversity

**CONAFOR:** National Forestry Commission

**CONAGUA:** National Water Commission

**CONANP:** National Commission of Natural Protected Area

**INECC:** National Institute of Ecology and Climate Change

**IMTA:** Mexican Institute of Water Technology

**LGEEPA:** General Law of Ecological Equilibrium and Environmental Protection

**NOM:** Mexican Official Norm

**PROFEPA:** Federal Attorney General's Office of Environmental Protection

**SEDUE:** Secretariat of Urban Development and Ecology

**SEMARNAP:** Secretary of the Environment, Natural Resources and Fisheries

**SERNAMAT:** Secretary of Environment and Natural Resources

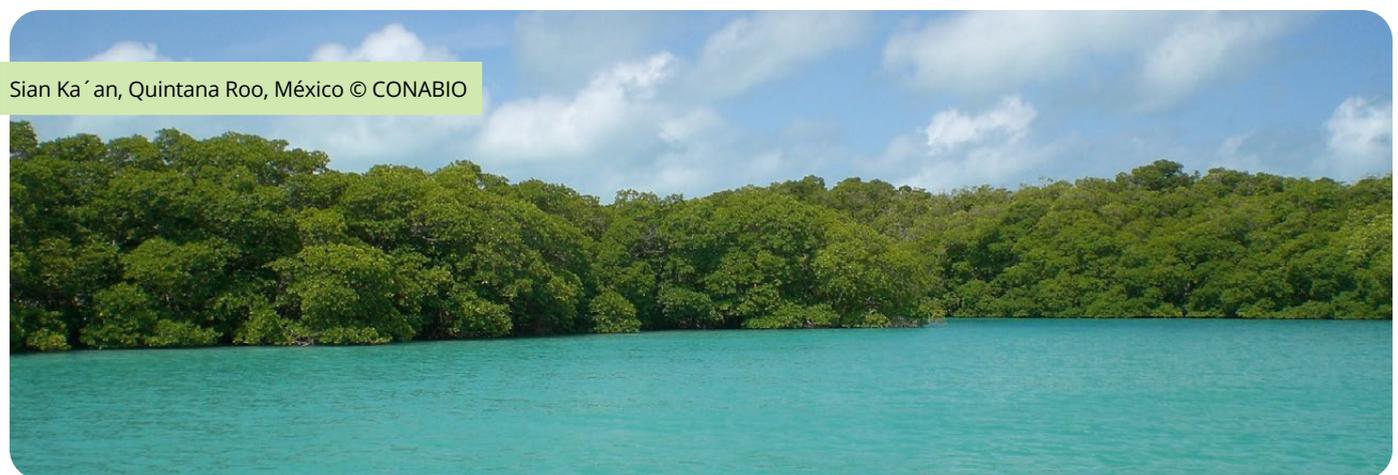
**SMA:** Environment Secretary

**SSA:** Secretary of Health

To generate Laws, Rules, and Regulations on the environment, SEMARNAT (CONANP, CONABIO, CONAFOR, etc.) regularly holds workshops in which the different groups involved in the subject (mainly government and academic institutions) are convened. The Rules, for example, are reviewed and updated every five years.

Mexico's Monitoring System for Mangroves (SMMM) has strengthened mangrove legal protection initiatives by providing baseline and monitoring data. For instance, changes in mangrove area over time identified through monitoring by the SMMM provided key evidence demonstrating the continuous removal of mangrove wetlands surrounding the Carpintero's Lagoon in the Northeastern state of Tamaulipas<sup>56</sup>. In this case, the Mexican Supreme Court used this data to stop this action and order the implementation of a rehabilitation project in areas already negatively impacted using an argument of violation to principles of prevention, precautionary and human rights to a healthy environment<sup>57</sup>. The legal norm NOM 059 SEMARNAT issued in 2010<sup>58</sup>, in which the SMMM participated in the reclassification of mangrove species from special protection to threatened, and the General 2000 Wildlife Law<sup>59</sup> modified by 60TER in 2007 are currently the main legal tools used at the national level to protect mangroves against removal/deforestation or indirect negative impacts.

The problem of deforestation and degradation of mangroves persists despite the recognition of the importance of this ecosystem through public environmental policies in recent decades. The causes are multifactorial; however one legal issue is that the regulation of natural resources is aimed at preserving species or ecosystems, but not at regulating the use of land where they are found.



<sup>56</sup> Suprema Corte de Justicia de la Nación. Reseñas Argumentativas del Pleno y de las Salas. Reseña del Amparo en revisión 307/2016. Primera Sala de la Suprema Corte de Justicia de la Nación. "Derecho Humano a un ambiente sano y digno". 2018. Available online: [https://www.scjn.gob.mx/sites/default/files/resenias\\_argumentativas/documento/2019-08/res-NLPH-0307-16.pdf](https://www.scjn.gob.mx/sites/default/files/resenias_argumentativas/documento/2019-08/res-NLPH-0307-16.pdf) (accessed on 17 March 2022).

<sup>57</sup> HRO. Human Rights Office-Extract of the Amparo-307/2016. Supreme Court of Justice HRO. 2016. Available online: <https://www.scjn.gob.mx/derechos-humanos/sites/default/files/sentencias-emblematicas/summary/2020-12/Summary%20AR307-2016%20HRO.pdf> (accessed on 17 March 2022).

<sup>58</sup> DOF. Protección Ambiental-Especies Nativas de México de Flora y Fauna Silvestres-Categorías de Riesgo y especificaciones para su Inclusión, Exclusión o Cambio-Lista de Especies en Riesgo; NOM-059-SEMARNAT; Diario Oficial de la Federación de México: Ciudad de México, Mexico, 2010. Available online: [https://dof.gob.mx/nota\\_detalle.php?codigo=5424575&fecha=05/02/2016](https://dof.gob.mx/nota_detalle.php?codigo=5424575&fecha=05/02/2016) (accessed on 17 March 2022).

<sup>59</sup> DOF. Ley General de Vida Silvestre. Federación; Diario Oficial de la Federación de México: Ciudad de México, Mexico, 2000; p. 72. Available online: [https://www.gob.mx/cms/uploads/attachment/file/131763/29\\_LEY\\_GENERAL\\_DE\\_VIDA\\_SILVESTRE.pdf](https://www.gob.mx/cms/uploads/attachment/file/131763/29_LEY_GENERAL_DE_VIDA_SILVESTRE.pdf) (accessed on 17 March 2022).

Other challenges are connected to insufficient personnel of institutions such as CONANP and PROFEPA to carry out timely surveillance, enforcement of laws and prosecution of environmental crimes, as well as the coordination between the institutions involved to generate programs (effectively binding in the practice) aimed at the conservation and restoration of mangroves. Regarding the SMMM, one of the main challenges is to incorporate new technologies for the generation of national cartography and consequently the management of changes in the figures inherent to the incorporation of new and better inputs and technologies. Further work is needed to effectively translating technical/scientific information to define the current and future negative economic impact of mangrove wetland loss to local communities in the long term.

Despite the limitations to effectively protect mangroves and the lack of integration between the different Laws, Rules and Regulations, they are currently more monitored by society in general. Since its implementation in 2005, the SMMM has revolutionized access to information, as well as promoting greater coordination between the groups involved through various mechanisms, including the generation of a directory of people who work with mangroves in the country (<https://www.biodiversidad.gob.mx/monitoreo/smmm/directorio>).

#### Additional resources:

SMMM's page: <https://www.biodiversidad.gob.mx/monitoreo/smmm>

Development and Structural Organization of Mexico's Mangrove Monitoring System (SMMM) as a Foundation for Conservation and Restoration Initiatives: A Hierarchical Approach <https://www.mdpi.com/1999-4907/13/4/621>



Lagunas de Chacahua, Oaxaca, México © CONABIO

# Case Study

# Mangrove frameworks and Blue Natural Heritage in Panama

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**Contributors:** Inés Côrte-Real de Portugal Fernandes and Adriana Moreno from the National Audubon Society, and Anelise Zimmer from The Pew Charitable Trusts

## Panama's rich coastline and mangrove policy landscape

Panama, with its extensive 2,988.3 km coastline,<sup>60</sup> has more mangrove cover than any other Central American country, with over 1,500 square km of habitat coverage.<sup>61</sup> As such, mangroves have high conservation priority. In 1918, Panama passed its first legislation to forbid the titling of mangroves,<sup>62</sup> and in 1941, Panama's constitution declared mangroves as property of the State.<sup>63</sup> Since then, the nation has put forth a number of mangrove-related policies and legislation. While some have provided greater clarity for mangrove management in Panama, others have been considered "unclear or conflicting" due to overlapping jurisdictions, inconsistent enforcement, and unclear land use rights.<sup>64</sup>

In recent years, Panama has pledged to improve mangrove management through a variety of local, national, and international commitments. For example, at the national level, an executive decree is under public consultation focusing on enhancing mangrove conservation; promoting restoration efforts; strengthening regulatory frameworks; facilitating blue carbon projects; and fostering interagency coordination. Panama also announced that they will include blue carbon into the national inventory of greenhouse gases. Likewise, the country is eager to support mangrove-related efforts and in September, 2023 launched a national chapter of the Global Mangrove Alliance (GMA) as a platform for knowledge exchange, under the Blue Natural Heritage (BNH) initiative.

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<sup>60</sup>Instituto Nacional de Estadística y Censo INEC. (N.D.). Datos Generales e Históricos de Panamá. DatosGenerales2.pdf (inec.gob.pa)

<sup>61</sup>Global Mangrove Watch, Panama. [https://www.globalmangrovetwatch.org/country/PAN?bounds=\[\[170.83475051456108,-51.12310359545077\],\[151.46311417761336,72.64812693415936\]\]](https://www.globalmangrovetwatch.org/country/PAN?bounds=[[170.83475051456108,-51.12310359545077],[151.46311417761336,72.64812693415936]])

<sup>62</sup>Republica de Panama (1919,) 'Poder Ejecutivo', Gaceta Oficial, [https://www.gacetaoficial.gob.pa/gacetatas/03021\\_1919.pdf](https://www.gacetaoficial.gob.pa/gacetatas/03021_1919.pdf)

<sup>63</sup>Chamberland-Fontaine, S., Heckadon-Moreno, S. and Hickey, G.M. (2022), 'Tangled Roots and Murky Waters: Piecing Together Panama's

<sup>64</sup>Mangrove Policy Puzzle, *Frontiers in Forests and Global Change*, 5.

At the local level, the Parita Bay Conservation Plan identifies mangrove conservation objectives.<sup>65</sup> The National Forest Restoration Program 2021-2025 sets goals for national-level reforestation, including mangrove restoration. Internationally, the country's current Nationally Determined Contribution (NDC) to the UNFCCC Paris Agreement, announced in December 2020, has several targets related to mangrove ecosystems. These commitments consist of strengthening management through two climate tools such as the Technical Guide to Climate Change for the coastal-marine ecosystem (in development) and a Manual of Restoration Techniques for Degraded Mangrove Areas (developed), which will focus on the restoration of key areas and corridors, biological solutions to strengthen connectivity, as well as in the design and implementation of nature-based solutions (NbS).

As a result of Panama's extensive mangrove habitat coverage and political ambition, many organizations are conducting research and policy in the country. This case study outlines several initiatives that support mangrove research and national mangrove strategies, specifically, the BNH<sup>66</sup>, developing blue carbon awareness, science, economic and policy knowledge. Equally important, as Panama seeks to restore and protect the country's valuable mangrove ecosystems, Pew, the Smithsonian Institution, Audubon and IADB are collaborating to provide technical policy support for the update of the coastal wetlands section of the country's next NDC, being led by the Ministry of Environment, due in 2025. This will serve as a roadmap for implementing commitments related, among others, to one of GMA's lines of action: "Community management and restoration."

### **Blue Natural Heritage – Patrimonio Natural Azul – Audubon Americas**

A collaborative initiative, BNH, was launched in 2021, involving Audubon Americas (AA), Inter-American Development Bank (IDB), the UK Blue Carbon Fund, and Panama Audubon Society (PAS). The project's main goal is to protect and conserve Panama's mangrove ecosystems and associated wetlands while enhancing coastal resilience. This involves developing a science-based framework in two pilot sites--Panama Bay and Parita Bay--that promotes carbon capture, biodiversity, skill development, and policy formulation. These locations were strategically targeted as they are a crucial biodiversity hotspot and a stopover for migratory birds due to their position between North and South America, with many of its coastal-marine ecosystems designated as Important Bird Areas (IBAs). This initiative is significant in contributing to the mangrove conservation goals of the GMA, achieved through initiatives such as the establishment of a GMA chapter in Panama. BNH's technical and scientific groundwork is essential to underpin and rationalize the climate-focused objectives and more ambitious commitments of the Panamanian government, including Panama's NDC. This project aims to create a pioneering model for enhancing coastal resilience that can be replicated across Latin America and the Caribbean. Below we dive deeper into our model.

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<sup>65</sup> López, O. and Díaz, Y. (2023), Plan de Conservación para los Humedales de la Bahía de Parita'. Sociedad Audubon de Panamá.

<sup>66</sup> Inter-American Development Bank (2023) Valuing, Protecting and Enhancing Coastal Natural Capital <https://www.iadb.org/en/whats-our-impact/PN-T1233>.

**1. Blue Carbon Baseline Assessment in Mangroves:** In compliance with the Intergovernmental Panel on Climate Change (IPCC) guidelines, aims to measure above and below ground mangrove carbon stocks in the two pilot sites and establish a blue carbon baseline to assess the net contribution of Panama’s mangroves to greenhouse gas emissions through a combination of fieldwork and laboratory analyses to measure methane emissions and carbon sequestration.

**2. Deeper understanding of mangrove coverage and dynamics, and ecosystem health:**

**Mangrove Species and Emissions Mapping:** Mapping mangrove areas by species and by variations in methane and carbon dioxide emissions. This aids the current understanding of mangrove distribution and serves as a foundational dataset for future restoration initiatives. Preliminary findings indicate significant variations in emissions among different mangrove species. Read more [here](#). This study is informing a mangrove restoration mapping activity that will complement the Ministry of Environment’s current Manual of Restoration Techniques for Degraded Mangrove Areas in Panama.

**Mangrove dynamics and mapping:** Analyzing the effects of nutrients and changes in salinity on mangroves, mapping future pilot mangrove restoration areas, and creating detailed maps [documenting land use and mangrove changes](#).

**Biodiversity as an indicator of carbon and mangrove ecosystem health:** BNH specialists deployed acoustic monitoring devices to assess bird populations as indicators of carbon and ecosystem health. Artificial intelligence analysis will document potential correlations between biodiversity, carbon stocks, and mangrove health.

**3. Valuation of Mangrove Ecosystem Services:** A critical facet of our work involved quantifying the ecosystem services offered by mangroves. Specifically, ESSA technologies<sup>67</sup> analyzed their role in providing coastal protection against storms and sea-level rise, as well as their capacity for carbon sequestration and fish production. Assigning economic value to these services aids in highlighting the significance of mangrove conservation and restoration in identified priority areas. See a summary of the results [here](#).

**4. Parita Bay Conservation Plan:** Parita Bay Conservation Plan: A notable achievement within this project is the formulation and launch of the [Parita Bay Conservation Plan](#) by PAS. The conservation plan, launched during World Wetlands Day on February 2nd, 2023, is the result of a collaborative process that includes authorities such as the Ministry of Environment, the Aquatic Resources Authority, the Ministry of Agriculture, the Ministry of Education, the Ministry of Tourism, and local authorities; as well as NGOs, academia, community groups and leaders, conservation actors, fishermen, among other local actors.

The process of developing the conservation plan, followed Open Standards methodology, and included substantial community involvement, ensuring that the plan is inclusive, reflective of local needs, and aligned with conservation goals in the region. The “Open Standards for the Practice of Conservation” is a methodology developed by the Conservation Measures Partnership (CMP) to guide and improve conservation efforts in prioritized sites.

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<sup>67</sup> ESSA - Environmental Consulting, Adaptive Management, Climate Change, ESSA, <https://www.essa.com/>.

Promotes collaboration among different stakeholders important to obtain conservation goals.

The main purpose of this plan is to create an alliance of stakeholders that will implement their actions. The strategies have been developed by all the stakeholders and this guarantees all of them identify where and when they should have an active role. PAS started disseminating the content of the plan to involve more stakeholders: a workshop with 100 students and professors from the University of Panama was held in August.

**5. Boosting mangrove awareness and policies:** The BNH project builds knowledge, awareness, engagement, and collaboration with key stakeholders such as the government, Smithsonian, The Pew Charitable Trusts, Ramsar Center, Conservation International, Wetlands International and the GMA, to drive actions that increase the protection of coastal wetlands. The project deploys ongoing environmental classes, “aulas verdes”, hosted by PAS; and has hosted one national plastics symposium and will host a final one in 2024; three national mangrove day events (webinars and symposiums), blue carbon capacity building workshops to government entities and journalists, among other outreach and engagement events. In coordination with GMA and Conservation International Colombia, BNH developed a public-private coalition for mangrove conservation- the Panama GMA National Chapter, hosted by Panama Audubon Society, to aid the Ministry of Environment’s mangrove conservation objectives. The Chapter will sit on Panama’s National Wetlands Committee, an official body of the Ministry of Environment. Finally, in the context of the development of the carbon market in Panama, BNH fosters coordination among stakeholders and cultivates expertise, including support for the inclusion of blue carbon projects.

At present, Panama’s National Carbon Market is in the process of being structured, with its foundation grounded in essential legislation. Specifically:

- **Executive Decree No. 100 of October 20, 2020**, has a pivotal role, as it regulates the General Environmental Law and establishes the National ‘Reduce Your Footprint’ Program, aimed at overseeing the management of low-carbon economic and social development in Panama.
- **Executive Decree No. 142** of December 09, 2021, represents another cornerstone, progressively and gradually laying the foundation for the national carbon market of Panama (MNCP).

These legislative frameworks, complemented by other climate-related regulations, underscore the country’s commitment to mitigating global climate change. The MNCP seeks to drive measurable, reportable, and verifiable reductions in greenhouse gas emissions (GHGs), aligning with the national Low Carbon Economic and Social Development Strategy and the Nationally Determined Contributions (NDCs).

The Climate Change department of MiAmbiente plays a central role in ensuring the effective operation and adaptation of the market, striving to harmonize it with national and international objectives. Additionally, Article 15 (Executive Decree No. 142) outlines the market’s function as a national compensation system, catering to the demand for GHG emission reduction units from domestic (actors in the *Reduce your Footprint* program) and international actors involved in national emission management programs.

It is noteworthy that the Climate Change department has devised a roadmap for the market’s development, offering a strategic plan for its growth and adaptability.

## **Mangrove Research and Policy - The Pew Charitable Trusts and Smithsonian Institute**

In an effort aligned and coordinated with the BNH initiative, Pew's Protecting Coastal Wetlands and Coral Reefs project, in partnership with the Smithsonian Institution, launched in 2023 a project to fill mangrove data gaps to inform science-based policy development and implementation, particularly Panama's NDC.

The project's mangrove research is led by the Smithsonian Institution, whose researchers are conducting above and below ground mangrove carbon stock sampling in two priority sites, compliant with the Intergovernmental Panel on Climate Change (IPCC) guidelines. Field work will be conducted in partnership with government, NGOs, and other relevant stakeholders, who will participate in field trainings. The results of this research will feed into a national mangrove carbon stock estimate for Panama which will be developed in partnership with government and NGO partners, incorporating data from the BNH project, and other IPCC compliant published mangrove carbon stock estimates for Panama. Published datasets will be compiled into the Coastal Carbon Atlas, a global database of blue carbon led by the Smithsonian Institution. The national mangrove carbon stock estimate will then be shared with Panamanian government agencies to provide a scientific basis for mangrove-related commitments in the next NDC.

To ensure that all relevant stakeholders, including government and the Global Mangrove Alliance national chapter, are able to engage and provide feedback, the Smithsonian Institution, in partnership with Pew, will host a series of meetings and workshops on the national mangrove carbon stock estimate and blue carbon data management of the Coastal Carbon Atlas.

In October 2023 Panama hosted the regional Latin America and Caribbean Climate Week (LACCW). In the lead up to LACCW, Pew and Silvestrum Climate Associates hosted a workshop which convened technical briefings and round table discussions and shared case studies from regional leaders -including Panama on research, policy, and technical expertise in the field of blue carbon/coastal wetlands, specifically greenhouse gas inventories, national policy development, and NDC commitments. This workshop provided a platform for regional engagement and learning related to enhancing and implementing commitments related to mangrove and other coastal wetland policies.

### **Additional resources**

[Audubon Americas Coastal Resilience Handout](#)

[Blue Natural Heritage Project Story Map](#)

[Infographic "Mangroves, key link to combat climate change"](#)

[Audubon Americas website](#)

[Article "Mangroves, a Line of Defense Against Climate Change"](#)

[Pew's Protecting Coastal Wetlands and Coral Reefs project](#)

## Case Study

# Seychelles Nationally Determined Contribution to the UNFCCC Paris Agreement

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**Contributors:** Anelise Zimmer, Stacy Baez, and Tom Hickey from The Pew Charitable Trusts and SeyCCAT

The nation of Seychelles is a climate-vulnerable archipelago of 115 islands, consisting of one of the largest and diverse marine ecosystems on the planet. Seychelles is home to a wealth of marine species and habitats, including mangroves—which are at the center of growing global interest in the role that nature-based solutions can play in addressing climate change. The country has moved to take strong climate mitigation and adaptation actions, which is reflected in its [updated Nationally Determined Contribution \(NDC\)](#) to the Paris Agreement that was submitted in July 2021. The updated NDC included strong protections for seagrass and mangroves, such as:

Fully mapping the extent of mangrove and seagrass ecosystems and conducting a first-time assessment of their carbon stocks.

Ensuring that at least 50% of the nation’s mangrove and seagrass ecosystems are protected by 2025 and 100% are protected by 2030.

Establishing a long-term monitoring program for seagrass and mangrove ecosystems and include the greenhouse gas sink of the nation’s blue carbon ecosystems within Seychelles’ National Greenhouse Gas Inventory by 2025.

Seychelles’ NDC was adopted by the Cabinet prior to its submission to the UNFCCC, therefore establishing it as a national policy. The NDC targets related to coastal wetland ecosystems are overseen by the Ministry of Agriculture, Climate Change and Environment’s Climate Change Department. The specific national policies that mandate the implementation of Seychelles’ NDC goals are the Seychelles National Climate Change Policy and Strategy and the National Development Strategy. The Seychelles Marine Spatial Plan is the relevant plan for implementing the NDC targets of long-term monitoring, which aims to ensure that there is clear guidance on the conservation measures that will have to be adopted to achieve the protection aspects of the NDC goals.

## The NDC in Practice

Over 6 percent of Seychelles landmass is made up of mangroves, with an estimated total of 29 square kilometers of mangrove coverage. The Ministry of Environment, Energy and Climate Change conducted the first mangrove blue carbon assessment in Seychelles. Fieldwork for the assessment took more than 50 days and sampled above- and below-ground carbon stocks at 17 sites. The results of the carbon assessment are being modeled through spatial analysis, and a final report will include maps displaying the distribution of carbon stocks stored in Seychelles' mangroves. Funding for this project came from Third South West Indian Ocean Fisheries Governance and Shared Growth Project (SWIOFish3), which is part of a broader World Bank program.

The implementation of the mangrove protection NDC targets will be guided by the current protection status of these areas. Some of Seychelles' mangroves are located on private land and others are on government owned land. If mangroves are within legally designated protected areas, then the corresponding legislation, the Nature Reserves and Conservancy Act, will guide the allowable protection activities. If mangroves are on privately owned land, they will be subject to proper channels for environmental authorization. Note that protection status still needs to be defined by the relevant authorities.

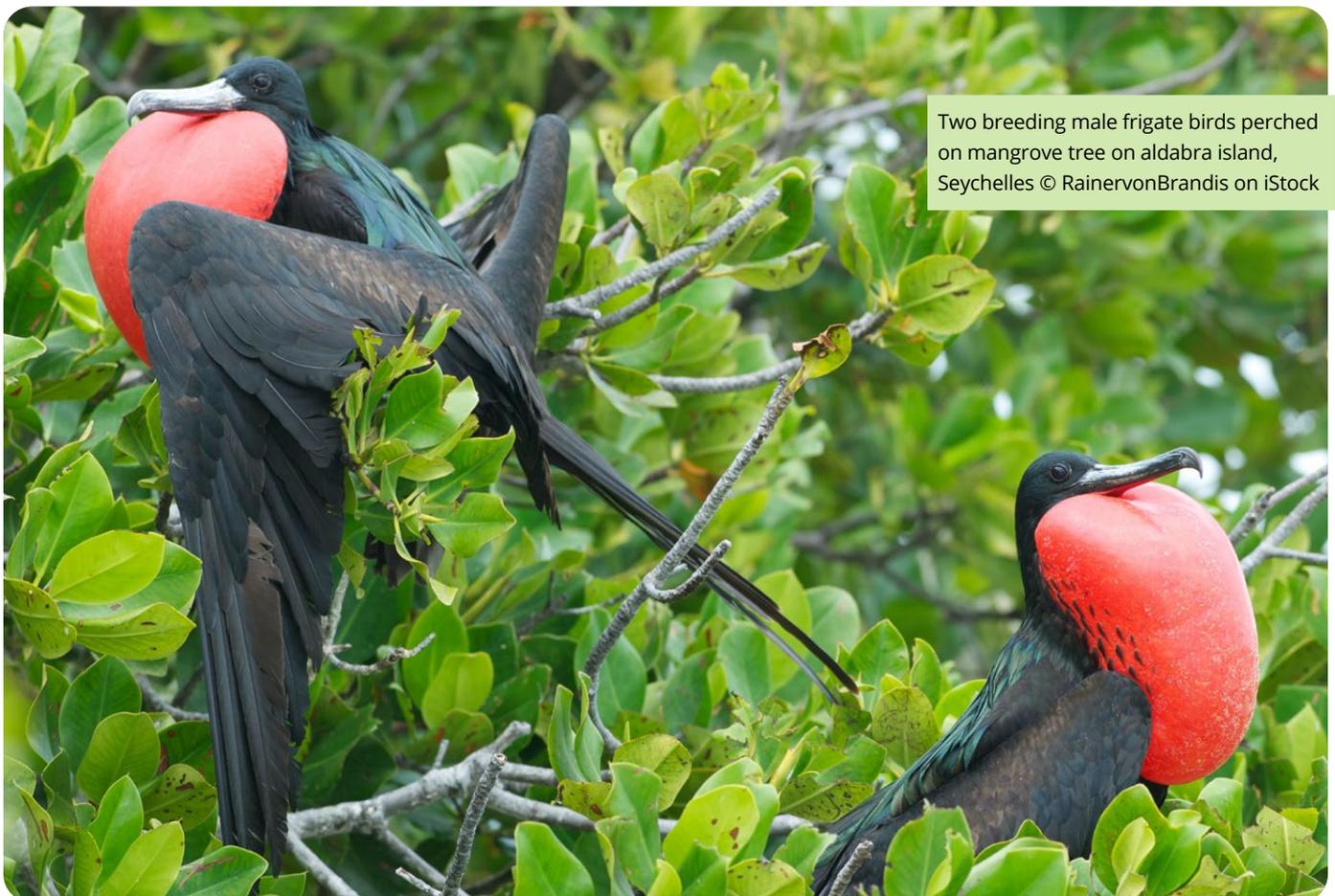
The completion of an Exclusive Economic Zone-wide seagrass mapping and carbon assessment effort has also been critical to the inclusion of coastal wetlands within Seychelles' NDC. The mapping and assessment work was funded by The Pew Charitable Trusts and led by the University of Oxford in partnership with Seychelles Conservation and Climate Adaption Trust (SeyCCAT), the University of Seychelles, Island Conservation Society, the German Aerospace Agency, and others.

To fully map all seagrass meadows, researchers collected satellite imagery of the country's waters. Since seagrass, algae, and coral can all occur in the same area, local field teams also photographed the ocean floor in several locations across the country. These photographs help researchers to distinguish seagrasses from other ocean ecosystems in the satellite images, thereby creating a high accuracy seagrass map. To understand the amount of carbon stored in seagrass sediments, researchers also collected 1 meter sediment samples across the Seychelles archipelago. The project was completed in August 2022, and the maps and the data were delivered to the government in December 2022. The seagrass mapping and carbon assessment data that was delivered to the government can be used to help implement the country's NDC and to allow the country to add seagrass to its GHG inventory.

## Lessons for Other countries

Seychelles' bold ambition to map and conduct carbon stock assessments for its seagrass and mangrove ecosystems sets an example for other countries that wish to include measurable and science-based targets in their NDCs. But not only did Seychelles lead on the science; they also undertook successful community outreach campaigns to support their conservation efforts.

SeyCCAT recognized that there was no unique word for seagrass; historically, the word “gomon” has been used to refer to both seagrass and algae. As a result, SeyCCAT launched a national campaign to formalize Seychellois Creole names for seagrass and groups of similar species commonly found in Seychelles' waters. SeyCCAT solicited suggestions from the public and, following a round of citizen voting and expert review, announced that “zerb lanmer” and “gomon zerb” are the locally derived Creole words that now specifically refer to seagrass. These words have been included in the Seychellois Creole dictionary in partnership with Lakademi Kreol Sesel. Aside from helping Seychellois better understand and appreciate this vital ecosystem, having locally derived names for seagrass is in line with a growing global recognition of the importance of nature to human well-being. There is no one-size-fits-all approach for the conservation of coastal wetland ecosystems, yet this lesson from Seychelles demonstrates that successful conservation outcomes involve engagement at both the national and community levels.



Two breeding male frigate birds perched on mangrove tree on aldabra island, Seychelles © RainervonBrandis on iStock

## Case Study

# Towards a Regional Mangrove Action Plan for the Western Indian Ocean Region

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Mwita M. Mangora, Anusha Rajkaran, Rashid O. Ismail, Western Indian Ocean Mangrove Network (WIOMN)

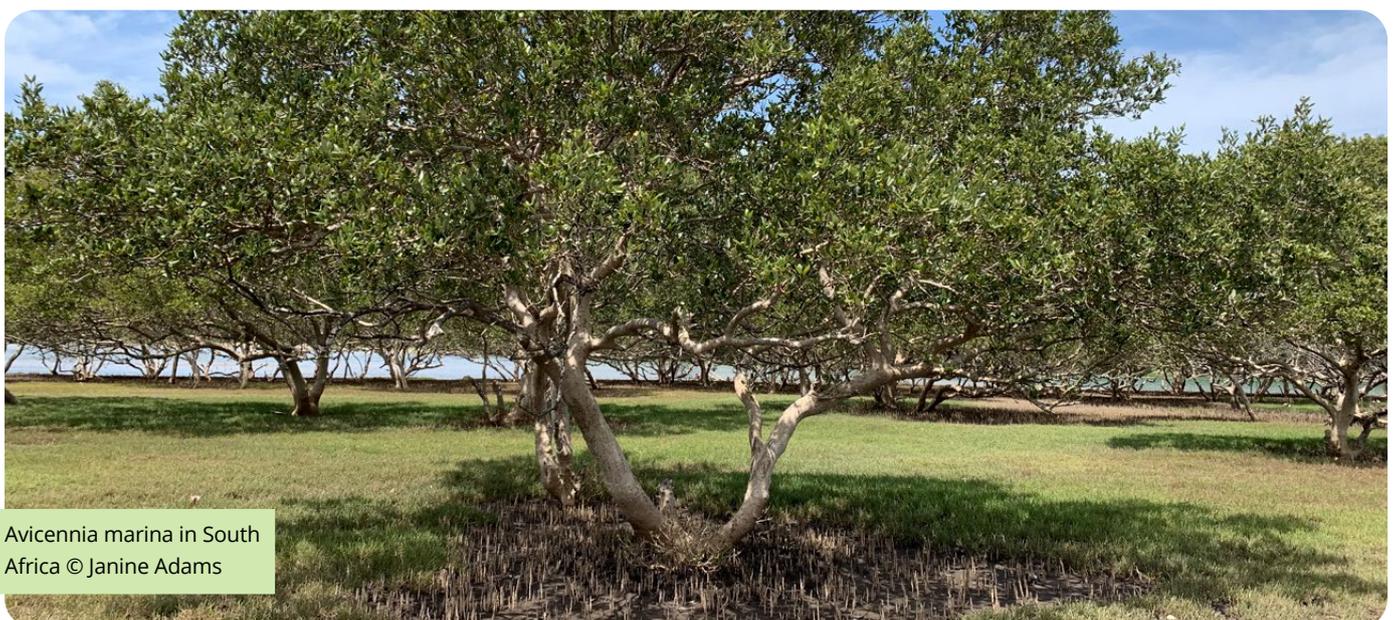
In the Western Indian Ocean region, dealing with mangroves at a regional level is essential since the countries share similar challenges at various levels (ecological, socio-economic, governance, etc.). Accordingly, countries in the region recognized that developing a regional mangrove agenda and support needs is a responsibility that all levels of governance within the WIO region should take on, while at the same time it is vital for a better recognition of the WIO region at global policy and donors' level. Hence, dialogues and efforts to cooperate aim at designing common policy and legislative frameworks, to manage and govern mangrove resources in a coordinated and effective manner.



School children planting mangroves in Seychelles © Elvina Henriette

Member states of the Nairobi Convention adopted a decision at the 10th Conference of Parties (COP10) in 2021, Decision CP.10/12/2(d) to develop a WIO Regional Mangrove Vision (RMV) and Regional Mangrove Action Plan (RMAP). Options for RMV were drafted through a Save Our Mangroves Now initiative, whereas WIOMN established a Regional Policy Advisory Group (RPAG) as a policy arm to oversee the process for the development of RMAP, first by verifying the RMV statement as “A healthy and resilient mangrove ecosystem in the WIO region by 2050 for the benefit of people and nature”. Then, seven strategic objectives for the RMAP were drafted to include: (i) promoting the translation of science into policy and ensuring the implementation of national and international legislation for the protection, rehabilitation, expansion, sustainable use and management of mangroves in the WIO region; (ii) identifying and sustainably managing natural, human, and climatic induced impacts on mangrove ecosystem within the WIO region in a way that actively involves the local community, raises awareness around these impacts; (iii) ensuring sound restoration/rehabilitation of degraded mangroves ecosystems to improve climate change resilience, community livelihoods and ecosystem services; (iv) establishing standardised and innovative monitoring and reporting of mangrove ecosystems and reporting; (v) identifying the needs and roles of stakeholders/actors in implementing sound management strategies; (vi) enhancing the capacity and capability of local communities to improve and establish alternative livelihood activities to promote good mangrove health; and (vii) effective communication, reporting and sharing of best practice across the region. The RMAP is scheduled to be completed, endorsed, and adopted by members states in the course of the year 2024. The RMAP will form a framework for regional policy dialogues (RPDs) around mangroves in order to enhance mangrove-related policies and sustainable management in the WIO.

The RMAP evolved from member states of the Nairobi Convention, recognizing the need for a common regional framework to guide the development, reforms, and implementation of national and local measures for the protection, management and conservation of mangrove ecosystems through active and effective community engagement for the benefit of people and nature.



Avicennia marina in South Africa © Janine Adams

## Further reading

The **Global Mangrove Alliance** is a worldwide collaboration between NGOs, governments, academics and communities working together towards a global vision for scaling up the recovery of mangroves through equitable and effective expansion of mangrove protection and restoration, in order to build a host of opportunities for coastal peoples and biodiversity around the planet.

For more information on the legal and governance approaches and enabling conditions relating to mangroves:

<https://www.mangrovealliance.org/wp-content/uploads/2019/11/Tangled-Roots-and-Changing-Tides.paf>

## Webinars on Policies for Mangroves | The Global Mangrove Alliance (November 2023)

Session 1: Indonesia, Costa Rica, Belize and Seychelles

[https://youtu.be/uzitj8TYqzM?si=\\_2baL7\\_VROzsfsmT](https://youtu.be/uzitj8TYqzM?si=_2baL7_VROzsfsmT)

Session 2: Mexico, Panama, Ecuador and W. Indian Ocean | The Global Mangrove Alliance

[https://youtu.be/mal\\_roECGVE?si=47YiV0McvY2\\_YYCU](https://youtu.be/mal_roECGVE?si=47YiV0McvY2_YYCU)



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