EXECUTIVE SUMMARY

136,000 km²
of mangroves world-wide in 2016

Raja Ampat, Papua, Indonesia
Photo by Ethan Daniels

Mangrove forests are critical ecosystems, both for biodiversity and for humanity.

Vast areas have been lost, but things are changing. As we begin to realize their full value—as carbon stores, fish factories, coastal defenses and more—ever-greater efforts are being made to protect what remains, and to start programs of restoration.

The State of the World's Mangroves provides the very latest information on what we know about mangroves and what's being done to support these magnificent habitats.

In 2018 Conservation International (CI), the International Union for Conservation of Nature (IUCN), The Nature Conservancy (TNC), Wetlands International, and World Wildlife Fund (WWF) formed the Global Mangrove Alliance (GMA).

This partnership now includes over 25 member organizations who share the aim of scaling up the recovery of mangroves through equitable and effective expansion of both mangrove protection and the restoration of former mangrove areas. From a practical perspective, the GMA works world-wide in supporting research, advocacy, education and practical projects on the ground—typically with local and community partners.

THE STATE OF MANGROVES

The global maps developed by the Global Mangrove Watch (GMW) team, who have been working in close collaboration with GMA since 2019, provide valuable insights into the extent of mangroves. The maps show **136,000 km² of mangroves world-wide in 2016**. Southeast Asia houses almost a third of all mangroves, with Indonesia alone being home to almost 20%.

The high-resolution GMW maps also track change over time. They show a net loss of some 4.3% of mangroves in the 20 years preceding 2016. However they also show that average **rates of mangrove loss are slowing world-wide**. Alongside losses, the maps also show a growing number of locations where mangroves are expanding, colonizing new sediments or inland areas, including as a result of rising sea levels.

Given their comprehensive detail and temporal coverage, **GMW maps have been selected as the official mangrove dataset by UN Environment** for reporting on the Sustainable Development Goals (SDG 6.6.1). Countries that do not have their own national mangrove monitoring systems are encouraged to use these maps.

The GMW maps are also able to pinpoint changes at high spatial resolution. And a new feature of the platform**—Change Alerts—can track variations in mangrove cover in near real time**, enabling those on the ground to respond to emerging threats quickly.

The causes of change are many, but **direct human impacts are responsible for over 60% of mangrove loss**. Primary causes include conversion to farmland, aquaculture and urbanization. Natural or indirect human causes make up the remainder, including erosion, sea level rise, and storms, many of which are being exacerbated by climate change.

Efforts to protect mangroves have risen globally and, currently, **around 42% of all remaining mangroves exist in designated protected areas**. While this represents good progress, these are varied in distribution and, within these areas, degradation and loss still occurs due to natural causes, but also failures of implementation or management.

Alongside protection, there is an imperative need for restoration. Mangrove restoration science is well advanced, yet **many restoration efforts that were not backed by science have failed**.

In reality, the requirements for successful restoration are well understood, and there are growing efforts to share this understanding, including by GMA partners. A recent pilot model estimated that **over 6,600 km² of mangrove area lost since 1996 is highly restorable**. Separately, efforts are underway to build a Mangrove Restoration Tracker Tool as a means to share information on existing restoration projects, thereby helping to support effective restoration world-wide.

THE BEST OF BOTH WORLDS

Mangrove forests are formed by a variety of trees and shrubs that have numerous adaptations to live in the challenging—part marine, part terrestrial—environment of the intertidal zone. They are **home to a rich fauna, including 341 internationally threatened species**, ranging from tigers to seahorses.

The structure and productivity of mangroves enables them to support rich fisheries. New research has estimated that, **in many countries, over 80% of small-scale fishers rely on mangroves, and there are over 4.1 million mangrove fishers globally**—each supporting a network or community of dependencies. Large-scale offshore fishing operations, notably for prawns, also have an often-overlooked dependency on mangroves for breeding or as nursery areas.

Since they are located where sea meets land, mangroves can reduce flooding and act as natural defenses from waves and wind. They also act as permeable dams, dampening storm surges and reducing damage. It has been estimated that **mangroves prevent more than $65 billion in property damages and reduce flood risk to some 15 million people every year**.

In the face of accelerating climate change, mangroves are particularly important contributors to ecosystem-based adaptation, with a robust capacity to support lives and livelihoods, even in the changing settings predicted by many future climate models.

A critical feature of mangrove forests is their ability to **convert carbon dioxide to organic carbon at higher rates than almost any other habitat on Earth**. This 'blue carbon' is stored both in the living plants and in their thick peaty soils where it can remain, fixed, for centuries.

Currently the world's mangroves store carbon equivalent to over 21 gigatons of CO_2. Destruction of mangrove ecosystems releases this carbon back into the atmosphere, exacerbating climate change.

The GMA advocates for the inclusion of mangroves into climate adaptation and mitigation plans. Using GMW maps, pilot work has shown **that the full return of 'highly restorable' areas could restore or stabilize carbon equivalent to over 1.3 gigatons of $C0_2$ into the atmosphere**—equivalent to over three years of emissions for a country such as Australia, or the avoided burning of 3 billion barrels of oil. The halting of ongoing losses will similarly produce massive benefits in terms of emissions avoided.

Taken together, **the many values of mangroves make a compelling case that needs to be communicated, absorbed and acted upon**—from government planning to investors and insurers, through to NGOs and local communities whose lives may depend on mangroves.

LIVING WITH MANGROVES

The front line of mangrove protection, management and sustainable use involves people—communities, indigenous groups, traditional users and local governments. Around the world, **there are countless examples of collaborations that have helped coastal communities and mangroves to thrive together**.

While people have lived alongside mangroves for centuries, growing pressures and changing times have created the need to develop frameworks to ensure sustainability. Our stories from Central America and West Africa describe **new management and governance systems that are helping secure traditional livelihoods and build new ones**, such as oyster-farming and beekeeping.

The importance of **working at the community level is critical**. Communities' knowledge of mangroves is considerable, their dependence on them is great, and so their potential roles in safeguarding and stewarding 'their' mangroves are hugely important. Over-use and degradation can be common problems, but **valuable participatory approaches are supporting new and effective efforts to engage and empower communities**. Stories from Madagascar, Micronesia, Indonesia and Central America all tell of how communities are being enabled to manage their mangroves, share knowledge and engage in monitoring.

Within that process of working with communities, it is also critical to ensure equity—strengthening the rights of the poor and marginalized, and particularly engaging women and young people. Our stories from Vietnam, Papua New Guinea and Honduras are among many that show how engagement of those three groups can secure a better future, both for mangroves and for local communities.

The local value of mangroves is often well understood by communities; however their global significance is widely overlooked. Stories show that **efforts to raise awareness of the full and varied value of mangroves may be critical in building a long-term sustainable future**—as illustrated here by programs from the Philippines to Bangladesh, and from the Bahamas to China and Senegal.

THE WAY AHEAD

Collaborative efforts will be essential to increase effective and equitable protection of mangroves, as well as to expand restoration.

The GMA is committed to its focus on halting any ongoing mangrove loss, advancing science-based restoration and increasing public awareness.

The great improvements in mangrove information and understanding are making it possible to write **transformative policies, which are often a prerequisite to effective management and investment**.

Multiple international agreements support and shape policy development at the national level. Practical applications of policy, by contrast, need to be tailored to local contexts and community needs.

Building on the remarkable advances in both science and practice we have now seen the launch of **the Global Mangrove Watch (GMW) web platform**. This has enabled the viewing and interrogation of very large volumes of data—including the GMW habitat and change maps, and a growing range of maps on mangrove values for carbon, fisheries and more. In the future, users will be able to model restoration potential, and run their own queries to generate detailed, policy-relevant outputs.

Efforts to protect and restore mangroves, engage communities and support research and monitoring depend on both public and philanthropic grants, but these are not always effective, or sufficient. More funds are clearly needed.

New financial mechanisms—like carbon markets, blue bonds, and insurance-based investments—represent a growing opportunity for mangrove protection and restoration. 'Blended' finance models which combine private capital with philanthropic or government grants are also being developed, and can be used to 'de-risk' investments in the short-term.

A CALL TO ACTION

There is an urgent need to protect all remaining mangroves, to enhance recovery and restore lost forests. Such actions will support coastal communities, jobs and food security, alongside providing global climate mitigation benefits.

Governments need to build mangrove management into policy, planning and law, allowing for local use, and halting harmful subsidies.

The **international community** needs to promote the adoption and scaling up of nature-based solutions that highlight mangroves. The **private sector** needs to recognize mangroves as assets and to increase investment in protection and restoration. **NGOs and advocacy groups** need to both raise awareness and catalyze funding and protection, while the **academic and research community** must prioritize supporting such efforts with data, models and tools.

For the GMA in particular, achieving our goals will require support, driven by increased public engagement, and clear policy frameworks driving equitable outcomes. It will also need considerable resources, including public, philanthropic and private investments.

The public, world-wide, must advocate for mangroves, generating interest, sharing stories of their immense value, and demanding their safeguarding. We need to leverage the momentum the mangrove community has created, and keep in mind what this work means to the world.

THERE IS AN URGENT NEED TO PROTECT ALL REMAINING MANGROVES, TO ENHANCE RECOVERY AND RESTORE LOST FORESTS

Woman sorting dried fish on Mousuni Island, Sundarbans, India
Photo by WWF / Simon Rawles