

# ROOTS OF HOPE

The socioeconomic value of mangroves in the Western Indian Ocean region

#rootsofhope



An initiative by:



Federal Ministry  
for Economic Cooperation  
and Development



Wetlands  
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# ROOTS OF HOPE: MANGROVES MATTER TO EACH AND EVERY ONE OF US

Mangrove forests arise in the intertidal zone between land and sea. These miraculous trees form abundant ecosystems out of challenging conditions, with roots held in soils that are waterlogged and oxygen-poor, ever-changing between dry and submerged. Yet here they not only survive, they thrive.

## CARBON CAPTURE

Concentrated in the tropics and sub-tropics (but found from Bermuda to Australia), with 14% of the world total in the Western Indian Ocean region, mangroves are vital to climate crisis mitigation. They convert CO<sub>2</sub> to organic carbon at higher rates than almost any other habitat on earth, storing it for centuries in both the living plants and the thick peaty soils in which they grow.

## PROTECT AND PROVIDE

Coastal peoples are hugely susceptible to the increasing impacts of the climate crisis, but mangroves provide a substantial natural defence. They stabilize coastlines by holding sediments to prevent erosion and act as safety nets and permeable dams against storms and surges – attenuating waves and holding the land together. And they are a supply of food and livelihoods through the vast habitats in which they shelter fish, crustaceans, shellfish and wildlife.

## RICH RESOURCES

Mangroves uplift the ecological and socio-economic wellbeing of global coastal communities – which will only become more important as the climate crisis accelerates. They provide food in abundance – such as mud-crabs, oysters, shrimp and banana prawns – polewood for fish traps, rot-resistant timber for homes, fuel for cooking and high-grade charcoal, and offer health benefits by purifying the waters that flow through their roots.<sup>4</sup>

## UNDER THREAT

But these precious trees are in danger. More than a third (35%) of all mangrove forests disappeared in the last half century.<sup>5</sup> According to the mapping data of the Global Mangrove Watch, the estimated worldwide mangrove decline between 2006 and 2016 was a net loss of 6,075km<sup>2</sup>. As a result, the total global mangrove area left was 135,882km<sup>2</sup> – about the same size as Greece, or the state of Louisiana in the U.S. Direct human impact is responsible for over 60% of this decline.

### CLIMATE



Mangroves store  
**3 to 5x**  
more carbon per area than  
tropical upland forests.<sup>1</sup>

### COASTAL PROTECTION



Mangroves prevent  
**>\$65bn**  
in property damages and  
reduce flood risk to some  
15m people every year.<sup>2</sup>

### CONTRIBUTION TO COASTAL COMMUNITIES



Over  
**120m** people depend on  
mangroves for their  
livelihood.<sup>3</sup>  
In the Western Indian Ocean, mangroves  
have the potential to contribute \$10.1bn  
each year to local economies.

<sup>1</sup> Donato DC, Kauffman JB, Murdiyoso D, Kurnianto S, Stidham M, Kanninen M. Mangroves among the most carbon-rich forests in the tropics. *Nature Geoscience*. 2011;4(5):293-7.

<sup>2</sup> Spalding, Mark D and Leal, Maricé (editors), 2021 *The State of the World's Mangroves 2021*. Global Mangrove Alliance.

<sup>3</sup> (UNEP)

<sup>4</sup> Costanza, Robert and Folke, Carl. 'Valuing Ecosystem Services With Efficiency, Fairness and Sustainability as Goals' in *Nature's Services: Societal Dependence On Natural Ecosystems* (Island Press, 1997).

<sup>5</sup> Polidoro, B. A., et al. *The Loss of Species: Mangrove Extinction Risk and Geographic Areas of Global Concern*. 2010 [as footnote 4]

# SAVE OUR MANGROVES NOW! FOR PLANET AND PEOPLE

Bringing together governments, conservation specialists and coastal communities, Save Our Mangroves Now! (SOMN) aims to reverse the decline of mangroves to restore biodiversity, protect livelihoods and mitigate against the impacts of the climate crisis. It is a joint initiative by the German Federal Ministry for Economic Cooperation and Development (BMZ), World Wildlife Fund (WWF), the International Union for Conservation of Nature (IUCN) and Wetlands International.

SOMN envisions a world with thriving mangrove habitats that work in harmony with local communities. Its mission is to mobilize action by facilitating policymaking, programmes and investments that regenerate mangrove ecosystems, tackle climate change and provide livelihoods, with an ambition to ensure that mangrove ecosystems are conserved, restored and sustainably used to the benefit of people locally, and nature globally.



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“ Initiatives like Roots of Hope are central work for us, for climate change, but also in the redressing of our relationship with nature to one of respect and balance, where it should be. There’s nothing more than coral reefs or mangroves to symbolize the importance of redressing that. ”



**Ambassador Peter Thomson,**  
**United Nations Secretary-General's Special Envoy for the Ocean**  
Speaking at the IUCN World Conservation Congress,  
September 2021

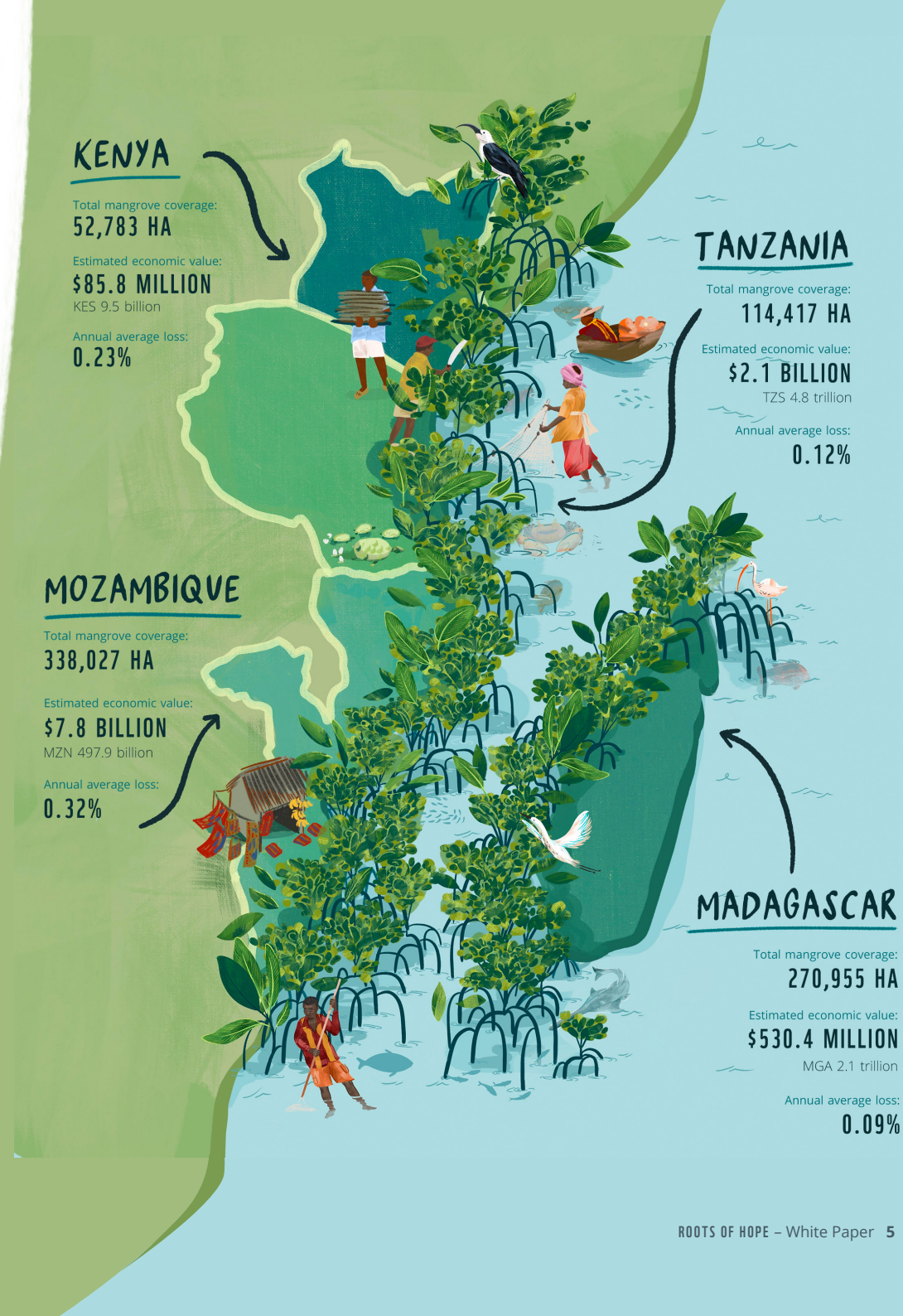
# MANGROVES IN THE WESTERN INDIAN OCEAN REGION: THE GILLS OF OUR PLANET'S OCEANS

In 2016, there were more than 11 million hectares of mangroves worldwide, collectively storing the carbon equivalent of 21 gigatons of CO2. About 14% of these tidal forests are in the Western Indian Ocean region, including the four countries spotlighted in this report: Kenya, Madagascar, Mozambique and Tanzania.<sup>6</sup>

## WESTERN INDIAN OCEAN MANGROVES

For the communities of the Western Indian Ocean region, mangrove forests are essential ecosystems bound up with livelihoods, not only preserving coastal homes and mitigating the effects of climate change, but generating wealth through natural resources such as timber, fuelwood, fish, honey and traditional medicines. Mangroves have unquantifiable benefits too, as spiritual sites and scenic and therapeutic destinations. Here, SOMN explores the specific benefits of mangroves to four key countries, the localized threats to their forests, and critical conservation and restoration plans and challenges.

<sup>6</sup> Spalding, Mark D et al. *The State of the World's Mangroves 2021*. [as footnote 2]



# WHY MANGROVES MATTER TO KENYA

## 52,783ha

total mangrove area,  
over 18 forest formations,  
2020

## \$85.8m

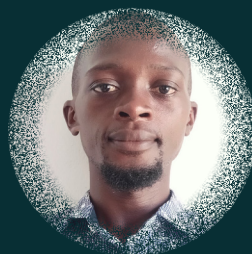
about 9.5 billion KES,  
annual economic value,  
2020

“ Some mangrove forests are used by the local communities as sacred sites, and some are used for their ecotourism potential. Both are important, and all must be protected and conserved. ”



**Titus Wamae**  
Wetlands International  
East Africa, Kenya

“ Mangroves and coastal communities in Kenya are inseparable and their conservation is a priority. Community conservation initiatives are now moving towards carbon trading schemes, deriving socioeconomic benefits, and enhancing climate resilience. ”



**Francis Okalo**  
IUCN, Kenya

## ESSENTIAL ECOSYSTEMS

Mangroves are fundamental to the Kenyan economy, generating revenue from fishing, fuel, ecotourism and honey. In the Vanga area, mangroves were found to be nearly five times more economically beneficial than rice farming, with an annual economic net benefit per hectare of \$1,615.<sup>7</sup> The national average is \$1,792. Communities described mangroves' value to SOMN as lying in wood extraction, shoreline protection, ecotourism, carbon sequestration, habitat provision, fish catch, non-use value, medicinal use, and biodiversity conservation.

## THREATS

But Kenya's mangroves are under increasing threat from both natural and manmade causes, with the country losing about 20% of its mangroves between 1985 and 2009.<sup>8</sup> Destruction is disproportionately higher in areas of urbanization. Major threats include a reduction in species diversity, overexploitation of timber and polewood, and the overreliance on mangroves for fuel because of a lack of affordable alternatives. But the harvest of mangrove poles has been traced back to at least 200 BC, and it is not the sole driver of deforestation: pollution from land-based sources, and conversion of mangrove areas to other land uses such as salt mining or settlements, are both contributing to the decline.

## CONSERVATION AND RESTORATION

Most local community members who spoke to SOMN for this report believe mangrove ecosystems to be an important part of their livelihood and many wish to play a role in mangrove conservation. But there are challenges to making such conservation viable: realising mangroves' potential as a natural asset relies on measuring the economic benefits they offer. There are four avenues to conservation programmes: asset protection, where mangroves are identified as cheapest restoration option; carbon trading (increasingly popular in coastal communities); community development that focuses investment on income-generating activities that enhance conservation efforts (rather than sustainable use schemes); and regulatory obligations. All should be explored.

<sup>7</sup> Converted from 179,500 KES, Kenyan shillings.

<sup>8</sup> GoK (2017), National Mangrove Ecosystem Management Plan. Kenya Forest Service, Nairobi, Kenya



# WHY MANGROVES MATTER TO MADAGASCAR

270,955ha

total mangrove area,  
2020

\$530.4m

about 2.1 trillion MGA,  
annual economic value, 2020

2%

of the world's mangroves,  
Africa's fourth largest amount<sup>9</sup>

“ Mangroves are critical in so many ways – to livelihoods, habitats and in capturing carbon. The environment minister has called for the development of a national strategy. ”

Maafaka Ravelona  
WWF, Madagascar

## ESSENTIAL ECOSYSTEMS

Mangroves bring a plethora of benefits to Madagascan communities, from food to resources, biodiversity to culture. There is also huge economic potential in their role as carbon regulators. By sequestering CO<sub>2</sub> from the atmosphere and storing it for centuries, mangroves provide an estimated annual \$45 million. They are abundant, generating honey and silk, and income from crab and shrimp farming (together worth an annual \$40 million). While wood harvest delivers no net fiscal benefit when weighed against the impact of destruction, it is currently one of the most important income sources for local communities. The country is predicted to lose 25% of its mangroves to deforestation by 2030.

## THREATS

The biggest threat to Madagascan mangroves is deforestation for fuel. Further threats include logging for agriculture, extensive – rather than local and artisan – shrimp farming and crab fishing, ecotourism infrastructure, human settlements, migration and population growth, and salt production. The climate crisis, the impacts of which mangroves can mitigate against, is also threatening the forests through sea level rises and increases in the frequency and severity of cyclones.

## CONSERVATION AND RESTORATION

To maintain the economic value of mangroves, from 2023 onwards Madagascar must restore 15,000 hectares per year – with a third of this area used for sustainable exploitation, and the rest for conservation. This goal requires regulatory reform – around logging, local management of renewable natural resources, and corporate social responsibility – to be achieved by emphasizing the myriad of socioeconomic benefits mangroves bring, while conservation efforts can be boosted by generating funds via license fees from fishing and forestry.



<sup>9</sup> Jones, Trevor G, et al, *Madagascar's Mangroves: Quantifying Nation-Wide and Ecosystem Specific Dynamics, and Detailed Contemporary Mapping of Distinct Ecosystems. Remote Sensing* (2016)

# WHY MANGROVES MATTER TO MOZAMBIQUE

## 338,027ha

total mangrove area, 2020

## \$7.8bn

about 497.9 billion MZN, annual economic value, 2020

## 98%

of Mozambique mangroves' value is from indirect values such as water purification, biodiversity, erosion control and habitat

One of the **top 15** countries in the world for mangrove coverage –  
**13th** globally  
**2nd** in Africa  
**1st** in the Western Indian Ocean region <sup>10</sup>

“ Mangroves are a priority green infrastructure. One of the first impacts of their destruction on people's daily lives is a lack of fisheries, the second is coastal erosion. It is crucial to understand their role in protecting nature and people. ”



Isabel Ramos  
IUCN, Mozambique

## ESSENTIAL ECOSYSTEMS

Though commercial exploitation of mangrove wood is illegal, mangrove forests supply Mozambicans in abundance with timber, firewood, poles, bivalves (such as clams, mussels, scallops and oysters), crabs, honey and leaves for domestic consumption and trade. Local communities identified to SOMN that their three most important mangrove derivatives are fish, traditional medicine, and firewood. Mangroves boost local economies, with charcoal worth an annual \$44 million to the Zambezi Delta and \$6,000 to the Limpopo Estuary, and polewood an annual \$38.3 million to the Zambezi Delta and \$738,100 to the Limpopo Estuary.<sup>11</sup>



## THREATS

Together, the four countries in this report have more than 700,000 hectares of mangroves, with a combined loss of 30,000 hectares over the past 20 years – but it is Mozambique where this destruction is at its worst. More than 6% of Mozambique's mangrove cover has been lost, primarily due to extraction of wood resources and deforestation to create land for saltpans and urban settlement. Solar salt production is also threatening the mangroves, as it involves clearing and selective logging, altering microhabitats and microclimates.

## CONSERVATION AND RESTORATION

An overwhelming majority of community members who spoke to SOMN for this report felt responsible for mangrove conservation and agreed to contribute to conservation plans. But they also identified challenges to protecting Mozambique's mangroves, such as poor collaboration between government departments and their communities, weak enforcement and low compliance with mangrove regulations, poor awareness about the need to ration resources, and the lack of viable economic alternatives to create livelihoods for the coastal families dependent on the forests.

<sup>10</sup> Temilola E. Fatoyinbo & Marc Simard (2013) Height and biomass of mangroves in Africa from ICES at/GLAS and SRTM, *International Journal of Remote Sensing*, 34:2, 668-681, DOI:10.1080/01431161.2012.712224

<sup>11</sup> Hogue et al. (2017)



# WHY MANGROVES MATTER TO TANZANIA

114,417ha

total mangrove area,  
2020

\$2.1bn

about 4.8 trillion TZS,  
annual economic value, 2020

Degradation and loss continue despite mangroves' protected designation as state forestry reserves

“ Awareness and knowledge of the role of mangroves in Tanzania have sky-rocketed, both at public and institutional level, community and national levels. In a quest for advancing blue economy initiatives in Tanzania, the Division of Environment at the Vice President's Office called for the translation of mangrove economic potential into livelihood improvement, especially of the local communities around them. ”



January Ndagala  
WWF, Tanzania

## ESSENTIAL ECOSYSTEMS

Mangroves ribbon their way along almost all of Tanzania's coastline, with a quarter of the population living within 100km of the forests. While most rural coastal dwellers rely on mangroves for their livelihood, it's impossible to calculate a precise monetary figure or investigate supply chains, as illegal forestry practices keep the true scope of wood extraction activities around the country's mangroves cloaked in secrecy. SOMN estimates that mangrove timber benefits the economy \$21 million annually, and mangrove poles \$6.4 million annually. Prawns – which are dependent on mangroves for nursery grounds – net \$3.8 million.

## THREATS

Widespread poverty exacerbated by population growth has created an overreliance on mangroves, with deforestation driven by uncontrolled and poorly regulated wood harvest, together with land conversion for agriculture, aquaculture and salt pans. Multiple sectors, including wildlife and tourism, agriculture and fishing, play a role in the decline, but none take responsibility or the lead in collaborative conservation efforts. Participatory forest management strategies have failed to get off the ground, and donor-led restoration initiatives have only succeeded in the short term – until funds dry up.

## CONSERVATION AND RESTORATION

Mangroves have a complicated root structure, bound to both land and sea, and the solutions to sustainable management can be equally complex and cross-cultural. Sustainable management of mangroves requires solutions that straddle boundaries. There must be a dedicated mangrove policy and a new legal basis for community co-management arrangements, together with state and non-state interagency and cross-sector coordination across local and national government. Conservation and restoration should be supported by the private sector, but awareness-raising must happen in all sectors. But above all, mangrove-dependent communities must be helped to find alternative livelihoods – so that they and future generations can continue to benefit from mangroves' abundance.



# ROOTS OF ACTION: PRINCIPLES TO GUIDE MANGROVE ACTIONS FOR THE FUTURE OF PEOPLE AND PLANET

To conserve these special forests for future generations, the global mangrove community has developed a set of golden rules for sustainable mangrove ecosystem management. These Mangrove Principles, rooted in global conservation efforts, offer guidance for national policy decision makers.



## PROMOTE GOOD GOVERNANCE

### Policy and legal frameworks

1. Adopt national policies that prioritize the preservation of mangroves, through coordinating action, influencing legislation, and providing incentives to stakeholders across sectors.
2. Recognize that mangrove ecosystems transcend political, municipal and state boundaries. Effective coordination and cooperation is essential across sectors and at all levels to protect against threats to mangrove ecosystems and communities.
3. Put mangrove conservation and restoration at the top of national agendas, and ensure mangrove communities are represented at international conventions.



## ENSURE AN ENGAGED AND EQUITABLE SOCIETY

### People's participation and empowerment

4. Ensure that communities are at the centre of mangrove conservation, with environmental and socioeconomic goals given equal precedence, and community stewardship legally recognized wherever possible.



## USE SOUND SCIENCE AND KNOWLEDGE

### Credible knowledge base for science-based arguments and capacity-building

5. Use up-to-date scientific research to guide and increase capacity for mangrove conservation and restoration.
6. Make a science-based case for the role of mangrove conservation and restoration in economic resilience of communities.



## ACHIEVE A SOCIALLY SUSTAINABLE ECONOMY WITHIN ENVIRONMENTAL LIMITS

### Sustainable use of natural resources

7. Optimize efficiency in the management of mangrove ecosystems by taking a local approach to conservation and restoration.
8. Ensure that communities and their future generations benefit from the ecosystem services provided by mangroves, by securing commitment of sustainable use to prevent ecosystem exploitation.



## IMPLEMENT SUSTAINABLE CONSERVATION FINANCING

### Innovative approaches and benefit-sharing

9. Engage communities in the conservation and restoration of mangrove ecosystems through the provision of financial support, including but not limited to the implementation of incentives and benefits in return for responsible management.

Save Our Mangroves Now! is creating a global community of support for mangroves. **Contact us now** to join the movement and become a signatory to the Mangrove Principles.

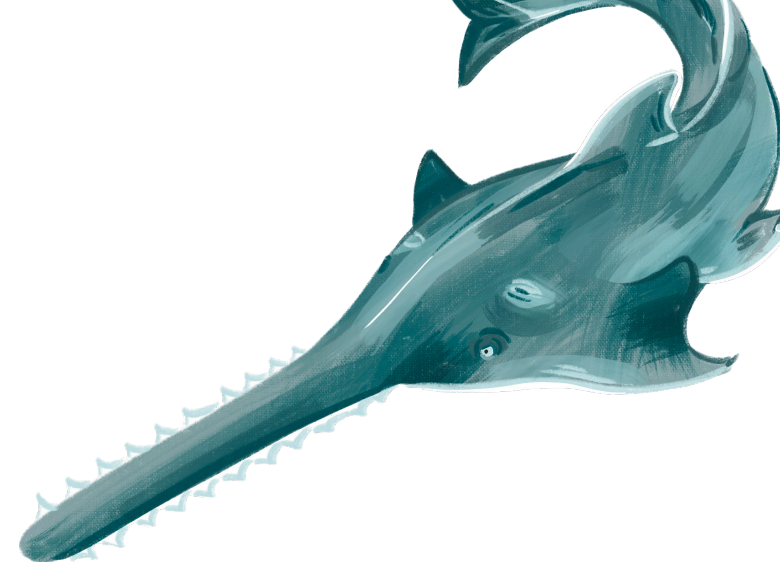
# GREAT BLUE WALL: EMBRACING A WAVE OF ACTION TO CONSERVE MANGROVES AND OTHER COASTAL AND MARINE ECOSYSTEMS

The marine and coastal community has long advocated for bold and ambitious action to conserve the ocean that supports mangroves and other marine and coastal ecosystems, with the Western Indian Ocean region key to this goal.

In September 2021, the International Union for Conservation of Nature (IUCN) organized the World Conservation Congress in France. Members and partners committed to deliver concrete and substantive contributions to the post-pandemic recovery and the biodiversity-climate crisis. The **Marseille Manifesto** outlines a joint commitment made by Western Indian Ocean states, IUCN and partners to support the establishment and implementation of the Great Blue Wall initiative.

## THE GREAT BLUE WALL

The Great Blue Wall movement is the first-of-its-kind regionally connected and internationally growing network of nature and people-positive seascapes. Coordinated by IUCN, the initiative champions an Africa-led roadmap to conserve and restore marine and coastal biodiversity while unlocking the development of a regenerative blue economy that will benefit at least 70 million people. These seascapes will be connected by a living blue “wall” composed of healthy and restored critical blue ecosystems that are the vital organs of the ocean and that will act as a crucial regional ecological corridor.



The goal of this initiative is to dramatically accelerate and upscale action on oceans. It is an action-oriented, action-driven and action-focused initiative that is deliberately designed to scale up and support all the important work already taking place.

## JOIN THE MOVEMENT

We are counting on your support to make this initiative a reality. Together we are stronger, and we can support nature and 70 million people in the Western Indian Ocean region.

Contact Thomas Sberna if you would like to join the Great Blue Wall movement:  
[thomas.sberna@iucn.org](mailto:thomas.sberna@iucn.org)

“ The Great Blue Wall comes at a critical time for the blue planet, when both people and nature need hope and action. We want to galvanize action against biodiversity loss, climate change, economic crisis, and hunger. This will be a “wall” that will shelter local communities against extreme weather events; a “wall” that will restore our relationship with nature once more. ”



Thomas Sberna  
IUCN Eastern and Southern Africa Regional Office

# METHODOLOGY

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All in-country studies summarized in this report followed the below methods:

1. Ecosystem services were valued based on market rates for resources, as well as through interviews and existing data.
2. Illustrative ecosystem services were selected based on the ability to value these services.
3. Literature reviews assessed the legal framework and governance surrounding mangroves.
4. Interviews were conducted with communities to obtain additional information, for example, on willingness to pay for ecosystem services.

Conclusions are based on the studies conducted in each country and are not necessarily representative of other countries, regions or locales. The economic values cited throughout this report are not exhaustive and simply based on the sum or average of the evaluated ecosystem services, listed below:

1. Kenya: food; wood extraction; medicinal use; tourism and recreation; shoreline protection; habitat provision; carbon sequestration; biodiversity conservation; non-use value.
2. Madagascar: non-wood forest products (crab, shrimp, honey, wild silk); wood; charcoal; carbon regulation; flood protection benefits (may be overestimated); maintenance of biodiversity; ecotourism.
3. Mozambique: charcoal; poles; protective function; habitat and nursery; carbon sequestration; maritime and inland transport.
4. Tanzania: Poles; timber; fuelwood; prawns; crabs; honey; coastal protection; carbon storage; biodiversity; ecotourism.



# CREDITS

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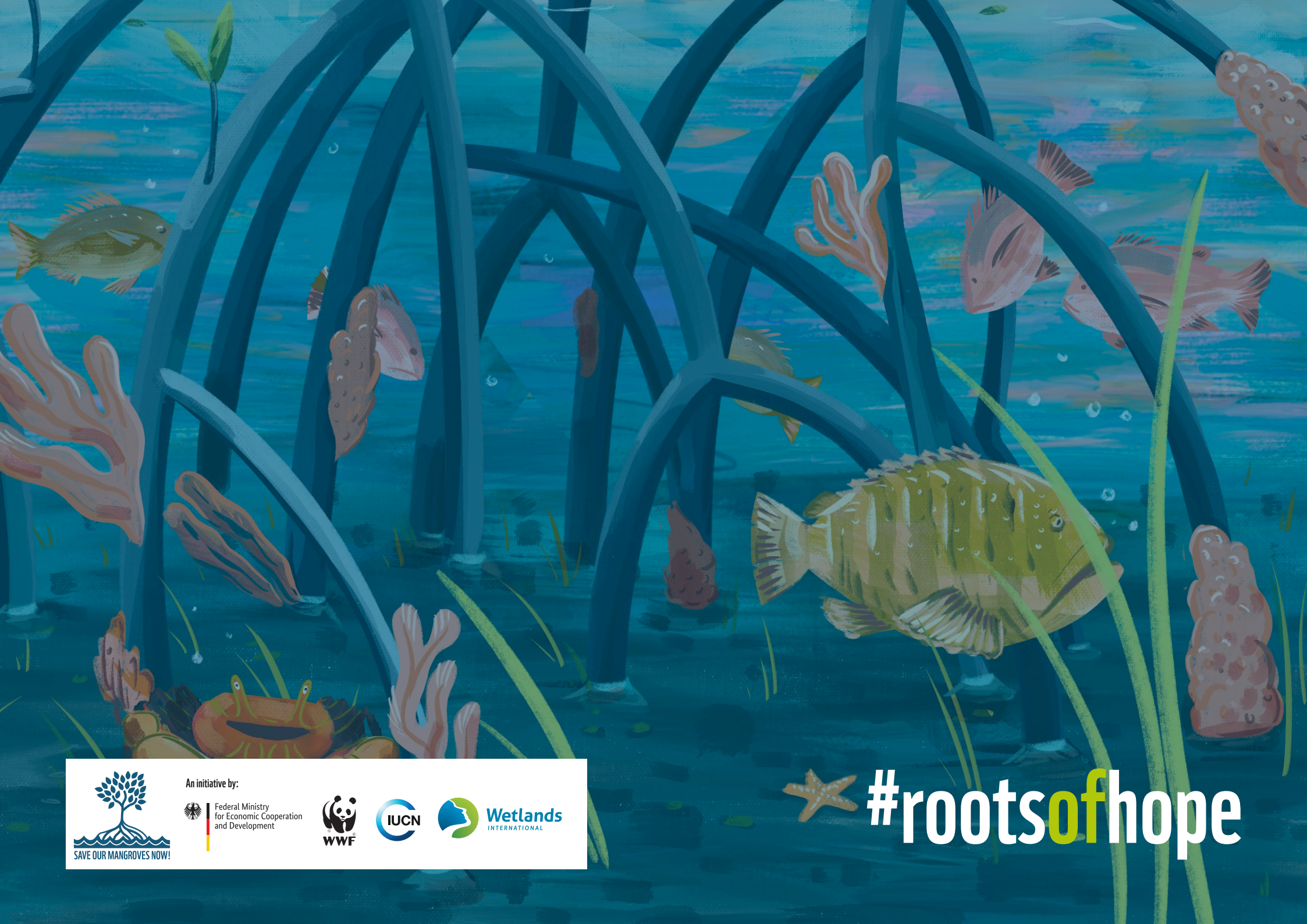
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**For further information visit:** [www.mangrovealliance.org/save-our-mangroves-now](http://www.mangrovealliance.org/save-our-mangroves-now), follow [@MangrovesNow](https://twitter.com/MangrovesNow) on Twitter and use the hashtag #rootsofhope

**Note:** \$ refers to US dollars unless otherwise specified. Local currency exchange equivalent amounts were correct at the time of publication.

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